

SAILPLANE

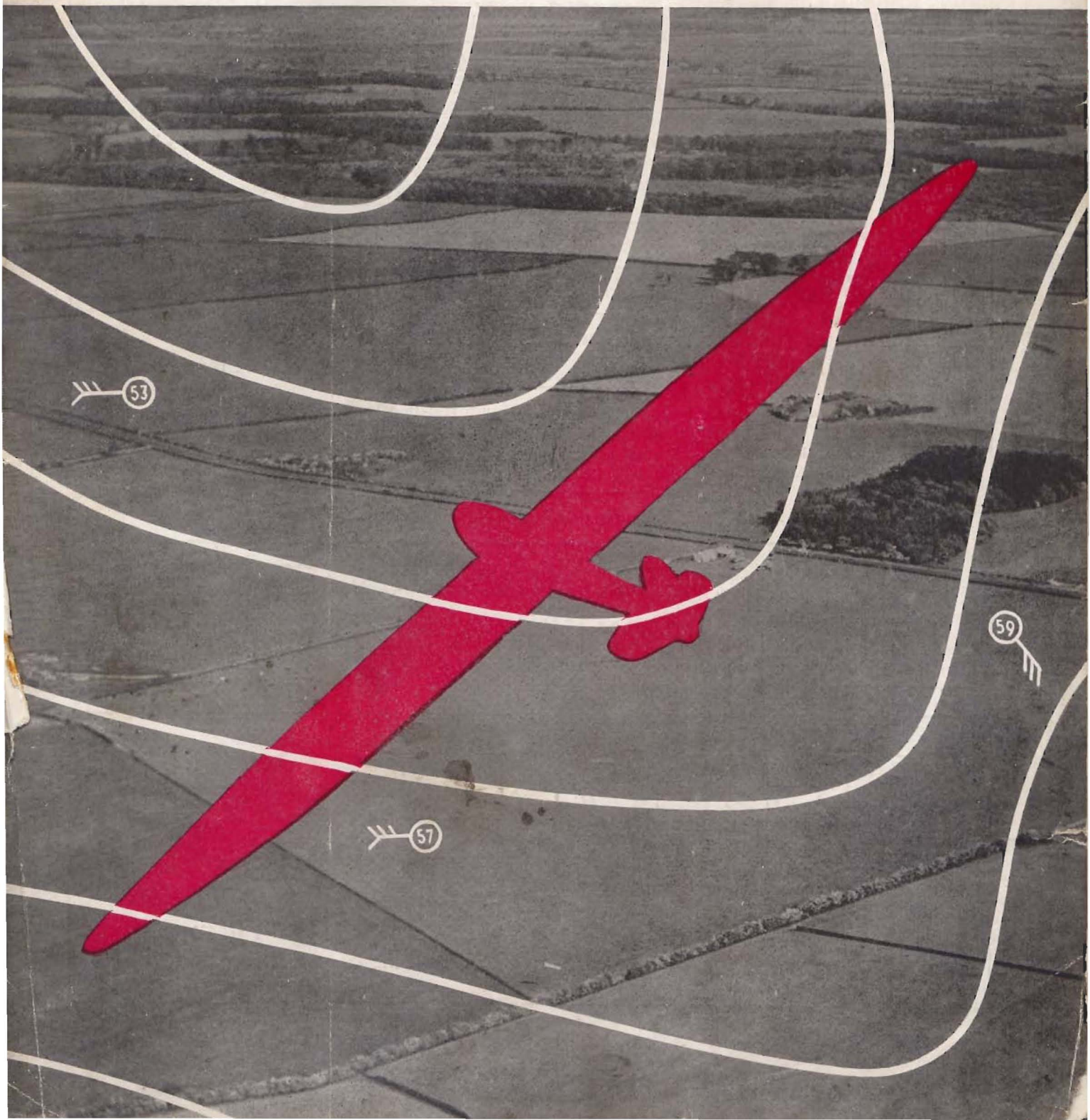
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Official Organ of the British Gliding Association

EDITED BY ALAN E. SLATER



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THE SAILPLANE *and* GLIDER

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Editorial

A GLIDING enthusiast who tries to impress the public with tales of marvellous long-distance flights is in a dilemma. For if he gets down to figures and mentions how far sailplanes have been able to go across country and how quickly they can cover the ground, he is met by the retort that other forms of transport are far more reliable and most of them considerably quicker. And if he counters this by explaining that it is not the purpose of sailplane pilots to use their machines for getting from one place to another, he will be asked: "Then why do they ever try?"

