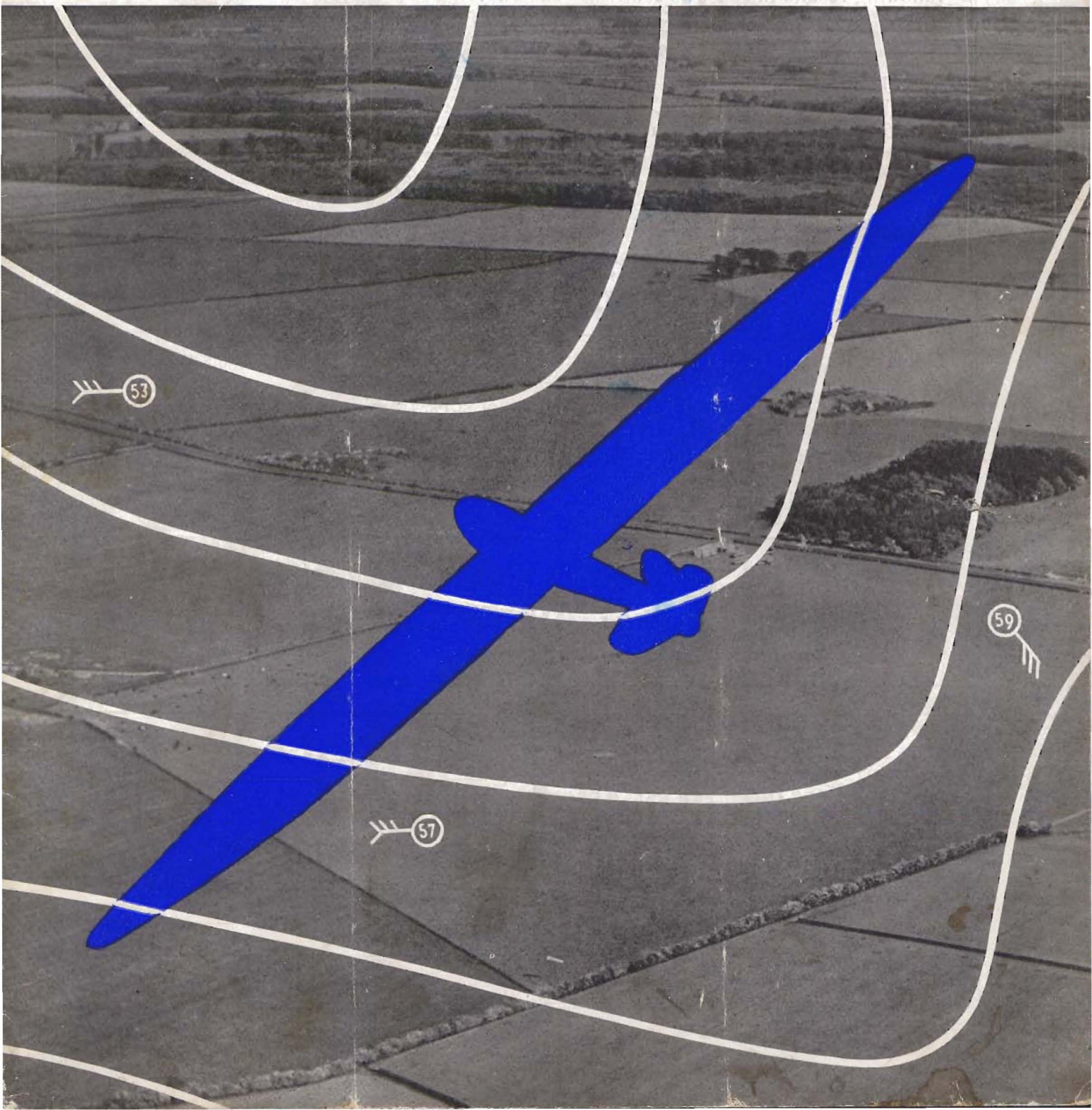
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Official Organ of the British Gliding Association

EDITED BY ALAN E. SLATER



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Meteorology

THERE are highly-placed meteorologists who are convinced that the practice of soaring flight has nothing of value to contribute to meteorological knowledge. For our part, we are convinced that scientists who are out of touch with modern progress in soaring flight have nothing of value to contribute to the question whether it can help meteorology.

Professor D. Brunt, chairman of the British Gliding Association, is one of the very few exceptions. Lecturing on May 26th to the Imperial College Gliding Club on "The Meteorology of Gliding and Soaring Flight," he expressed the opinion that, whereas in the past meteorology had contributed much to the advancement of soaring technique, the tables had now been turned, and sailplane pilots were in a position to gather data for the advancement of meteorology. He went further than this, and indicated exactly what kind of data could be gathered and how pilots could set about the task. Since no one in the meteorological profession has ever before taken this further step of getting down to details, the occasion was a notable one.

Soaring flights at present are carried out almost entirely by the use of rising air, and the lecturer dealt with the causes of rising currents under the usual three chief heads:—

1. Deflection of the wind by hills.
2. "Fronts."
3. Convection currents.

The research work which Professor Brunt particularly wishes to have done comes under No. 3, though under No. 1 there are also some questions outstanding which scientists would like to see cleared up; while in the case of No. 2, sailplane pilots are still in the position of needing help from meteorologists.

Research into Thermals

To deal first with convection currents, or "thermals," as the ascending ones have come to be called: the term is taken to include vertical currents arranged in "cells," wherein their size, distribution and strength depend on conditions within the atmosphere itself rather than on the differing properties of the various portions of ground over which it is blowing.

Such "cells" can be reproduced artificially on a small scale—we were treated after the lecture to a beautiful exhibition of a cell pattern formed in a layer of cheap gold paint poured into a shallow dish. (Note: it must be *cheap* paint, or it won't evaporate fast enough to cool the top surface and produce instability—that is, a tendency for the top and bottom layers to change places.) But it is remarkable that, whereas in liquids the up-current is usually in the middle of the cell, in a smoke-filled chamber the air is seen to be rising *between* the cells and descending at their centres.

Yet in the free atmosphere precisely the opposite holds good in almost every case, and nobody knows why. When an unstable layer of air is roofed over by a cloud sheet, the separate cloud masses, which mark the tops of up-currents, are nearly always arranged in "cells"; only rarely does one see the opposite appearance of a continuous sheet with holes "punched" in it, denoting cells of descending air, with the compensating up-currents at their edges.

Readers of THE SAILPLANE may remember that Sir Gilbert Walker could produce smoke cells of different shapes by introducing varying degrees of shear, or relative motion between the roof and floor of his air chamber, and that all the shapes so obtained were imitations of well-known cloud patterns. Professor Brunt, by varying the depth of the chamber, has found that this also can cause changes in the pattern of the artificial clouds. He exhibited slides showing examples both of the changes thus caused and of similar appearances in real cloud sheets.

But the point is this: nobody knows whether, or to what extent, vertical currents in the free atmosphere resemble those produced artificially. For instance, Professor Brunt showed a diagram of a "cell" in which the up-current only occupied one-third of the cell's diameter. This would mean, in effect, that the velocity of the up-current is four times that of the compensating down-current. Is this the case in nature? Professor Brunt wants gliding men to tell him.

What Information is Wanted

What is wanted, then, is information as to the magnitude and the horizontal and vertical extent of ascending and descending currents. For this a sailplane would need to carry an instrument, such as a lightweight recording variometer, and the pilot would have to fly straight on through a thermal current when

he found one, curbing his natural instinct to stop within it in order to gain height.

Such observations, the lecturer said, could only be made from sailplanes; they could not be collected in any other way. He hoped the time would come when we should be able to obtain observations of this sort with a certain amount of regularity. The large amount of work already done by the German gliding research organisation did not include anything of this type. It would be an original piece of research, and he hoped to draw up a scheme, with the co-operation of the B.G.A. Council, for recording the results obtained.

A question was raised as to whether a recording thermograph would be a suitable instrument to carry, but Professor Brunt considered that there would be no value in temperature records alone; moreover, nothing but a platinum wire resistance thermometer would be sensitive enough, and such an instrument would be more usefully employed on power planes.

The subject of the gust structure inside cumulus clouds was raised by Mr. Wills, who had noticed that either it is very rough as soon as you go in, or else it is smooth at first and then suddenly becomes turbulent. The lecturer suggested that the gustiness would be found at the centre of the top of the thermal current, where the ascending air began to diverge towards the periphery and the pilot would strike air patches of different horizontal velocities in quick succession.

Hill Currents

One point which, it appears, badly needs tackling is the question how high above a hill the influence of the ascending current up its windward slope extends. Three times the height of the hill above its top is the generally accepted figure, obtained from experiments with no-lift balloons. But in practice sailplane pilots have found that greater heights can be obtained over a hill in summer than in winter, evidently because, in the first case, the lift is reinforced by convection currents from the warmed ground.

The shape of the hill is also of importance. Obviously a wind blowing against an isolated hill, in distinction to a long ridge, tends to go round it as well as over it, but to what precise extent, the lecturer said, is another matter that has never been properly looked into.

In the discussion after the lecture a further point was brought out. Pilots had found that, in general, they were unable to get as high over Sutton Bank, in proportion to its size, as over Dunstable Downs, the figure being less than three times the hill height in the first case, and more than three times in the second —assuming a good soaring wind. One suggestion was that the *absolute* height of the hill was the factor concerned, Sutton Bank being the higher of the two; Professor Brunt, however, disagreed, and thought the difference was entirely due to the shape of the hill face, in that the top of Sutton Bank is an almost vertical cliff, whereas Dunstable Downs is much less steep and the brow of the hill is rounded.

Cold Fronts

Where cold and warm masses of air adjoin each other, the dividing surface is called a "front." At a "warm front" the warm air overrides the cold, whereas at a "cold front" the cold air mass wedges itself in under the warm. It is important to realise that the tip of this wedge is not on the ground, but further up—perhaps a few hundred feet; a sailplane must therefore have a certain amount of initial height if it is to reach that part of the warm air mass which is being lifted above the cold wedge. The explanation is that the lowest part of the cold air is slowed up by friction against the ground, allowing the layers above to push on ahead.

Professor Brunt himself found, when he was 300 feet up a wireless mast at Leafield, that the cold air of a "front" arrived at his level before it did so at the ground, and that the slope of the under-side of the "wedge" was 1 in 200. This overhanging of warm air by cold is, of course, an unstable condition, and in fact the tip of the wedge periodically breaks down and re-forms. Its presence is indicated by the rotating cylindrical roll-cloud which so often just precedes a cumulo-nimbus.

Can the time of arrival of a cold front be predicted? It can, and this is a matter in which meteorologists can make themselves useful to sailplane pilots wishing to carry out cross-country flights by this means. The lecturer gave an example of four successive cold fronts crossing England from west to east on the same day; from the 7 a.m. weather chart, he said, it would have been possible to time the arrival of each of the four at any given station.

Sea Breezes and Air Waves

This country, with its long coastline, is especially suited to the investigation of diurnal land and sea breezes and their influence on soaring conditions. The example of Tynemouth was given, where, on an average, winds from E. and E.S.E. form only 10 per cent. of the total from all directions at 7 a.m., but as much as 35 to 40 per cent. in the afternoon. Another example was quoted from Darwin, according to whom the South American condor is such a heavy creature that he has to come home and make his landing before the sea breeze has died out in the evening, otherwise he crashes his undercarriage.

Another unclassified up-current was referred to by Mr. Wilkes, of the Imperial College Club, during the discussion. Soaring flights have been carried out in the air waves to leeward of a mountain near the Grunau gliding school in Silesia, where a lenticular cloud known locally as the "Moazagotl" gives an indication of their presence. Information as to these flights, however, has not yet reached scientific circles, either in this country or, apparently, in Germany, where the latest edition of Professor Georgii's book contains no mention of them.

There is, in fact, a large amount of information in regard to the meteorology of soaring flight already available, which would be of great interest both to scientists and to soaring pilots. But it needs collecting, and that takes time, and therefore money. For the present, the immediate need is to establish the prestige of soaring flight, and its possibilities for research, in the scientific world. That is one reason, though not the only one, why the investigations proposed by the chairman of the British Gliding Association should be undertaken forthwith.

Model Sailplanes in Competition



Some of the 340 models assembled from all over Germany for the National Model Sailplane Competitions on the Wasserkuppe at Whitsun.

"VORSICHT!" At the familiar shout we all duck our heads as an enormous model glider whizzes past and hits the ground with a loud crack, the wing going one way and the fuselage another. When a model may weigh anything up to 17 lbs., with a lump of lead on its nose and its own speed of, perhaps, 20 miles an hour added to that of the wind, the prudent spectator allows it to pass without let or hindrance.

Three hundred and forty-six was the number of models entered for the Whitsun Competitions for model sailplanes on the Wasserkuppe. But this is not to be taken as the entire German output of models between the wing spans of 1½ and 4 metres—the limits laid down for competitors. On the contrary, these were merely the survivors of a series of eliminating contests held by the German Air Sport Association, or D.L.V.

First the *Ortsgruppen*, or local groups, hold preliminary heats to decide who shall go to the competitions of the *Landesgruppen*. These district groups, as they may be called (there are 16 of them), are each allowed to send a maximum of 25 picked modellists to the National Competitions on the Wasserkuppe.

So the number of large-size model sailplanes being built in the whole country must run into thousands.

How is it that so many schoolboys, who form the greater proportion of the competitors, learn to make such excellent models? Here again the D.L.V. steps in. This organisation tries to make it its business to see that every "air-minded youth" in Germany is kept busy making model aircraft until such time as he is old enough to fly in person.

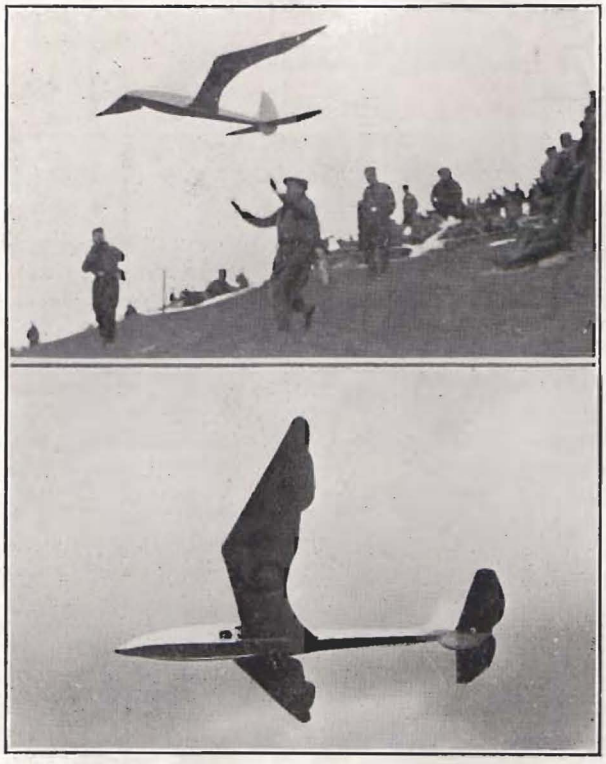
Teachers are specially provided, or specially trained; and with one such, who had come to see his pupil compete, we shared a room at the *Segelflieger* Hotel. Two hours a week, he said, were set aside during school hours for the work, but a really keen pupil would take his model home and get on with it there. Out of the 600 boys at his school, 40 took the model-making course.

Air-mindedness in youth is presumed to begin at 11 years of age, so this leaves five years to be filled in —four years at school and one at classes run by the D.L.V., which, however, also provides instruction for those who can't get it at school.

It is not easy to get the average boy to stick to one hobby for five years, but the D.L.V. has worked out a most ingenious scheme which was explained in a booklet on sale at the Wasserkuppe last year, but now, apparently, out of print. This is the schedule:—

The eleven-year-old boy makes simple paper gliders, and parachutes of tissue-paper and cotton; he also flies kites.

The twelve-year-old starts by assembling the prepared parts of a plywood model, and goes on to one



Four metres was the maximum span allowed at the German model sailplane competitions. When this one is flying, you need to keep an eye on its whereabouts.

whose wooden members have to be bent by steaming, then covered and doped. These models can be launched from a hill into a soaring wind.

At 13 years he builds a "Baby," which has a fuselage built up of longerons and cross-frames. He also has his first introduction to power-driven models, for which the D.L.V. provides prepared parts.

A high-performance soaring model of standard design, with a span of 5ft. 7in. and very good directional stability, is made by the boy of 14, taking 80 to 100 hours over its construction. The designer is Horst Winkler, and it is called "Der Grosse Winkler," to distinguish it from the standard plywood "Winkler Junior" which the same genius designed for younger modellists. A more efficient rubber-driven model is also made at this age, and the pupil has to carve out and shape his own airscrew.



Metal construction is coming into favour among German model aircraft makers.

At 15 years a return is made to sailplanes, but something new in construction materials is introduced, for he learns to make his "air frames" of metal. This metal construction was first made possible about two years ago by a firm called "Meco," of Schmalkalden, which has produced a delightful series of miniature tools for working the material—an aluminium alloy. The result looks just like a small-scale version of a real metal aircraft, complete with a multitude of rivets.



Competitors, like their machines, were of all shapes and sizes. Above: a study in comparative cross-sections. Centre: a tail-first machine about to start. Below: the result of a wing-tip landing, but what remains is still a great deal bigger than its constructor.

To return to our fifteen-year-olds: their air-mindedness is further stimulated by making models of original design (not necessarily of metal), such as tail-first, tailless, tandem, or autogiro types. The tailless models are the most popular, and it was one of these which won the competition last year with a duration of 37 minutes.

This year's winner was Joachim Schmidt, of Allenstein, with a model of conventional type which went 11 kilometers. By a coincidence, it had been allotted the competition number A1.

It is evident that, although a certain amount of skill and judgment is required, it is chiefly luck which decides whether a particular launch will result in a record distance or duration flight, as, without a controlled steering mechanism, such performances are only put up by the model getting into a thermal current.

This is true, also, of power-driven models, which sometimes reach heights at which the thermals are big enough to circle in, before the power gives out.

The equivalent method for model sailplanes is to launch them like a kite. At the Wasserkuppe this method is used for part of the competitions, which are divided into "Handstarts" on the first day and "Hochstarts" on the second. For the high start a "cable" length of 100 metres is used; this is mostly twine, but a length of elastic cord, about 10 metres unstretched, is included.

The real test of an unsteerable model glider is how long it will keep facing the wind, and there is no doubt that models of certain design, like some full-sized gliders, have the "weathercock" property, as it is called. The "grosse Winkler," one of the most successful in this respect (if properly adjusted, which it usually wasn't), is remarkable for its turned-up wing-tips, a feature which was copied by the majority of conventional type models, as well as by most of the tail-first and a few of the tailless.

The best type for keeping into wind appeared to be the tail-first (elevator in front of main wing), in spite of the fact that they were rather unstable longitudinally, alternately diving and zooming.

The tailless models were very variable; a few flew steadily, but did not face the wind for long; many were in bad longitudinal adjustment (one had apparently mislaid its centre of gravity and turned over and over as if being held by its tips and twiddled round); most of them turned sharply to right or left and crashed into the hill.

Entrants were divided into several classes as follows:—

Class A: Models built according to a published plan. (This class was for competitors under 18 years old; there was no age limit for the other classes.)

Class B: Models of normal type designed by the competitor. (Special credit given for avoidance of "interference drag" and for ability to stand up to bad landings.)

Class C: Unconventional types (tailless, etc.).

Class D: Models of any type constructed of metal (except surface covering).

Class S: Self-steering models.

Class F: Models controlled from the ground by wireless.

There were very few entries for the last two classes. The self-steering models were to carry a mechanism for moving the rudder or elevator in flight. The prize winner had a machine which flew straight at first and then started circling; the idea was to help it to keep in a thermal, if it should be lucky enough to strike one at the right moment. This model kept up for 3 minutes 14 seconds.

There were three entrants for Class F, of which one succeeded in making his rudder move on the ground, and the other, the prize winner, put up a flight of nearly two minutes, including right and left turns at the behest of the officials. Great importance was attached to this class of the competition, as a prize of R.M.1,500 was offered, whereas the other prizes were all on the small side.



The "flying wing," as the ultimate goal of aircraft design, has its devotees among German model makers.

The "Bird Man"

"THE first man in the world to fly without an engine," says a writer in the journal which once organised a big motorless flying demonstration on the South Downs in June, 1930.

Clem Sohn himself, of whom these words were written, makes no such claim. But he does hope that some day "everyone may have my wings and be able to soar from the house-tops." How many of the 50,000 people who gathered to see his first European demonstration, at Hanworth, on May 2nd, were aware that soaring can already be done, if not from house-tops, at least from hill-tops?

But there is an essential difference between Clem Sohn and a sailplane. Two differences, in fact: first, he can fold up or open out his wings at will during "flight"; and second, that the main spars of the wings are alive, being none other than his own arms.

It must be admitted that the sailplane is not the complete solution to "humanity's age-long dream," however much we may pretend it is. What humanity is really after is the ability to soar like a sailplane with wings like Clem Sohn's. At present it can have either separately, but not both together, and it is Sohn's ambition to remedy this defect. We wish him luck, but doubt whether he will succeed; a recent attempt to use larger wings resulted in their fouling the parachute lines, and he was only saved by his precaution in carrying a spare parachute.

We were among the 50,000, but found the spectacle somewhat disappointing. He starts from 10,000 feet, but if you use a telescope on him you miss the pattern of his evolutions, whereas if you don't, you can't see what he is doing with his wings until just before the concluding parachute descent. In any case, the nearest approach to the same thing in nature is not the bird at all, but the so-called "flying gecko," a species of lizard which has an expanse of skin running from its elbow to its knee, extensive webs between its fingers and toes, and a broad and peculiarly flattened tail. The reptile is able to "glide" down from one branch of a tree to another. A specimen was recently presented to the Zoo.

Can he spin? In an interview, Sohn told the *Sunday Express* that he had sometimes started a spin as a result of stalling while trying to loop, and that if he does not stop the spin at once it becomes increasingly difficult to do so. Once, after attemping a flick roll, he spun down for 5,000 feet.

He gives his flying speed, with wings and "tail" (between the legs) extended, as 60 miles an hour. The total surface, according to *The Times*, is about 30 square feet, which gives him a wing loading of 8 lbs. per sq. ft., his weight with the apparatus being 240 lbs., of which 75 lbs. is due to the two parachutes. We hope no one is going to dispute the weight.

So incapable are many of our journalists of understanding what Mr. Sohn really does, that an impression has got abroad that he tries to propel himself along by muscular power, and *Flugsport* "hopes that he won't come and do it in Germany and so make the really serious experiments along these lines appear ridiculous."

Forthcoming Meetings

The Annual Competitions of the British Gliding Association are to be held at Bradwell Edge, Derbyshire, from Saturday, August 29th, to Sunday, September 6th, inclusive.

Previous to this, it is announced in the Press, the Yorkshire Gliding Club will hold a week's Open Competitions terminating on August 23rd.

The expedition to the West of England, proposed by Mr. J. S. Fox, of the London Gliding Club, in our last issue, is now taking shape. The dates proposed are Friday, July 31st, to Sunday, August 9th, and the following have signified their intention of joining: Buxton with HJORDIS, Nicholson with RHÖNSPERBER or BUSSARD, Davies brothers with SCUD II., Hiscox and Fox with a KIRBY KITE each.

The German National Soaring Competitions take place from August 16th to 30th at the Wasserkuppe in the Rhön Mountains, near Fulda. A tour to visit the competitions, at an inclusive cost of £8 8s., is being organised, starting on August 22nd and returning on August 30th; particulars are obtainable from E. Arland, 8, Lower Regent Street, London, S.W.1, and bookings should be made before the end of June. A similar tour a week earlier can be arranged if sufficient numbers apply.

The American National Soaring Contest will be held at Elmira, N.Y., from June 20th to July 5th.