As sailplane performances improve and flights to a pre-determined goal become more frequent, the dilemma will get worse. Particularly will this be so the more the art of soaring flight becomes introduced into tropical countries. As long ago as 1931 the International Commission for the Study of Motorless Flight was urging that a sailplane expedition should be sent to India, and expressing its conviction that it would be possible there to make soaring flights to a regular schedule with the practical certainty of reaching one's destination. Nothing was done about it at the time, but a near approach to such conditions was found by the German soaring expedition which visited South America early in 1934. In the present issue of *THE SAILPLANE* Mr. Wills, as a result of his recent visit to South Africa, confirms that the conditions expected to be found in tropical countries were certainly present there.

In fact, sooner or later sailplane devotees will have to face the fact that there are parts of the world where soaring flight could be used as a regular means of transport. It is even possible that, over certain types of country, it might be the most economical means of transport of goods available, and, except for aeroplanes, the fastest. What will then become of our proud boast that soaring flight is a pure, clean sport, untainted by anything so sordid as commercial usefulness?

The truth seems to be that the "reliability" of sailplane flights to given destinations diminishes rapidly with increasing latitude, and, to some extent, with increasing proximity to the sea. In the article referred to, Mr. Wills gives reasons for thinking that "goal flights" are considerably easier to make in Germany than in the British Isles—a fact which may give

encouragement to the British team which is expected to enter for the international competitions at the Wasserkuppe this year.

Near the other extreme in latitude—the sub-polar regions—there are features that mitigate the disadvantages of being so far from tropic conditions. On the borders of the "Land of the Midnight Sun" the thermal currents, such as they are, continue throughout the 24 hours, so we were told recently by Peter Riedel, who took part in a sailplane expedition to Finland some time ago. Cumulus clouds, he said, continue to float overhead all through the night at midsummer, so that continuous cloud-soaring could be carried on from one day to the next.

Many "goal flights" are made in Germany, but it seems that the pilots often have to wait for suitable conditions. When those conditions are present, the possibilities with modern high-speed sailplanes are immense. The flight by the Hungarian pilot, Ludwig Rotter, described in our December issue, showed what could be done in directions other than directly downwind. Calculation shows that, if the pilot had chosen to carry out his flight directly into wind, he would nevertheless, given equal luck in finding thermals, have made a flight of 140 miles in the same length of time, and his average ground-speed for the trip would have worked out at 36 miles an hour.

In the British Isles the conditions for such flying are undoubtedly less frequent, but they do occur. Nowadays it is becoming common for club pilots to go wandering many miles away, over flat ground and then return to their club ground, as if in no way incommoded by the speed of the wind. What with the Yorkshire Gliding Club arranging to introduce aero-towing facilities, and several other clubs working on the problem of enormously high winch-launches, it seems that flights to pre-determined destinations on calm summer days are going to become much more frequent in this country.

Stimulus to the performance of such flights will be given by the very welcome announcement of an offer by Mr. C. Espin Hardwick, chairman of the Midland Gliding Club, of £50 for the first pilot to soar from the London Gliding Club to the Midland Gliding Club, 108 miles away to the north-west. It will take some doing.

From Here and There

Gliding in Southern Rhodesia.—Sir Abe Bailey has presented £3,500 to this colony for the encouragement of aviation. Part of the sum is to be used for a grant to the Umtali Gliding Club.

* * *

Yorkshire Club's Programme.—A prospectus of the club's camps and meetings for 1937 will be enclosed with our next issue. Among the arrangements is an Open Meeting with informal competitions at Easter, and an instruction camp from August 1st to 14th inclusive.