"Driffield Times" Prizes

In conjunction with the Working Men's Committee of the Alfred Bean Hospital, Driffield, the *Driffield Times* is offering prizes of three guineas each to the first two pilots to soar from the Yorkshire Gliding Club's site at Sutton Bank to within two miles of Great Driffield on Friday, July 3rd, 1936, the occasion of the annual Hospital Fête. It is a condition of the prize that machines piloted by winning pilots shall be displayed to the public for the remainder of the day.

The new R.A.F. aerodrome (now under construction) at Driffield is 1½ miles to the west of the town.

Intending competitors should write for particulars to H. T. Blakeston, Aspen House, Driffield, Yorks.

In Short

Englishwoman gets "Silver C."—Miss Naomi Heron-Maxwell, who has been attending an aero-towing course at Darmstadt, flew into a thunderstorm and is reported to have got carried up 10,000 feet, landing five hours later.

* * *

Correction.—In the description of Mr. Wills's flight from Mann Tor to Plumley in last issue, page 81, 1st column, 16th line: for "pivot head" read "Pitot head."

* * *

"Minimoa" Two-seater.—The MINIMOA high-performance sailplane, being designed to carry 75 kg. of water ballast, can carry instead a two-seater fuselage, and one is being built for it in readiness for the Rhön competitions.

News from Germany

IN one of the main streets of Frankfurt am Main a knot of people stood looking up at a small cumulus cloud. They said they had seen a sailplane go into it. We watched and watched, but we never saw it come out again, either whole or in bits. In a little while the cloud began to melt. The pilot must have departed unobserved on the other side.

At the office of *Flugsport*, a few yards away, the occurrence was apparently devoid of news value. They said that sailplanes often flew over Frankfurt; they came purposely, to get the thermal currents over the town.

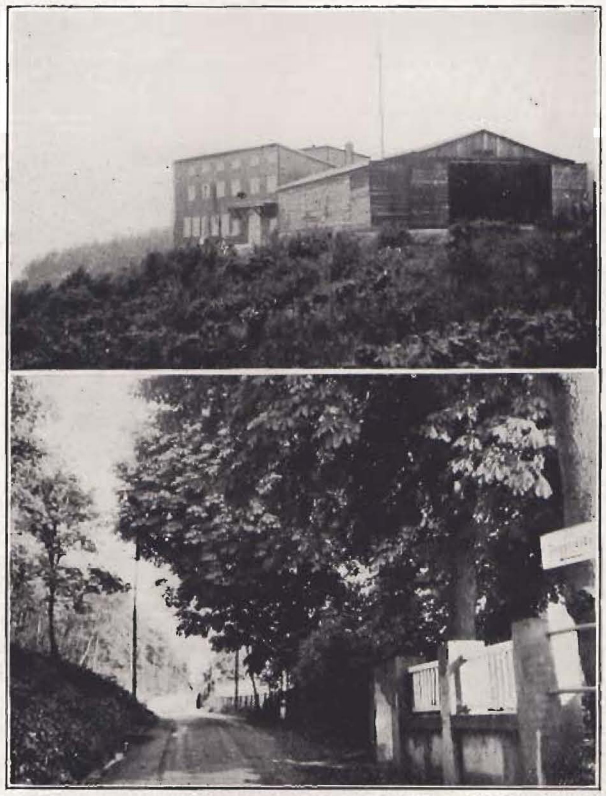
On the Wasserkuppe I ran into Frl. Emmy von Roretz, well known at Dunstable and at Sutton Bank. She was sporting the "Silver C" badge—No. 206—which she recently won at Darmstadt. It was all done from aero-towed starts. Her distance flight was 76 kilometers. Her duration, which she did from noon to 6 p.m. on another day, was also carried out in cloud currents. She said there had been the most wonderful cumulus clouds day after day.

Aero-towing, if you do a lot of it, becomes as simple as bicycling, according to Emmy von Roretz. As to thermal soaring, she does quite a lot without looking at the variometer, finding it easy to sense the alternate rise and fall when circling half in, half out of a thermal, and change course accordingly. What is more—and this is a new one on me—she says she can *feel* the warmth of a thermal on flying into it. (She says this only applies fairly low down, and not to rising currents under clouds, which are comparatively cold.) Yet the meteorologists cannot provide us with a thermometer sensitive enough to detect thermals by their warmth.

Strangely, there are two aero-towing schools on the Griesheim aerodrome at Darmstadt. One is operated by the D.L.V., or German Air-sport Union; the other by the D.F.S., or German Research Institute for Soaring Flight, which is all that was saved from the old German gliding organisation when the D.L.V. took over the whole of civil flying in 1933. Frl. von Roretz is in the D.F.S. school, while Miss Heron-Maxwell, whose "Silver C," she thinks, is No. 208, attended the D.L.V. school. It appears that the D.F.S. has the best machines, with the FAFNIR, SAO PAULO, and all Herr Jakobs's latest creations before they go into production. Among the latter, by the way, is a specially small and light version of the RHÖNSPERBER built for Hanna Reitsch, who is now a D.F.S. instructor (or instructress).

Wolf Hirth, readers will be grieved to hear, has had a crash at a demonstration in connection with the "Istus" meeting at Buda-Pest. He tried to loop a GRUNAU BABY from ground level, and stalled at the top of the loop. His only sound leg has been damaged, and his opposite hip fractured by a blow from the artificial leg. We must all hope he will still be able to go on flying when he has recovered.

Talking of GRUNAU BABIES, one broke up in the air while Frl. von Roretz was doing her "Silver C" duration. She noticed it near her, but when she looked again it had gone. It appears that the pilot went into a cloud and came out upside-down, going very fast. He tried to do a half roll, and a wing snapped off. He saved himself by parachute.



The gliding school at Siegen, not far from Cologne, where an Anglo-German camp is to held in July. Below: the path leading up to it from the main road, 700 feet below.

As the alleged site of the Anglo-German gliding camp, at Asslar, near Wetzlar, was on the route home, I called in to inspect it; had to walk up an interminable hill, found the place deserted, got stuck four hours in a thunderstorm, and returned wet through as the rain wouldn't leave off. Next day I found the leader of the school, an important person in the Leitz optical works. He demanded to know who had sent me there to interview him, laughed at the statement in the prospectus that his was one of the leading gliding schools in the country, said they only flew at week-ends, could hardly soar even on a RHÖNADLER, couldn't train properly on account of the crops, and he would ring up headquarters at Darmstadt to ask what they meant by arranging an Anglo-German camp at his place without telling him.

Then the truth came out: the camp wasn't to be at Asslar at all, but at Siegen. As this was also on my way home, I went there and found the local leader, Herr Bürger, a charming man, partner in a large factory in the town. He directed me to the gliding school, which was on the Eiserner Hardt, a hill four miles away, standing 1,350 feet above sea level and 700 feet above the valley of the Sieg. It stands among rolling hills mostly covered with woods, but there is a large clearing for primary training which serves also as a landing ground for soaring flights. The secretary of the Anglo-German Circle says that six machines have been ordered specially for the camp; also, he understands that there is to be a beginners' and an advanced group, and that two aeroplanes are to be available for towing. The latter would probably be at Hirzenhain, one of the better-known German schools, which is in the district but which I had not time to visit.

A. E. S.

Sailplane Construction

[*Mr. W. Butterfield, of the Furness Gliding Club and of Messrs. Vickers at Barrow-in-Furness, to whom we are indebted for the series of articles on "Sailplane Construction for the Amateur" which began last year, has, we regret to say, been obliged to discontinue them for the present owing to pressure of other work. Meanwhile, the articles have aroused much interest and a certain amount of discussion, and below we publish some notes by Mr. Keeble, of the London Gliding Club and of Dart Aircraft, Ltd., on some of the points raised, together with Mr. Butterfield's reply.*—ED.]

1—Load Factors

IN the January SAILPLANE the errors in these have been corrected in part; the factors given in the article were: C.P. Forward, 5; C.P. Back, 3·5. These figures were altered by the B.G.A. some time ago to: C.P. Forward, 6; C.P. Back, 4. The point, however, that gives interest is the values for civil aircraft of under 2,200 lbs. as specified by the Air Ministry in A.P. 1208:—

	C.P. Forward.	*C.P. Back.*
Normal Category ...	7 ...	5·25
Aerobatic Category ...	9 ...	6

Cannot one be certain that a sailplane can be stressed as much as a power plane? I think certainly it can, especially in cloud flying and aerobatics. (See Mr. Baynes's letter in THE SAILPLANE for April 28th, 1933.) Surely, then, we should adopt the Air Ministry figures —especially since it has unfortunately been demonstrated that a GRUNAU BABY with a load factor C.P. Forward of 8 can be broken up in aerobatics. There is, to my knowledge (I am open to correction), no sailplane in England up to the Air Ministry aerobatic specifications in load-factors.

There is a point here, too, that should be watched closely: German machines are designed and stressed for pine, but in England we use silver spruce, which is 10% weaker in compression; hence *any machine built in England from German plans, unless altered, is under strength.* A British firm manufacturing power machines had a lot of trouble over this matter, and had to re-design the whole machine.

2—Scarfs in Plywood

Six times the thickness is stated as being the width for a joint in plywood. Here I must disagree violently. German books on construction all say from 12 to 15 times; personally I never allow anything less than 10 to 1, and then only when anything bigger is impossible.

On spruce one can allow less, but in spars the Air Ministry specify 1 in 9, and I prefer 1 in 12 or 15. Mr. Walker, of the London Gliding Club, who claims that his splices never come unput—and they certainly get involved in heavy crashes subsequently—sometimes makes his splices up to 24 to 1.

The glued tape on a splice is horrible stuff and makes the joint awkward for later fixings of plywood, etc. I rather think that the Air Ministry has discontinued the tape. Another point against it is that the glue thereon goes mouldy and holds moisture, whilst the true state of the joint is hidden from inspection.

3—Tacking or Pin-Strip?

Tacking strips of spruce $\frac{3}{8}$ in. square would seem to be efficient on a straight joint; but upon a curved joint, as when putting ply on to a wing, a different kind of strip is necessary. A very satisfactory idea is to buy a sheet of cheap commercial 3-mm. ply and get this cut into strips $\frac{3}{4}$ in. wide and use $\frac{5}{8}$ in. 20-gauge steel gimp pins about one inch apart. For pulling down odd edges and corners there is nothing like 1-inch 20-g. steel gimp pins.

4—Glue Thickness

The thickness of casein glue is often a debated point, and the usual conclusion reached is that the thickness should vary according to the job—most satisfactory for those in the argument! It does seem, however, that for jobs like putting ply in saw-cuts a considerably thinner glue is needed than that required for putting on ply in a place where a run would disfigure the work; here one often uses it so thick that it is hardly workable, whilst the unbelievers make rude remarks about straining wrists and nailing the glue on.

In *Materials of Aircraft Construction,* by F. T. Hill, it is stated that, for hardwoods such as ash, very thin glue should be used. This seems to apply also to ply, for birch is a hardwood.

5—Aspect Ratio

This is rather a minor matter to bring up, but Mr. Butterfield remarks that aspect ratios are often as high as 12. Surely he should have said that they are occasionally as *low* as 12. Here are a few examples:

FALCON ...	... 9	SCUD II. ...	... 16
WREN ...	... 11	RHÖNADLER ...	... 16·8
GRUNAU BABY (about)	14	SAO PAULO ...	... 19
RHÖNBUSSARD	... 14·3	HJORDIS ...	... 21
RHÖNSPERBER	... 15	AUSTRIA (I believe)	... 30

6—Wood Preservation

Varnish for the interiors of machines is mentioned. It should be noted that it should be shellac varnish, since an oil varnish soaks into the wood and spoils the joints in the inevitable repair work. On the outside of the machine, where an oil varnish is necessary, two coats of dope will prevent the penetration of the oil. Note that Cellon clear dope appears to be the best for this purpose, as it does not turn white under the varnish.

7—Laminations

Mention is made of laminated spars, and it is stated that they are very flexible. This, I am afraid, is rather far from the mark. A piece of laminated wood is stiffer than a piece of solid wood of the same dimensions; in fact, one laminates things to make them stiffer.

Whilst on the subject of laminations, it may be mentioned that they provide a most fascinating kind of work; with them it is possible to make all kinds of weird and wonderful shapes, including fuselage noses, wing-tip curves, seats, seat-backs, hoops—in fact, anything wooden with a curve in it.

J. M. KEEBLE.

Mr. Butterfield Replies

At the very outset I expressed a desire that these articles would provoke discussion and stimulate ideas for the future. Such matters are controversial and there is a danger of misinterpretation. Mr. Keeble's comments confirm my opinion that our differences (if any) are due to misunderstanding. I can, however, only undertake to depend or justify what has been written, and take no responsibility for words and descriptions substituted for others.

Taking the points raised in the order presented by Mr. Keeble, my comments are as follows:—

Load Factors

These were corrected from C.P. Forward 5 and C.P. Back 3·5 to 6 and 4 respectively in the January SAILPLANE; the latter figures now conform to B.G.A. requirements. I am glad this correction has been noted. [We corrected the C.P. Forward only.—ED.]

Mr. Keeble then proceeds to compare B.G.A. factors with the Air Ministry factors for civil aircraft of under 2,200 lbs. weight. The factors quoted are, of course, minimum figures. There is no objection to increasing them, except that one must bear in mind that sailplanes have often to be man-handled across country.

Article No. 5 of the series opens with the following:

> "There are three main methods of procuring lightness with a given strength:
> "(1) Relates to choice of materials;
> "(2) Disposition of materials throughout the structure;
> "(3) Reduction in the factor of safety.
> "The first two are legitimate; the third should be avoided."

I have read the last sentence of Mr. Bayne's letter: ("The strength requirements of sailplanes differ from aeroplanes in many ways and the load factors should be revised accordingly"), and I quite agree with him.

A sailplane in a nose-dive always reminds me of hailstones in a thunderstorm; these do not disintegrate but actually increase in size and consequently in weight when suspended in a vertical gust.

Airship designers have assumed that vertical gusts of 100 m.p.h. are met in thunderstorms and have designed on that basis.

Perhaps the best answer to Mr. Keeble's question is to state that Mr. G. M. Buxton, in a SCUD II., successfully weathered one of the most severe thunderstorms in August, 1934. And the load factors possessed by that machine would satisfy me.

Now, to say that German machines are designed for pine conveys nothing. Before we can criticise we must know what kind of pine, and its physical properties—particularly its Modulus of Rupture.

Article No. 4 of the series states: "In fairness to the designer, the constructor must endeavour to fulfil the requirements of the specification governing the strength of timber and other materials called for by the drawings." Surely that is clear.

Scarfs in Plywood

Article No. 8 states that "The joint should overlap $\frac{3}{8}$ to $\frac{1}{2}$ inch, or six times the thickness of the sheet." Since the joints are generally arranged in way of a bulkhead or stiffener, I see no point in making the scarf longer than bulkhead thickness as the delicate feathered edges thus formed cannot be exactly closed.

The article states that the length of the splice in longerons should be eight or nine times the depth of the member, and when *not* supported by plywood it should be wrapped with strips of linen tape glued on, etc.

Representatives of the Air Ministry have made hundreds of tests with all sorts of variations in the splice, and the report states that splices made as described above give best results. The glue thereon will not go mouldy or hold moisture if coated with shellac varnish as advised in article No. 11.

Tacking or Pin Strips?

Article No. 8 states also: "For curved surfaces strips of plywood or cardboard are used; the brads should be driven in flush." We seem to agree on this point.

Gimp pins used by upholsterers are generally black; they have sharp clipped points like fine tin-tacks, and are excellent for this job. The round steel wire variety, 1 in. × 10 S.W.G., are known as panel pins. But why use pins one inch in length to pass through 3-mm. strips? It is far better to drive the pin home—unless for economy's sake the strips are to be used over and over again.

Glue Thickness

Article No. 6 states: "The mixture should be the consistency of thick cream." In that form it is used for glueing together the laminations of walnut aircraft propellers. And I have found it satisfactory for birch plywood. When in doubt, apply the simple test as advocated in the article. "The proof of the glueing is in the sticking."

Aspect Ratio

Article No. 9 says: "This ratio in sailplanes is often as high as twelve; a higher ratio is still more efficient aerodynamically, but uneconomical in a structural sense." Meaning, of course, that as the span goes up the weight of the structure increases at a greater rate, and becomes prohibitive. Particularly is this the case with planes of rectangular plan.

It is well to remember that several of these high aspect ratio machines have broken up in flight; presumably due to excessive spans or otherwise high loading per square foot of area. Or, as Mr. Keeble suggests, too low a load factor when abnormal conditions arise.

Wood Preservation

Article No. 11 says: "All internal woodwork should be protected by a coat of shellac varnish." The question of outside finish was to have been dealt with in a later article under the heading of "Doping and Finish."

We appear to be in agreement on these points, for I know that draughts will turn clear dope white.

Laminations

The article reads thus: "Laminated flanges can be built up to almost any length, and are very *elastic*. The scarfed joints are overlapped and the finished spar is then *stronger* than with flanges made in one piece." (See bottom of page 200, issue of December, 1935.) Mr. Keeble substitutes "flexible" for "elastic," and later uses the word "stiffer" when he really means "stronger." Which is certainly very far from the mark.

A spar is said to be *stiff* when it deflects but a very small amount before fracture, and such a spar would be dangerous. The stiffness of a beam is the ratio $\frac{\text{deflection}}{\text{span}}$.

A spar is said to be *strong* when a lot of energy is expended in breaking it. It is said to be *elastic* when the strain entirely disappears on removal of the stress that produced it. Whereas *flexible* simply means "easily bent." A strip of steel, glass and lead of the same dimensions are all flexible, yet their strength, stiffness and elasticity varies considerably.

If Mr. Keeble had said that one laminates things to make them tougher I might have agreed with him.

W. BUTTERFIELD.

I would like to take this opportunity of correcting one or two small errors which have appeared.

Article No. 4, Vol. 6, No. 5, page 71.—The weights of dry birch plywood are weights per square foot.

Article No. 5, Vol. 6, No. 6, page 88.—In the section "Duralumin Sections," the word "extended" should be "extruded."

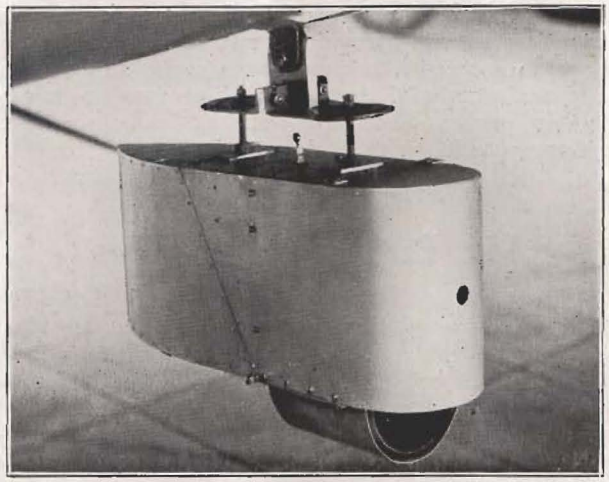
Article No. 14, Vol. 7, No. 4, page 64.—Under "Notes to remember when splicing": the fibre core is *not* removed when splicing in the Liverpool style.

W.B.

A Thermo-Barograph

THE *Fédération Aéronautique Internationale* has extended the regulations regarding record flights, and now requires a record of the temperature as well as of the pressure of the air in order to establish the altitude reached on a flight. The German Research Institute for Soaring Flight (Deutches Forschungsinstitut für Segelflug) has developed an instrument specially for this purpose, and we are indebted to Professor W. Georgii, President of the International Commission for the Study of Motorless Flight ("Istus"), for the following description and photograph of the "thermo-barograph," as the instrument is called.

The instrument registers automatically the pressure and the temperature. Its approximate dimensions are: 130 × 90 × 310 mm. (5·1 × 3·5 × 12·2 inches). Being exposed to the air flow, it is furnished with a streamlined fairing to reduce resistance to a minimum. It is suspended by means of a strap at one point only, and may be fixed on a wing rib. In addition, the suspension device is designed to absorb shocks; owing to this, the usual bracing with rubber cords becomes superfluous. The soft shock absorption guarantees a practically shockproof suspension of the instrument, even in power aeroplanes.



A thermo-barograph produced by the German Research Institute for Soaring Flight. Note the spring suspension.

(Courtesy D.F.S., Darmstadt.

In devising the thermo-barograph, care has been taken to facilitate the interpretation by recording the measurements on straight lines and not, as is more usual, on arched lines. The style moves on a line parallel to the axis of the recording drum. It follows from this that the records of the temperature and pressure are displaced with respect to each other, the amount of displacement being 16 mm. It is, however, easy to interpret the records by means of a transparent paper strip, 16 mm. broad; the point on the one tracing which lies against the front edge of the strip corresponds to the point on the other tracing which lies against the hind end of the strip. Owing to the records being on straight lines, errors are reduced to a minimum.

The instrument is constructed in such a manner that no sensitive or movable parts are without protection. It is impossible to touch any important part without unscrewing the casing, so any damage by careless treatment is almost impossible. A transparent cover allows of continuous inspection.

The range of measurement can be either 3,000 or 5,000 metres, according to choice. A normal D.V.L. clockwork mechanism is employed, with a drum 100 mm. (3·9 ins.) in height. The duration of rotation can be regulated as for 1 hour or 3 hours; if desired, however, other rotation times can be arranged. The drum of the clockwork has been modified in so far as the bearing yoke for the blackened paper has been removed. The barograph chart is inserted into a slot; this modification offers the advantage that more complete drum rotations are possible without a loss of some parts of the tracings. Provided that the clockwork is turned only in a clockwise direction, damage to the recording style is almost impossible.

The simplicity of construction of the D.F.S. type thermo-barograph makes it possible to deliver the instrument at the same price as an approved barograph.

Correspondence

Sailplane Weights

SIR,

After reading Mr. P. A. Wills's article and letters from L. H. ("Weights") Barker, I decided to have a KIRBY KITE, the HJORDIS, and a KIRBY KADET officially weighed by the best local authority. It may interest your readers to learn that the KITE, with instruments, weighs 252 lbs.; the HJORDIS, with instruments, batteries, etc., 364 lbs.; and the KADET, 231 lbs.

A weights certificate was issued for each and the accuracy cannot be disputed.

The KITE weighed was identical to that owned by Mr. Hiscox, of the London Gliding Club.

F. N. SLINGSBY,
Kirbymoorside.

[Some further sailplane weights, obtained by spring balance, are given at the end of the Derbyshire and Lancashire Club News on page 113.—ED.]

"Thermal" Indicators

SIR,

Mr. Walkden's letter in the March issue of THE SAILPLANE makes interesting reading. To a non-technical mind like mine it is surprising to see that, on entering a thermal current at an angle, one may easily get three times as much lift on one wing as on the other. However, actual experience does show that the resultant lurch given by the machine is considerable—sufficiently fierce to be obvious not only to the hypersensitive pilot; consequently I do not think a mechanical detector on the lines suggested by Mr. Walkden is really necessary.

What is, however, badly needed is a thermal indicator *on the ground*; i.e., an apparatus for use on calm or light-wind days for showing the existence and whereabouts of passing thermal currents. G. E. Collins used to say that on calm days the presence of thermals could be detected by watching the vagaries of the wind-sock. When it blew apparently idly towards first one quarter, then another, he held that it denoted an air current blowing towards a thermal; that is, it pointed towards the rising current.

This method, however, is obviously a chancy and rather unsatisfactory makeshift, and on a visit to the Derbyshire and Lancashire Club last year a better one presented itself. This club is fortunate in possessing, free of charge, the most excellent "thermal" indicator in the shape of two factory chimneys at the N.W. corner of the club's West Slope which seem to belch smoke night and day. On an unstable day all the pilot has to do is to traverse up and down the slope with an eye on the smoke-trail from the factories until a sudden upward deflection of the smoke shows the whereabouts, and even the velocity, of an up-current, whereupon the pilot makes a bee-line for this spot and the rest is easy.