* * *

Cloud Motion Pictures.—The film of cloud photos, reproduced on page eight last month, was taken at the rate of one frame every half minute for 15 minutes—not 50 as stated. On the following page another correction should be noted in the fourth paragraph: "cell" clouds are cloud *sheets* subdivided—not "streets" (at least, not necessarily).

* * *

Whirlwind's Amazing Feat.—The upward current in a whirlwind must be at least as fast as the "terminal velocity" of the objects it raises, and this should be borne in mind when reading the following description of a whirlwind in South Africa, which has been forwarded to us by Mr. J. W. S. Pringle. The actual writer of the account is a medical man in Newcastle, Natal, who writes:—"Yesterday (January 3rd) the District Surgeon asked me if I would like to go and help with the post mortems on five natives killed in a storm, so naturally I went. These natives were all sitting in a hut and a whirlwind came and lifted hut and them, distributing them varying distances of 80 to 130 yards. Eight large cattle were carried up from an enclosure and dropped at similar distances, one as far as 180 yards. They were all killed, mainly by being dashed on the rocks. They must have been lifted to a tremendous height. Small sticks were hurled with such force that they penetrated the ground for three inches. Six huts were taken and no trace of them could be seen on the previous site except the presence of circular floors."

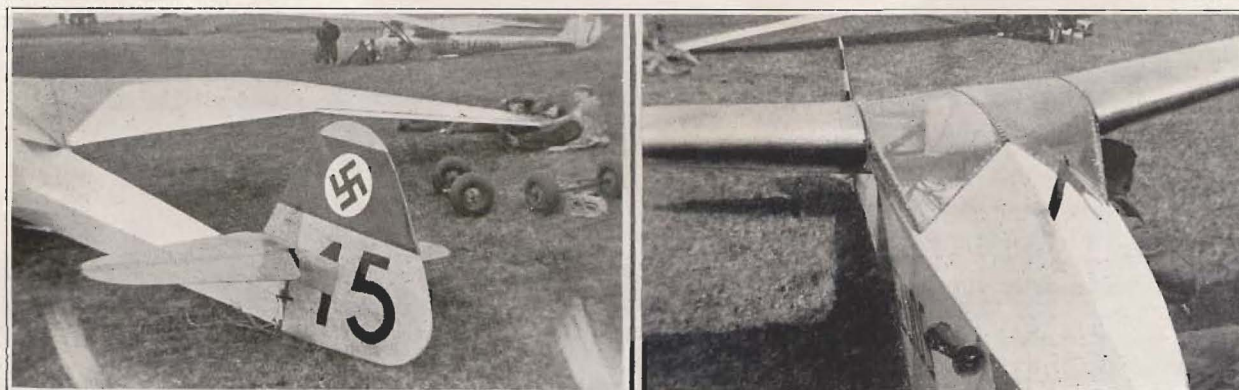
Without Controls.—Captain J. Railton Holden, having been a war pilot, aeroplane advertising agent, editor of a screen journal, mechanic, clerk, truck driver, snow shoveller, mine driller, fur trapper, airline pioneer, traveller and author, in various parts of the world, has now turned glider-designer in Yorkshire. He has built a model glider of "Pterodactyl" type which recently made a flight of two miles in the Tottley district. Finding the machine to be inherently stable, he believes himself to have solved the problem of "fool-proof flying for all at a cheap rate." In the next few months he will build a full-sized glider, capable of flying "straight and level without the use of controls at all," though it will have ailerons and an elevator. "I hope that every Tom, Dick or Harry will be able to walk off the side of a hill with this machine and fly away without any risk of a crash," the inventor told a *Yorkshire Evening Press* reporter. And he now threatens that, if it is a success, he will add a little engine to it.

International Competitions

An effort is to be made to send a British team to these competitions, which, as reported in our last issue, take place at the Wasserkuppe from July 4th to 18th this year.

Pilots who may be considered as possible entrants are to be circularised. It is proposed, once the team has been selected, to train them to as high a standard as possible in blind-flying and aero-towing. The best possible team of sailplanes will be sent. It is impossible at the moment to give particulars, but it is expected that the latest Slingsby product, the HJORDIS II., will be ready in time for one or more to be included in the team.

Those who are unable to be included owing to limitation of numbers imposed may decide to enter for the Austrian meeting on the Gaisberg from May 26th to 31st (note date, erroneously given in our last issue). It should be mentioned that any entrants for this meeting wishing to make use of aero-towed launching must produce a certificate that they have done at least 10 such launches previously.



The tail and nose of the Berlin sailplane "Helios," described on the opposite page. The fuselage structure is of metal, and the tail surfaces of plywood.

Metal Construction in German Sailplanes

EARLY in 1934 Oskar Ursinus, in his capacity of spiritual guide to the German gliding movement, wrote in his paper *Flugsport* that it was about time German sailplane designers turned their attention to metal construction; and later he suggested, "in order not merely to breed cold-glue engineers," that premiums for sailplanes incorporating new metal construction methods should be given at the annual competitions.

One such machine had already been turned out by the Berlin group. It was a sort of general purpose training machine called FLIEGE (Fly); large numbers were being made under a scheme for putting the unemployed to work. We have not seen it described in the German aviation Press, but one was on view at the Rhön competitions of 1933, and a photograph of it is given herewith. It had an open metal fuselage resembling that of a nacelled primary, and metal struts. The wings had a straight taper almost to a point at the tips. The machine was said to be designed for aeroplane towing as well as for instruction and soaring practice.

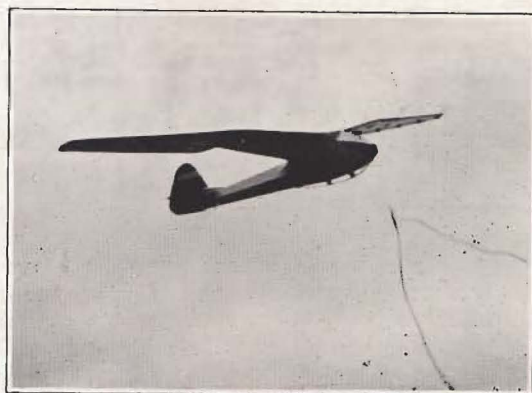


The "Fliege" type of all-purpose instruction machine, with a fuselage of metal.

At the 1934 Rhön meeting two part-metal sailplanes were among the competing machines: one, the HELIOS, from the Berlin *Hauptstelle für Segelflug*, the designers of the FLIEGE; the other, a two-seater called the MILAN, was from the Munich group. (A subsequent single-seater development of the latter, the ATALANTE, was the winning machine of last year's Rhön competitions.) These two groups have specialised in developing metal construction for sailplanes, so it will be of interest to describe their chief products.

The "Helios"

This machine was entered at the Rhön both in 1934 and in 1935, and in the latter year carried out a flight of 110 miles, taking $3\frac{1}{2}$ hours on the journey. This was on an almost calm day (it was the day on which Wolf Hirth soared 261 miles in 7 hours in the first



The "Helios" launched.

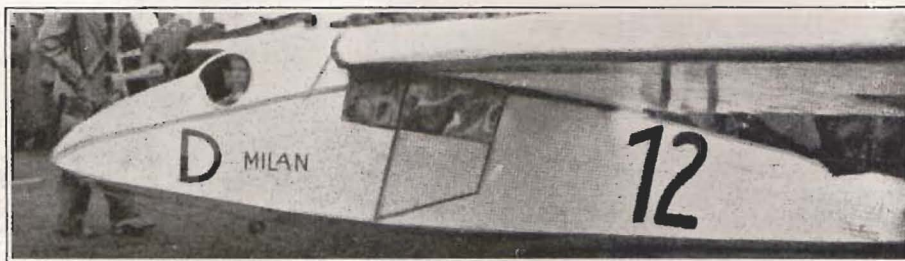
MINIMO), and the time taken is of interest in that the HELIOS was designed to have a high speed for long distance flying. This was attained by a thin wing section and high wing loading.