My suggestion, therefore, is for each club to obtain two machines capable of producing a constant and fairly large volume of smoke. These will be placed, on suitable days, on the two up-wind corners of the site, and when a thermal arrives a machine must be quickly winch-launched into it. This method might even enable clubs without full-blown soaring sites to get in some thermal soaring, though it obviously requires a fairly good standard of pilotage to pull it off.

I hope shortly to try out this suggestion in practice; the problem of a cheap apparatus to produce a sufficient volume of unobjectionable smoke is, however, not an easy one.

SAILPLANE PILOT.

Tests on a Turn Indicator

FROM A CORRESPONDENT

THE advanced soaring pilot will frequently find himself circling in clouds, and for this some form of turn indicator is practically a necessity. The air driven gyroscope used for power machines is not so suitable for sailplanes owing to their much lower air speed. An electrically driven turn indicator has recently been put on the market, and it appeared to be so well suited for sailplane use that one was bought and tested by the writer with the following results:—

The indicator is stated to take 0·20 amp. at 12 volts. On test it would run quite well when the voltage had dropped to 6. It took 0·2 amp. at all voltages down to 7, and 0·24 amp. at 6 volts. The sensitiveness at 6 volts was ample. The instrument showed a deflection of one division—about ¼ in.—when making a slow turn which occupied nearly two minutes. With 12 volts it was really unnecessarily sensitive, but this should not matter.

It was then coupled up to four large 3-volt torch batteries, No. 1829 Ever-Ready, giving nominally, when new, 12 volts. A fifth was held in reserve. It ran continuously for 2¾ hours, by which time the voltage had fallen to 6·5. The extra 3-volt torch battery was quickly added, and the run continued for a further 2¾ hours, when the voltage fell to 6·3; but the instrument was still running and indicating freely. A continuous run like this, however, would be unlikely in practice, and is not fair to dry cells, which behave best on short runs with rests between.

The same battery was then given a rest, and its voltage recovered to 11·5 (for five torch units of nominally 3 volts each). It was then given half-hour runs with rests between. In this way it gave a further 5½ hours before the voltage on load fell to 6.

The complete battery assembled in a cardboard tube weighed 2¼ lbs., and cost retail 2s. 11d. For exceptionally severe work a second battery could be carried.

The turn indicator weighs 1 lb. 9 ozs., and contains also a side slip indicator—in effect a convenient well-damped level. The instrument will indicate turns 10 seconds after connecting up, and runs up to full speed in about 30 to 40 seconds. It would only be connected up when going into cloud, as it is useless to run it when visibility is normal.

It is considered particularly satisfactory that dry cells can be used, as any form of accumulator would be heavier, and acid might get free and cause damage to the delicate fabric of a sailplane.

When purchasing it should be tested on receipt to make sure that it is undamaged and will run with 0·2 ampère. If it takes more it should be returned to the makers to be re-adjusted.

A Sensitive Variometer

By NORMAN WRIGHT

[*Several ingenious home-made variometers are now in use on British sailplanes. Here is a description of how one was made out of an air-speed indicator for use on the "Dorsling" sailplane, which, piloted by Mr. J. Laver, has more than once held the British duration record for soaring flight.*—ED.]

MANY veiled references to this or that variometer are heard from time to time, but few venture to give to all and sundry their secret; so here goes a "blackleg" attempt to draw them out.

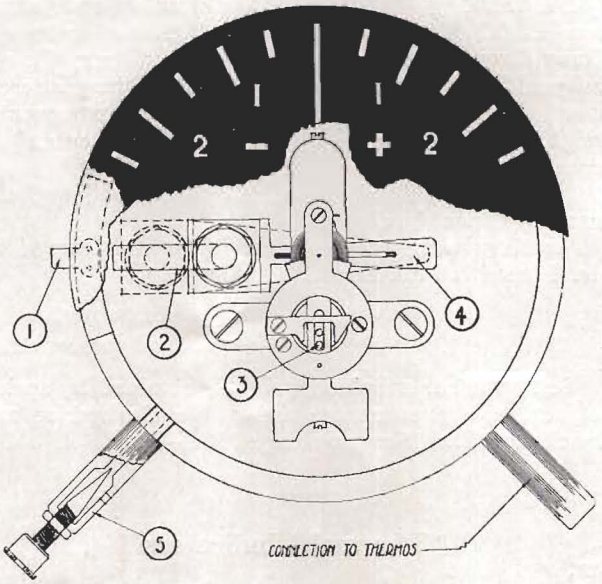
Let me hasten to say that the sensitivity of this instrument has not been compared with any other, therefore there may be better, or on the other hand, there may not, but it will show quite appreciable readings in variations of altitude, even as little as 6 feet!

The three main items required are an airspeed indicator of the oiled silk type, a pint thermos flask, and a rubber door-stop from our old friend Mr. Woolworth, to use as a bung for the thermos. First, completely dismantle the A.S.I., so that you can work on the main case. The slot (No. 2) that holds the bolt which keeps the leaf spring (No. 4) in place should be extended almost to the centre, so that the spring can be placed much nearer than when opened. The spring should be ground slowly down, without excessive heat, to about 5-32″ wide, as per sketch, and about half its original thickness at the same point; also about ½″ can be cut off the total length. That the spring should be particularly weak at this point depends much of the success of the instrument, as it has only to balance against the hair-spring via the gearing.

Another hole should be drilled and tapped to take the release valve, which is made from the tube connecting nipple from the main case. This hole should be drilled through the edge of the back cover in a similar manner to the one already there—marked as a rule "P." The valve (No. 5) was made by simply making the end of a screw into a needle valve, and soldering the nut to the top of the nipple, a small release hole being drilled in the side. This is quite satisfactory, as a lock-nut can be put on the thread for locking the setting of the instrument.

In the mechanism there is a small round lever connecting the vertical spindle with the quadrant. This should be bent so that it will operate over its full range, and at the same time just clear the bottom of the slot (No. 3). This adds considerably to the gearing.

Many kinds of rubber and other materials have been tried for the diaphragm, but the best results have been obtained with the sheet rubber as used for car inner-tube patches, which can be bought in sheets approximately 6″ × 4½″ for 6d. Just place the metal fitting in the centre, and tighten up fairly hard. Then cut off the little tail-piece that acts as a reverse stop against the back cover, as the diaphragm will have to work in a reverse direction to a small degree. Now fix in the new diaphragm, making sure of two highly-important points. The first being that you have the pin located truly central in the hole, and the second



that the diaphragm is tight. Both take a fair amount of patience, and the writer found that by making a hole ¼″ larger than the diameter of the air-speed indicator in a piece of 3-ply, and fixing the rubber tightly to this, it could be made taut and central quite easily by forcing the board down over the air-speed indicator. As far as the instrument itself is concerned it is ready to be put together, with the exception of the face and dial. When replacing the mechanism there is a little "wangling" to be done, as all the tension has to be taken off the hair-spring by releasing the small gate at the bottom, and replaced so that when the leaf-spring is just slightly pressing on the diaphragm pin it holds the toothed quadrant about central. The leaf-spring, of course, is anchored as near as possible to the centre in the new slot, as this gives a much bigger gear ratio. This takes some little time in bending the spring and levers, but unless it is done nicely it will not be delicate enough. A primary test can be easily made by coupling the instrument to the thermos flask, and placing on the floor with the needle vertical, and slowly lifting overhead and noting the needle deflection, which should be 3-16″. There is one point to watch, however, in doing this: the mechanism is somewhat out of balance now, and by going a few degrees out of the vertical with the face the needle will move with the weight of the diaphragm, so care must be taken to keep it upright, such as sliding its back up a wall. If it will not work to the degree mentioned, further adjustments will have to be made by trial and error. No doubt some "bright spark" will try to take me up because, when the instrument is returned to the ground, the needle will not return quite to its normal position. This is nothing to be alarmed at, as this is entirely due to friction, and it will always have a lag of some three or four feet plus and minus; but this is little in practice, and means that you have only to rise or fall, say six feet, before a definite indication is given.

An angle on the dial of 90 degress plus and minus from a vertical central point is sufficient arc to work over, and when the release valve is properly adjusted a rise or fall of 400 feet per minute gives a full scale deflection, while the minimum register will be about 2 ft. per second. Setting the release valve is best done by sucking on the release hole with the mouth, and adjusting till a full deflection (90 degrees) takes about 10 seconds to return to zero. Do not blow into the release valve as the condensation so formed will block up the aperture. Quite a good test can be made in a car, and quite small rises are indicated; in fact, with the release valve fully closed, you should get a reading over a hump-backed bridge!

There is a temptation to close the release valve too tightly, and make the instrument exceedingly sensitive, but this will not pay in practice, as the happy medium has to be taken between extreme sensitivity and time lag.

As a refinement the dial can be made to rotate a few degrees so that the pointer can be adjusted to zero, and the writer did this by cutting a slot about 2″ long and $\frac{1}{8}$″ wide in the casing at the bottom just behind the dial, and riveting a small lever (No. 1) to the dial, which will rotate if the small locating pins are withdrawn. This refinement is desirable as it has been found that the rubber diaphragm is subject to slight variations and, of course, otherwise it means re-setting the pointer.

The alterations to the spring, etc., are shown in full lines, while the dotted lines show the original.

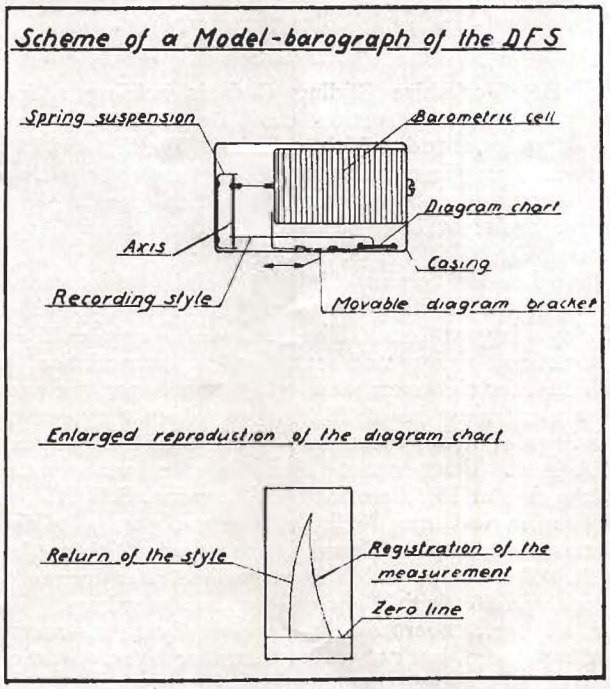
A Barograph for Models

RECORDS set up by model aircraft are now recognised by the *Fédération Aéronautique Internationale,* who require, however, that a barograph shall be carried on the flight. An instrument for this purpose has been produced in Germany by the D.F.S. (whose thermo-barograph for sailplanes is also described in this issue). Professor Georgii, who has read a report on the instrument at the general meeting of the F.A.I. at Paris, has kindly sent us particulars



A barograph for model aircraft produced by the German Research Institute for Soaring Flight, shown with a ruler and a match box for comparison.

[Photo by D.F.S.



of it, together with the accompanying photograph and diagram.

The instrument is enclosed in a casing of aluminium with the dimensions of 37 × 21 × 17 mm. (1·46 × 0·83 × 0·67 ins.). This casing contains a barometric cell (Vidi) of 15 mm. diameter, which transfers its elongation to the recording style, removing at the same time the barograph chart. Thus a landing shock, which, of course, causes a deflection of the style, does not falsify the measurement, for the record of such a shock is drawn at another point of the barograph chart.

As the chart is advanced only by an elongation of the pressure capsule (*i.e.* during ascent), the instrument must be adjusted to the initial position each time before being used again. The barograph chart consists of a transparent material, and has a recording surface of 8 × 17 mm. It is blackened before installation, for which no other aid is required.

The casing has a cover of Plexi-glass, and can be sealed.

The interpretation of the record should preferably be done with a special eyepiece, and it is advisable to carry this out at the same place where the calibration has been done, as the work demands a certain experience and accuracy.