The wing section is complicated. At the root it is Göttingen 549, thickened by 18% (this being done to get higher lift values and greater spar depth). One metre out from the root it is Göttingen 549 unthickened; at the bend in the wing it is Göttingen 682, and at the tip M1. The gradual change from one section to the next is linear. As a result of the thin wing section, the wing, which is single-spar and of wood—not metal—can be deflected rather a lot; the amount of deflection at the tips is 27 cm. ($10\frac{1}{2}$ ins.) in an unaccelerated glide.

The bent wing is to give lateral stability. There is also so much longitudinal stability that the wing is almost inherently stable, and only a small horizontal tail surface is needed (fin and elevator 1.1 sq. m., or 11.8 sq. ft.). This is due to the backward-projecting ailerons, which comprise one-fifth of the whole wing area. There is also an aerodynamic wash-out of incidence of 3 degrees, to give an elliptical lift distribution.

Now for the metal parts of the machine. The ailerons are of dural, with a dural tube for spar and dural sheeting for ribs; the ribs and fittings are fixed to the spar tube by internal rivets in the Junkers manner. The leading edge of the ailerons keeps its shape by being surfaced with dural sheet; as this ensures great torsional stiffness, one central horn suffices for working each aileron. The ailerons are each hinged to the under-side of the wing in five places, and are separated from the wing by a narrow Lachmann slot (should we translate this "Handley Page"?), which opens when the ailerons are pulled down and thus ensures good efficiency in their action. The ailerons can together be pulled 5 degrees downwards to reduce landing speed; they are also arranged to act differentially.

The fuselage is built up of steel tubing; this was chosen on the ground of cheapness and rapidity in construction; in fact, it took two men only $2\frac{1}{2}$ days to cut and weld the fuselage framework. (The whole machine was built in $6\frac{1}{2}$ weeks, taking about 2,500 working hours.) The fuselage section is hexagonal



The two-seater sailplane "Milan," of Munich, showing the position of the passenger's cockpit, which is specially roomy and accessible owing to the metal construction of the fuselage.

in front, eleven-sided in the middle, and diamond-shaped at the tail end.

The pilot's head fits into the leading edge of the wing. The wing spar is attached to the fuselage on a very large base—the whole width of the fuselage—by two bolts, a third bolt being in the upper flange of the spar. The torsional loads in the wing are taken by a strong torsion rib.

Flying trials showed that there was something wrong with the air flow at the junction of the wing root with the body, for during landings the air stream would break away and the machine fall out of the pilot's hands when it was still doing 34 m.p.h. The same trouble had been found with the nacelled FLIEGE, and further trials with both types were needed to remedy it.

The dimensions, etc., of the HELIOS are: Span, 14 m. (45 ft. 11 ins.); wing area, 13 sq. m. (140 sq. ft.); aspect ratio, 15.1; empty weight, with instruments, 116 kg. (256 lbs.); flying weight, 200 kg. (441 lbs.); wing loading, 15.4 kg. per sq. m. (3.16 lbs. per sq. ft.); flying speed at least sinking rate, about 62 km. (39 miles) per hour; at best gliding angle, about 75 km. (47 miles) per hour, while at 53 m.p.h. there is little change in the gliding angle.

The "Milan" or "Mü 10"

The presiding genius of the Munich technical flying group is Egon Scheibe, who has been specialising in constructing gliders and sailplanes as much as possible out of steel tubing. The advantages he claims for this material, especially when used for the fuselage framework, are lightness, rigidity, durability, rapidity of construction, protection in crashes, and ease of repair. In a crash, for instance, a steel fuselage becomes deformed and thereby takes up the shock, whereas a wooden fuselage breaks. And it has been found by experience that severe damages can often be repaired in a few hours. Further, the steel construction can be more easily inspected, while parts such as incomplete bulkheads are more rigid than similar parts of equal weight in wood.

The MILAN, his most notable design, was built in 1934, took part in that year's competitions, and on August 20th, after they were over, was flown by the pilot Ziegler 203 miles from Hesselberg, in Bavaria, to Preice, in Czecho-Slovakia, taking 5½ hours on the journey and getting up to 6,250 feet.

It is a two-seater machine, and last year took part in the 400-mile sailplane tour described in last month's SAILPLANE, getting nearly all the way round with a passenger. It has performed many fine flights in Ziegler's hands, and is still going strong.

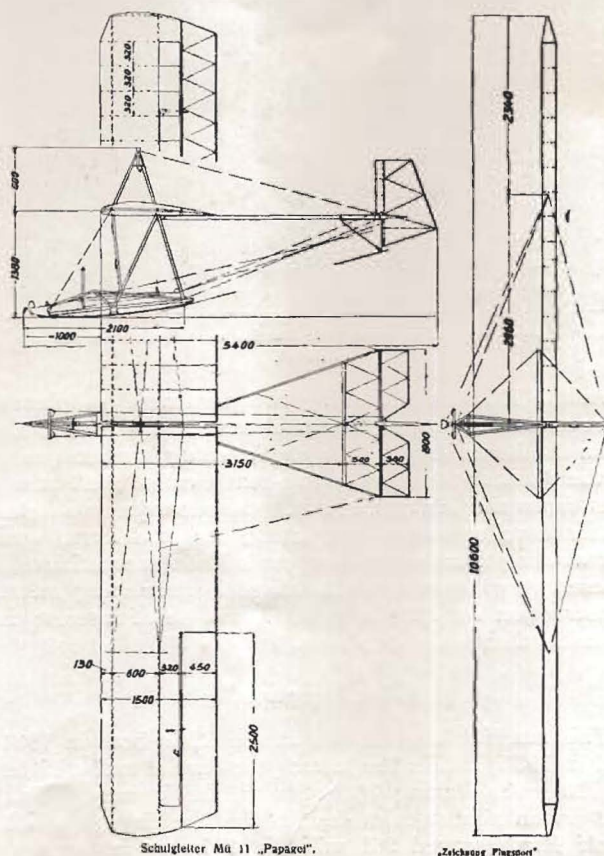
The steel tube construction has, it is claimed, alone made it possible to include a second occupant without

weakening the wing-fuselage junction, and to make his seat easy of access. A peculiar feature of the wing, which is in two parts, is that the division between the parts is to one side of the fuselage, not in the middle. The ailerons are also built on a steel tube framework, and are actuated by push-rods. The elevator and rudder are cantilever, and can be quickly assembled.

Dimension, etc., are: Span, 17.8 m. (58 ft. 5 ins.); wing area, 22 sq. m. (237 sq. ft.); aspect ratio, 14.4; empty weight, 185 kg. (408 lbs.); additional weight, 165 kg. (364 lbs.); flying weight, 350 kg. (772 lbs.), which gives a wing loading of 3.26 lbs. per sq. foot. The wing section is a special one developed by the Munich group.

The "Mü 11" Metal Primary

Scheibe's next creation was a training machine which was given the name of PAPAGEI ("parrot"). It is almost the precise opposite of the Dagnall primary, for, whereas the DAGNALL has metal booms to the tail and the rest of the machine of wood, the PAPAGEI has wooden tail booms and the rest of the fuselage is built



of steel tubing. There are only two of these booms, so six rigging wires are needed in addition to hold the tail in position.

The machine weighs less than either the ZÖGLING or the GRUNAU 9 primary, its weight being 92 kg., or 203 lbs. Having so much weight to spare, the designer could afford to simplify the wing construction, so he has covered the upper surface of the wing with plywood as far as the rear spar, and in consequence the wing needs no diagonals inside. The wing section is rather flat, being Göttingen 633 modified, and there are two spars of "E" type. All the wing ribs are alike.

The ribs of the ailerons and the ribs and spars of the tail surfaces are of simple pine board 4 to 8 mm. thick; the increased stiffness is found to be a useful attribute when the machine is being lifted about, and the additional weight, as compared with built-up ribs, is small. The elevator is actuated from one side only.

All possible metal-to-wood connections are made with hollow rivets for cheapness. All control levers and horns are of steel sheet. Wing rigging wires are hung from tongues on a tube going through the front and rear spar, which serves also as a tie-rod. The machine can be assembled very quickly. The rigging wires are just hung on what the designer calls "a species of carbine-hook" made of metal plate. The fitting on top of the cabane to which the upper wires are attached is made so that it can be lowered and raised. It is lowered while all the rigging wires are coupled up, and then, by simply raising it and fixing in the raised position, the whole lot of wires—upper and lower, including all control cables except those to the rudder—are tightened up and the machine is ready for use. Four practised men can do all this in 4 minutes.