The model barograph weighs 11 grams. The price is between R.M. 11 and 12, provided that a certain number of instruments will be manufactured. The eyepiece for interpreting the record may be obtained from the D.F.S. for R.M. 75; it is, of course, only necessary for each inspection station to have one. The accuracy is about ±1% of the range of measurement, which, on request, may be limited to 2,000, 3,000 or 5,000 metres above zero-normal.

The D.F.S. would welcome enquiries from any model constructors intending to try for a record. The address is: Deutsches Forschungsinstitut für Segelflug e.V., Instrumentenabteilung, Darmstadt-Flughafen.

Gliding Instruction

THE Yorkshire Gliding Club is holding a fortnight's instruction camp, open to all, from August 2nd to 15th inclusive. The fee, £12 12s., includes flying instruction, meals in the club house, and full camping accommodation at Sutton Bank. Apply to the assistant hon. secretary of the club at Aspen House, Driffield, Yorks.

The London Gliding Club is holding an instruction camp at Dunstable Downs from Friday, July 31st, to Friday, August 14th. The fee, which includes flying instruction, meals and camping accommodation, is £11 11s. for club members; non-members pay the same plus a camping fee of £1 1s., for which they get the privilege of flying membership of the club till the end of August. Further particulars from the hon. secretary of the club at 13, Victoria-street, London, S.W.1.

The Anglo-German Circle is organising a gliding instruction camp in Germany from June 28th to July 25th. The camp, which is to be held near Siegen, is to include 20 British and 20 German members. The fee, £7 10s., covers living expenses, flying instruction and insurance, but not travel there and back. Particulars from A. V. S. Lochhead, 1, Bloomsbury Square, London, W.C.1.

The gliding school on the Gaisberg, near Salzburg in Austria, takes foreign pupils for both the beginners' and the advanced courses. The agents are : Anglo-Continental Express Co., Ltd., 177, Regent Street, London W.1. They charge £16 18s. for the beginners' and £21 8s. for the advanced course; the fee includes travel from London to Salzburg and back, living expenses there, and an instruction course, which lasts just under three weeks.

The Grunau Gliding School in Silesia is the only German gliding school which regularly takes foreign pupils. A member of the London Gliding Club ("C" pilot), who has arranged to go there in August, has given us some particulars of how to get into it. You write first to Aero Club von Deutschland, Berlin, S.W.11, Prinz Albrecht Strasse 5, Germany. You then receive a form to be filled up in triplicate, with your photo (also in triplicate); various personal particulars are asked for, and whether you can speak German (you needn't), what flying experience you have had, and what sports you practise. You must also declare on your word of honour (in triplicate) that you are not of Jewish extraction. The courses available to foreigners, and the fees (which can be paid in registered Marks) are as follows:—

A.	Course for absolute beginners	R.M.153
B.	For those with previous elementary schooling	R.M.163
C.	For more advanced pupils	R.M.184
D.	Soaring practice course	R.M.193
E.	Aero-towing course	R.M.303
F.	Auto and winch-towing course	R.M.152

The fees include instruction and sleeping accommodation; food costs R.M.2 to R.M.3 extra per day. We gather, from a pupil who wrote of his experiences in the Press, that pupils have to submit to rather more discipline than they would in other countries; nevertheless, the Grunau school is a well set up establishment of long standing, and the instruction is probably as good as is to be found anywhere.

News from the Clubs

Yorkshire Gliding Club

April 25th.—Wind S.W., 20-25 m.p.h. Neilan was the first in the air in KIRBY KITE for a flight of two hours, during which he attained 3,600 ft. and toured the district, visiting Cold Kirby and Sutton village. Hastwell joined him in the air in GRUNAU BABY for a short flight, and he was supplanted later by Sproule, who looped it. As Neilan was landing an awkward down gust caught the machine as it crossed Casten Dyke and the wing hit the wall.

FALCON still being in the repair shop, Wordsworth had to descend to HOLS for his flying. GRUNAU was taken up later in the day by Neilan, Hastwell, and Pick, Neilan making tests for spins and obtaining a slow tight spiral only.

Flying time for the day, 4 hours 24 minutes.

April 26th.—Wind S.W., 20-25 m.p.h. Another ideal day with five machines in the air together and a total flying time of 18¾ hours shared between nineteen pilots.

HOLS was first up, piloted by Watson for just over the hour, during which he topped 1,000 ft., a feat equalled by Blakeston later in the day. Most pilots in this machine exceeded 600 ft. Flying time, 3 hours 37 minutes.

	Launch	Landing
Watson	10.45 ...	11.48
Jowett	12.18 ...	12.39
Miss Horsley	12.55 ...	1. 4
Blakeston	1.57 ...	2.18
Alderson	3.52 ...	4.28
Cox	5.12 ...	5.53
Woolcock	6. 5 ...	6.15
Wordsworth	6.44 ...	7. 0

CITY OF LEEDS, piloted by Stedman, who disseminated much dual instruction throughout the day. Circled up to 2,000 ft., on one occasion making 700 ft. in five circles. Two of his flights exceeded the hour. Taken up by Neilan to give dual to Pick (A. O.), a new member, at the end of the day. Total flying time, 4 hours.

GRUNAU BABY, flown for about six hours during the day. Looped by Ivanoff and Neilan; the latter also achieved maximum height with 2,100 ft.

	Launch	Landing
Holdsworth	11.25 ...	1.20
Neilan	1.37 ...	2.15
Sharpe	3.24 ...	3.41
Heath	4. 4 ...	4.52
Hastwell	5.39 ...	6. 9
Sproule	6.28 ...	7. 5
Ivanoff	7.17 ...	7.35
Watt	7.55 ...	8.22
Hastwell	8.37 ...	8.42

KIRBY KADET: test-flown by Sproule for 20 minutes, during which he exceeded 1,200 ft., and later flown by Ivanoff for one hour.

FALCON III.: Slingsby flew her on five occasions and Neilan once (dual with his father) for a total time of three hours. After the last flight the pilot apparently tried to land in the hangar and demolished a thorn bush in the process, resulting in more damage to his pride than to the machine.

April 29th.—Wind S.W. Watt turned up and took GRUNAU BABY up for an hour and a half, reaching 2,000 ft. Later Neilan and Heath flew this machine for an hour and ten minutes respectively, the last flight being carried out in semi-darkness.

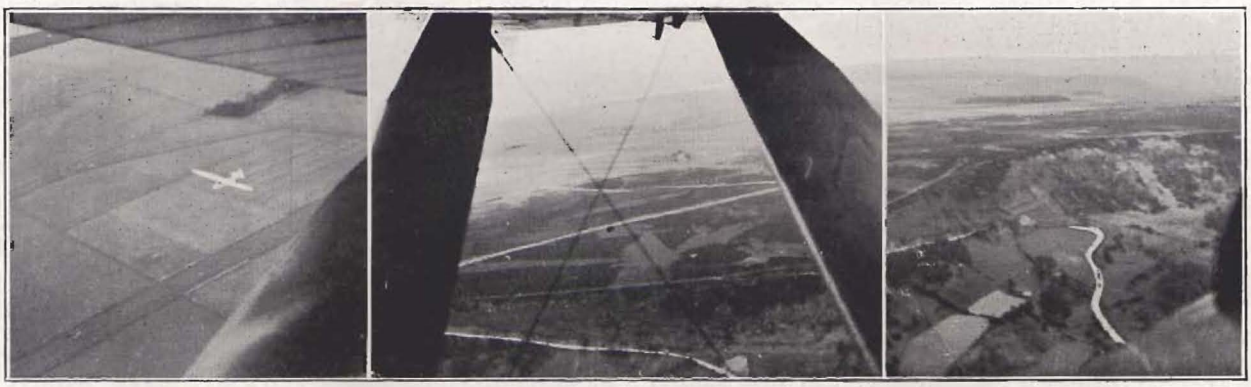
The total flying time for the month of April exceeds 50 hours.

May 2nd.—Wind S.E. Holdsworth prospected for lift along the South Slope in GRUNAU, but without any luck. Rather than do nothing, DAGLING was hopped by Stedman, Heath, Woolcock, and Holdsworth.

May 3rd.—Wind S.E., 15-20 m.p.h. Apart from circuits in GRUNAU at the end of the day by Heath and Stedman the day was devoted to training in both DAGLING and HOLS. Fisher and Pick (A. O.) both qualified for their "As" on HOLS.

May 10th.—Wind N., 15-20 m.p.h. Hick, also of the Newcastle Club, who joined us last summer, had his first flight with us in HOLS. He qualified for his "A" and also obtained his two 45's for his "B." Stedman took up his CITY OF LEEDS in an attempt to soar, but after two minutes had to come in down-wind.

FALCON was hopped by Woolcock for the first time, and late in the day Heath took up GRUNAU and soared for four minutes, using a very short beat above Roulston Scar.



Photos taken by H. Hastwell from the Stedman two-seater "City of Leeds" while soaring over Sutton Bank.

May 17th.—Wind N., 0-5 m.p.h. Another training day. Smith, who procured an "A" with the Leeds Club in 1931, recommenced training on DAGLING and was later promoted to HOLS. On the latter Fisher, Hick, and Pick (A. O.) all qualified for their "B's"

May 24th.—Wind N.E., very variable. Rain. Training was out of the question, so a visit was paid to Slingsby's factory at Kirbymoorside to see Sharpe's new FALCON III., which will be coming up to the Bank next week-end. Sharpe has generously placed this machine at the club's disposal for use as a club machine.

The new hangar has now made its appearance above the ground and is expected to be completed in a month's time.

Instruction Camp.—We are pleased to report that entries for our Instruction Camp are coming in steadily. Already the limited accommodation of the camp is one-third booked. Our experience of training has convinced us that, with a limited number of pupils, we shall be able to train every pupil up to "C" certificate standard within the fortnight. Instruction will be in the capable hands of F. N. Slingsby, J. C. Neilan, and P. H. Baster.

Derbyshire and Lancashire Gliding Club

Sunday, April 26th.—Wind west, about 25 m.p.h. Over 10 hours' flying by club members.

It looked such a marvellous day that Smith set off in the GOLDEN WREN complete with telephone numbers, maps, barographs, etc., hoping for his 31 miles. This was not to be, however, and try as he would 2,000 ft. was his ceiling, even this being an isolated peak on the barogram. Later, in the same machine, Robertson was unable to get down and had to search for a down-draught to circle in before landing.

Thomas had the CRESTED WREN out for the second week in succession, while Coleman soared his own GRUNAU for the first time; there being very little to choose between the height of these two, the balance being perhaps slightly in favour of the WREN.

Davies had been up quarter of an hour in the NACELLED DAGLING, when a sudden lull brought everything down 300 or 400 ft. This proved too much for the poor old DAGLING, which retired gracefully to the bottom. Godson took the PRÜFLING up for half an hour later in the day and got quite a respectable height in it. The answer to the PRÜFLING-DAGLING controversy seems to be that the PRÜFLING has a little better performance "if it is flown properly, but. . ."

At long last the KASSEL two-seater was brought out and flown, all five members of the group who were present having 20 minutes to half an hour with Smith as chauffeur. (Hats off to those instructors who give dual in this machine.) The old veteran showed up quite well, but could not quite reach the CRESTED WREN or the GRUNAU.

Sunday, May 3rd.—Wind east, 10 to 15 m.p.h. A full day of solid and valuable training, resulting in four "A" certificates: to Leech, Buckler, Hardy, and Dickson. All flights were from the winch, of course, and three machines were in use all day; the PRIMARY, NACELLE and B.A.C. VII. Curiously enough, the open PRIMARY was the best machine for "A" flights because one could pull up so much higher without fear of overshooting the far wall. Even with this machine a slight S turn was advisable in order to get down comfortably. Meads gave dual instruction to beginners in the B.A.C., while "B" pilots and others did circuits or S turns in the NACELLE.

Saturday, May 9th.—Wind east, 5 to 10 m.p.h. The experiment was tried of pulling more or less raw beginners across the ground with the winch, giving them just flying speed and no more. Theoretically this is all right, but it seems to us to compare unfavourably with the winch-cum-bungy method described in our notes a month or two ago, as by the latter the strength of the launch depends chiefly upon the instructor at the glider end. With the pure winch method, however, the launch depends entirely upon the skill of the winch driver, which seems to us wrong in principle.

Everyone was glad to see that work had actually started on the hangar, even if it was only to the extent of a workmen's hut and a large square bereft of its turf.

Sunday, May 10th.—Wind north, about 15 m.p.h. Another good training day. On the principle of keeping up the bar profits we had kept one prospective "A" certificate up our sleeve and this was now brought out in the person of Forman, who obliged very nicely and showed that our confidence had not been misplaced. Meads did much instruction in the B.A.C., while others flew the NACELLE.

In the meantime Slater had taken the GOLDEN WREN over to the Peveril launching ground near Castleton and started off in great spirits for Dunstable. Unfortunately there was an inversion 400 ft. above the hill, so that was that.

The Hobson brothers brought out a beautiful new varnished GRUNAU, and this was successfully tested by Meads. It is distinguishable by a slightly different shaped nose, which is rather pleasing in appearance.

[The Hobson brothers started their gliding at the Rossitten school in East Prussia in June, 1930.—ED.]

Saturday, May 16th.—Wind east, 30 m.p.h., moderating. Circuits and S turns with the NACELLE and some primary work in the evening when the wind died.

Sunday, May 17th.—Wind west, but what a wind! Ten m.p.h. maximum throughout the day, and five m.p.h. as soon as anyone started to rig a machine. A lot of useful training was done, however, with the PRIMARY, NACELLE, and B.A.C. VII., several pilots being promoted from hand launching to the winch.

Coleman had out the BLACK DIAMOND, as his orange and black GRUNAU has been christened, and did some circuits for landing practice.

The following weights may be of interest to some. They are by spring balance and may be considered correct within three or four pounds. They include, of course, all such instruments, fairings, etc., as are normally used.

The BLACK DIAMOND (GRUNAU BABY)	253 lbs.
The GOLDEN WREN	240 lbs.
The CRESTED WREN	215 lbs.

Southdown Gliding Club

Opening of New Buildings.—It is announced that the new hangar, workshop, records office, etc., are to be opened on Saturday, July 4th, when demonstrations by experts will be given, and it is hoped to arrange friendly inter-club contests. A collection will be made for the Royal Air Force Benevolent Fund on that date under the auspices of the Air League of the British Empire.

London Gliding Club

May.—Most week-ends the wind failed to oblige for soaring pilots, but much training was done. Having missed most of it, we only received news when anything went wrong, as when a ground-hopping pupil, having failed to secure himself properly, stalled, turned over sideways, became detached, and reached the ground before the glider's wing-tip.

The winch is in frequent use both for primary training and for launching sailplanes. Pilots who soar low along the brow of the hill in congested traffic must now keep a look-out in three dimensions instead of only one.

On May 24th Rainey was practising side-slips off winch launches; he discovered how far over it was possible to tip a GRUNAU BABY, but underestimated the amount of room required to bring it back on an even keel. A more serious crash, unconnected with club flying, occurred on this day, when Startup, one of the club's founder-members, came over in an aeroplane with a passenger, did some hair-raising aerobatics over the club ground, and crashed a few yards from the old club house.

At Heath Row.—At the Royal Aeronautical Society's Garden Party on May 10th, a display of winch launching was given by five of the best club and privately-owned sailplanes, using the club winch which had been transported there for the occasion. They were launched to 600 ft. and glided slowly round to a landing; one machine was able to hold its height during one circle in thermal lift. This part of the programme only lasted 20 minutes, but it is evident from Press reports that it aroused more interest than any other item in the display. The society's secretary, in a letter of thanks, says that many of the aircraft people were definitely envious of the beautiful construction and finish of the gliders and he thinks their eyes were not a little opened by what they saw.

Whitsun Camp.—This was held from Saturday, May 30th, to Wednesday, June 3rd. Soaring conditions were mostly poor, but in four flying days 256 launches were made, with a total flying time of 9 hours 23 minutes, excluding ground hops. The influence of our full-time instructor, H. E. Hervey, is making itself felt.

On Saturday there were 20 flights from the hill-top (total flying time 1 hour 45 minutes) and nine off the winch (1 hour 52 minutes). Box got his "A," Chirgwin his "B," and Lingford his "C."

On Sunday 57 ground-hops and 52 hill-top launches (3 hours 41 minutes). "A" certificate flights were made by Miss Goldney and Cohen, and "B's" by Austin, W. Adcock, H. Adcock, Miss Archer and Bolton.

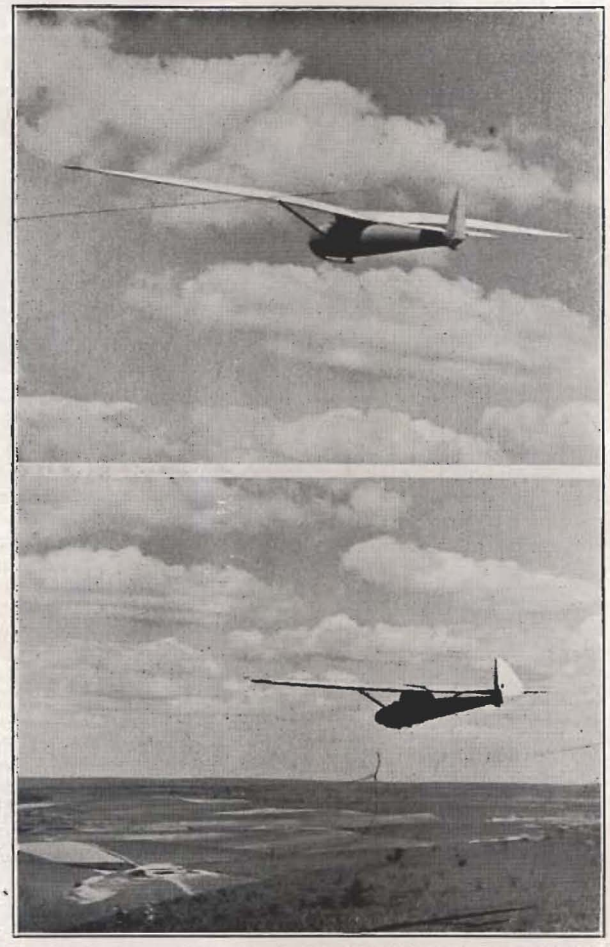
Launches on Monday were 67 ground-hops and 24 from hill-top (1 hour 41 minutes); and on Wednesday 19 ground-hops and eight from hill-top (24 minutes).

Annual General Meeting.—This was held on April 30th at the Victoria Mansions Restaurant, and was followed by a dinner which has already been reported.

The chairman, Major H. Petre, read his Annual Report for the year 1935-6. He congratulated the club on the great progress made since he had last addressed an Annual Meeting two years before. Referring to the erection of the new club house and hangar as the biggest single step in the whole progress of the club, the chairman said: "The erection of this building was a bold step from every point of view; bold in its financial implications, and bold in its design and constructional details and, like every other bold step taken in the history of this enterprising club, a complete success. True, the Government subsidy helped us by providing a substantial proportion of the cost of the hangar part of the scheme, but I want you always to bear in mind that the club of its own resources had arranged the finances for the entire building, and subsidy or no subsidy it would have been carried through exactly as you see it now." The highest credit should be given to its architect, Mr. C. Nicholson, who was a member of the club.

He next referred to the land, extending to 117 acres, which during the past year had become the absolute property of the club. This land was secured for the club by the generous and far-sighted action of a club member, Mr. Espin Hardwick, who, when the club was threatened with a notice to quit in 1933, purchased it outright and gave the club 15 years to buy it back from him at the same price. The re-purchase had now been completed, the money being provided as to £525 out of Government subsidy, £225 from the club's own resources, and £200 as a gift from Lord Wakefield.

The club's fleet at the moment consisted of a two-seater, four sailplanes, a PRÜFLING, a nacelled DAGLING and three primary



Above: D. G. Hiscox in his "Kirby Kite," starting from Dunstable Downs on April 19th on a flight which ended at Hatfield Aerodrome, 14½ miles away. Below: launch of the "Blue Wren," piloted by G. L. Bell, who flew part of the way there and worked his way back against the wind. The pilots used short "streets" of cloud, some of which can be seen in the photos. It will be noticed that the clouds are of the flattened type described by Heini Dittmar in our issue of last November, under which the up-currents are fairly persistent, while the compensating down-currents are evenly distributed over the space between.

(Photos by J. D. A. Boyd, A.R.P.S.

DAGLINGS; though this revealed a certain deficiency in secondary types, the matter was to be put right. (We understand the club has since obtained a KADET from Slingsby's and a TOTTERNHOE from Dart Aircraft.)

As regards transport, much praise was due to Mr. Ruffle and the Transport Committee; this section had never been kept in so efficient a state as now.

The flying record was the real test of a club's progress, and during the year reviewed the club had obtained 56 "A," 48 "B," and 26 "C" certificates, which in each category was more than the whole of the rest of the country put together. No complete record had been kept of flying time, but a scheme had now been evolved which should make such a record available. Sheets of paper were to be mounted on a board in the club house—one sheet per machine—and each member should make it his business, before leaving at the end of the day, to see that particulars of all his flights were accurately entered up.

Last summer's successful training camp, organised by Mr. Ashwell-Cooke and run by Mr. Humphries was referred to. Finally the chairman referred to the loss of Mr. G. E. Collins, due to a fatal accident in an air display. Besides being one of the most likeable personalities in the club, he was a pilot of superb skill, both in the handling of his machine and in the science of soaring flight; his loss had left a gap which it was impossible to fill.

Furness Gliding Club

Sunday, May 10th, was a good day here in Furness, so that we managed to induce Charles to try for his "A," "B," and "C" all in the same day with flights of 8½ minutes, 25 minutes, and 1 hour 10 minutes respectively.

Sunday, May 31st.—A day for soaring, with a west wind of 20 m.p.h. Charles in the KIRBY KITE once more made the six miles flight to Roose. He got there neatly and quickly with 1,000 ft. to spare. His circles over the site this day were not a success; they were too tight, and he lost height each time. He seemed to climb best by standing straight out over the estuary well away from the hill.

On another occasion Charles has soared for 55 minutes over the east side of our site, making a swoop down-wind to land on the west side beach.

In the meantime training has proceeded in the primary on every possible occasion. Seven of the members are anxiously awaiting the arrival of a new soaring machine in which to take their "C's." Our B.A.C. IV. is out of commission and I hear that a KIRBY KADET has been ordered. It is rumoured that no less than six of our members are to be married this summer, so why not get a FALCON III.?

We are all hoping Stevens will have his GRUNAU BABY ready in time for the National Competitions.

Norfolk Gliding Club

May.—Most of the month was spent overhauling the DICKSON primary and looking for sites. There has been some difficulty about using the one at Cley, but a search for a suitable place for winch launching has resulted in the find of a promising site near Hevingham.

Whitsun (Sunday and Monday) was spent at Dunstable; we had hoped to take the nacelled DICKSON there with us, but unfortunately could not do so without a C. of A., for which, by the way, the authorities are at last threatening to send an inspector. We must thank the London Club for a very happy and instructive week-end—instructive both as regards what to do and what not to do, for we saw four machines incapacitated during the two days. The feature of our stay was a demonstration of slope-soaring by a SCUD II. in a breeze too light to keep any other machine in the air.

Midland Gliding Club

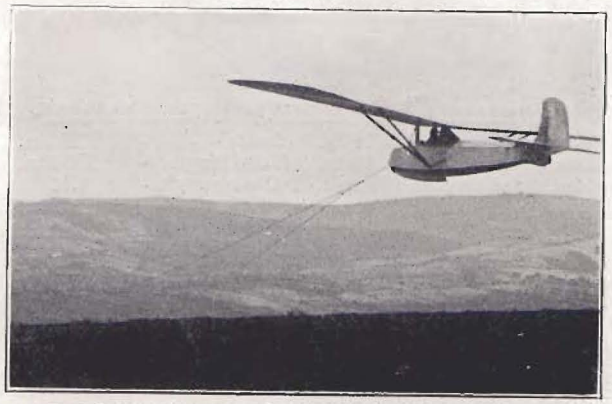
Hereford Branch.

In spite of adverse winds the whole of the month, the club has been fortunate in being able to fly every week-end on the reserve field sloping gently west and north-west.

Launches this month total 240, of which only 15 have been ground slides. All active members are advancing and improving steadily. Brook and Pritchard have forsaken the "controls wildly waggling" technique and have become safe and good.

James is a new member who lives 90 miles away at Chester, and turns up regularly each Sunday!

The sixteen-stone proprietor of the club's headquarters, R. G. Robinson, is now managing to get into the air nearly every time.



A "Falcon" launched from the Midland Club's soaring ground at the Long Mynd, Church Stretton.

[Photo by C. E. Hardwick.

On occasions when the wind is great and the launch is good, he even attains a modicum of altitude. All this to his huge delight and to the complete astonishment and confounding of his customers—albeit the latter were not convinced until photographic evidence was produced and duly exhibited.

[We are pleased to hear, from another source, that Mr. Dugdale, who takes a leading part in the running of the Hereford Branch, obtained his "C" on May 30th at the Midland Club's soaring site on the Long Mynd.—ED.]

Dorset Gliding Club

Although there was very little club flying during the winter, the members have been very busy renovating the DAGLING, and taking advantage of the bad weather, have constructed a detachable nacelle, made in five sections, the fairing behind the pilot's seat being made in two parts and the cockpit in three parts. On each side there is a door that folds down, and there is also a folding celluloid-lined flap which allows light to reach the instrument panel. The finished article amply fulfilled all conditions, the strength being adequate, its lines are very pleasing to the eye, and by undoing seven bolts and three straps it can be taken off in very little time. We have long thought that a nacelled DAGLING might be a very satisfactory machine for slightly more advanced training at our Maiden Newton site, which, with its somewhat restricted "beats," is not ideal on which to learn soaring, though Laver has soared there on both the DORSLING and the open DAGLING. Also Leak confounded the prophets by getting his "C" there on the DORSLING and, of course, Penrose has soared his little sailplane PEGASUS there on several occasions.

Flying at Maiden Newton.—Up to Easter the only flights done were a few by Penrose in PEGASUS, but owing to the wind being inadequate none of them was very lengthy, about half an hour or so. There were a few days when there was ample wind, but on these occasions the visibility was absolutely *nil*.

Easter.—There was a camp on this site, and in spite of bad weather some flying and training were done in the open DAGLING.

Sunday, April 26th.—Lansdown, Aldridge, and Shelton, from the Brow over the Pimple, and Rolfe also had flights. In the steady wind pilots had no difficulty in getting plenty of height, but owing to the cramped space they had not much room in which to lose it.

May 2nd and 3rd.—Finishing touches to the nacelle; machine "balanced" to locate C. of G., with lead weight *in situ* in nose of nacelle.

Saturday, May 9th.—Wind entirely unsuitable for trying out the nacelle, so training was carried on from the Cottage Slope.

Sunday, May 10th.—Training went on till dinner time from the Cottage Slope. After dinner, as the wind had dropped a bit, the nacelle was put on, and in it Lansdown and Aldridge had flights from the top of this slope, and later on, when the wind dropped completely, they and Shelton had flights from the hangar slope. The improved performance of the DAGLING with the nacelle fitted was very obvious to those watching, but perhaps the nicest feature is the effect on its controllability; the response to the rudder is really delightful, as is also the elevator, probably due to the better flow of air round the nacelle.

Other Gliding Clubs

Kirbymoorside.—The *Yorkshire Post* announces that the Kirbymoorside Gliding Club decided at its annual meeting to affiliate with the Yorkshire Gliding Club, as the stage had been reached where a permanent soaring site was needed. Mr. W. H. Rutter, the secretary, stated that the club was formed on February 12th, 1935, and that during the year 306 flights were made and one "C," two "B," and 11 "A" certificates obtained. The total membership was 25.

Bath.—A gliding club for Bath has taken shape, and at a meeting held early in May, 30 members were enrolled. Mr. R. H. Wilkes elected as chairman and Pilot Officer E. A. Tiley as hon. secretary. A flying ground is understood to have been acquired at Claverton Down, and the arrival of a glider is expected "in the course of the next week or so."

Penrith.—On a recent Sunday the club had "the most successful outing of its career" at Mell Fell, 25 flights being made "without a hitch."

Preston.—The Preston Gliding Club, after flying for six years without engines, is, according to newspaper reports, "being reorganised and its gliders are being converted into ultra-light aeroplanes." Two of the club's machines are at present having

engines put in, and one is almost ready for testing. An agreement has been come to with the Lancaster and Morecambe Aero Club under which they are to take their machines over to Middleton Sands, where there is a licensed aerodrome, and flying instruction is to be available at about 15s. an hour.

Stafford.—Members of the Stafford Aero Club, which was formed last November with a membership of about 50, are reported to be "now working on a third glider," which, like the other two (one a ZÖGLING) is to be a training machine. Mr. Maurice Collins is chairman, and J. H. Simpson and J. W. Bagnall joint secretaries.

Portsmouth.—The Portmouth and Southsea Gliding Club appears to have become a section of the Airspeed Social and Sports Club, and has 42 members. Flying takes place on Portsdown Hill with "Izzy," a reconstructed primary ZÖGLING, which (or who) is launched by car.

Inverness.—The club has taken delivery of a primary glider and had its first flying meeting on Tuesday, April 28th. The official instructor is Mr. J. Gordon Hay, a power pilot with the "B" commercial licence. Mr. F. Oliver is hon. secretary.

Official Notice

B.G.A. Address.

From now on the address of the British Gliding Association, Ltd., will be:—

119, Piccadilly, London, W.1.

Telephone numbers: GROsvenor 1246, 1247 and 1248.

"DAGLING" FOR SALE
£30 10s. 0d.
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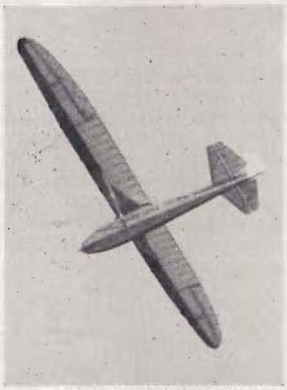
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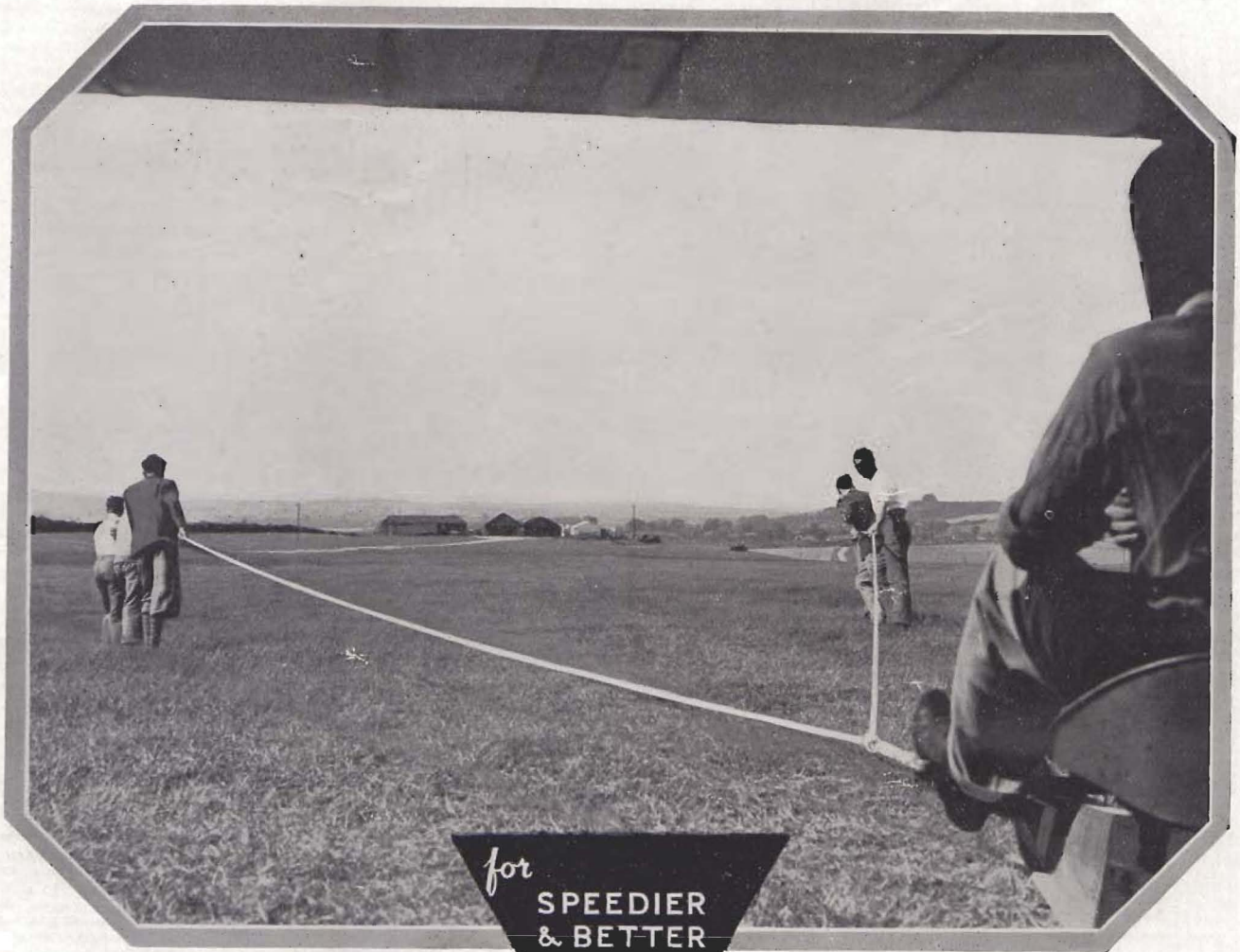
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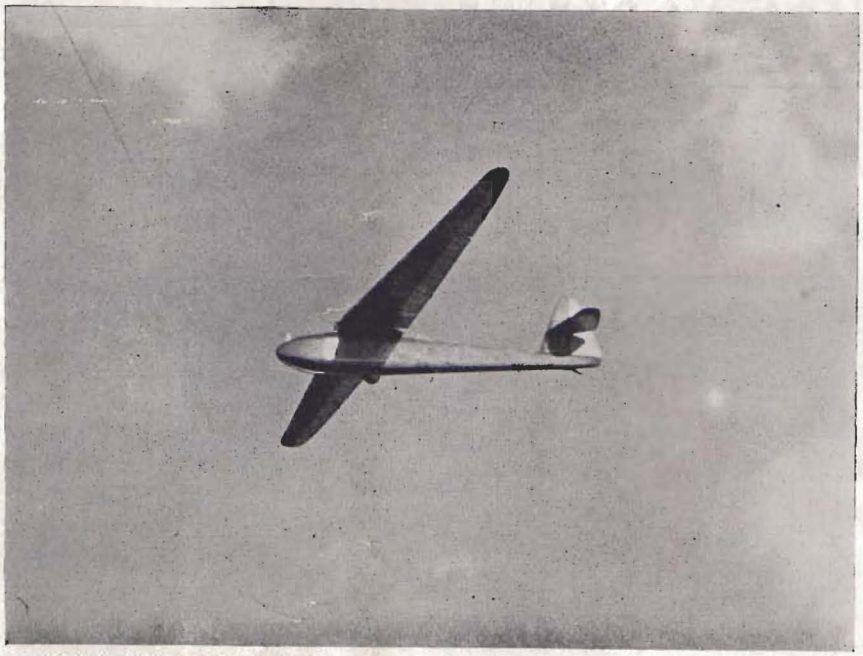
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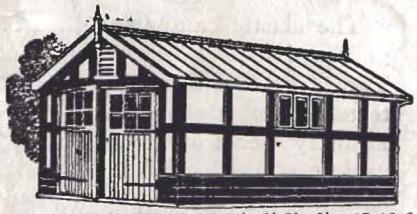
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