The span is 10.6 m. (34 ft. 9 ins.), and wing area 16 sq. m. (172 sq. ft.). The flying speed is said to be between that of the ZÖGLING and the GRUNAU 9, and the sinking speed and gliding angle better than either. The machine is claimed to differ from most primaries in being "comfortably sensitive on the ailerons."

"Merlin" and "Atalante"

We now come to the *pièce de résistance*, the new machine which put up easily the best performance at the last Rhön competitions. Actually there are two of the type, which is known as "Mü 13." Kurt Schmidt, who won the competitions, designed it in collaboration with Egon Scheibe.

Schmidt will be remembered as the pilot who put up a world's duration record of 36 hours 35 minutes in East Prussia in August, 1933. In the following year, while he was visiting the Hesselberg centre, his friend Scheibe took him for a flight in the MILAN. Thereupon Schmidt decided to build himself a similar machine, and, as there were no funds or facilities for doing so in East Prussia, he decided to settle in Bavaria, where at least the Munich group could give him space in their workshop. Here he worked for two years, giving up flying during that time, of which the first six months had to be spent working out the design, owing to the many unconventional features. He had to raise in all 7,000 to 8,000 R.M., and it was only a final windfall at the last moment that enabled him to take part in the competitions at all. The cost of the machine when put into production is expected, however, to be between



The "Atalante" at last year's Rhön competitions.

2,600 and 3,000 R.M. Schmidt himself spent altogether 3,000 hours on it.

The two machines of the type which have been built are the MERLIN, which was ready first and took part in the sailplane tour and the Alpine trials last year, and the ATALANTE, which Schmidt built himself. Both are designed to take an auxiliary motor later, not to convert them into aeroplanes, but chiefly to help them to get up to thermal currents in the morning and reach an aerodrome at night. But whereas in the MERLIN the motor is to be in the nose (necessitating a temporary launching undercarriage for keeping the airscrew off the ground), in the ATALANTE it is to be above the wing, and will be capable of being swung inside the fuselage as in the Carden-Baynes auxiliary sailplane. Kurt Schmidt intends to put in a motor of 12 to 14 h.p., and it is admitted that it will be used for returning home after a long-distance soaring flight. In each machine the motor will be easily removable in a few minutes.

The wing, as in the MILAN two-seater, lies directly on a rectangular-section fuselage built of steel tubing. Schmidt used chrome-molybdenum steel, because it is easily welded, very rigid, and yet available in thin-walled tubing—0.5 mm. was the thickness he used almost exclusively. The fuselage weighs only 52 kg. (115 lbs.). By having the pilot's head in the leading edge of the wing, the fuselage could be kept narrow (it has a clear width of 54 cms., or 21½ ins.). This also gives the pilot good visibility in front. For good visibility downwards, and while making turns, there is a large triangular window on each side of the cockpit (covered, of course, with transparent material). The junction of the cockpit cover with the wing is specially good aerodynamically, and is also such that the pilot can easily get out in an emergency.

The wing is divided asymmetrically, as in the MILAN, and this allows of a clear space for winding in the motor, just as in the MILAN space for the passenger is obtained by the same means. The unequal division of the wing also makes for ease of assembly: first the larger right wing is laid on the fuselage and fixed to it at three points; the left wing is then coupled to the right at the main spar, and only fixed to the fuselage, automatically, at the auxiliary spar. The bolts at the main spar are brought into position by a lever.

The wing section is developed from that used in the MILAN; it has a thickness of 13 to 15%. The aim was, "with otherwise good wing-section properties, to attain

low C_{mo} , in order to reduce the twisting loads of the wing and therewith the weight of the parts thereby stressed." The wing has a single main spar of "E" section, with torsion-resisting leading edge. The spar attachments consist of supplementarily reinforced chrome-molybdenum sheet and are, like most of the other connections, fixed by hollow rivets to the wooden parts.

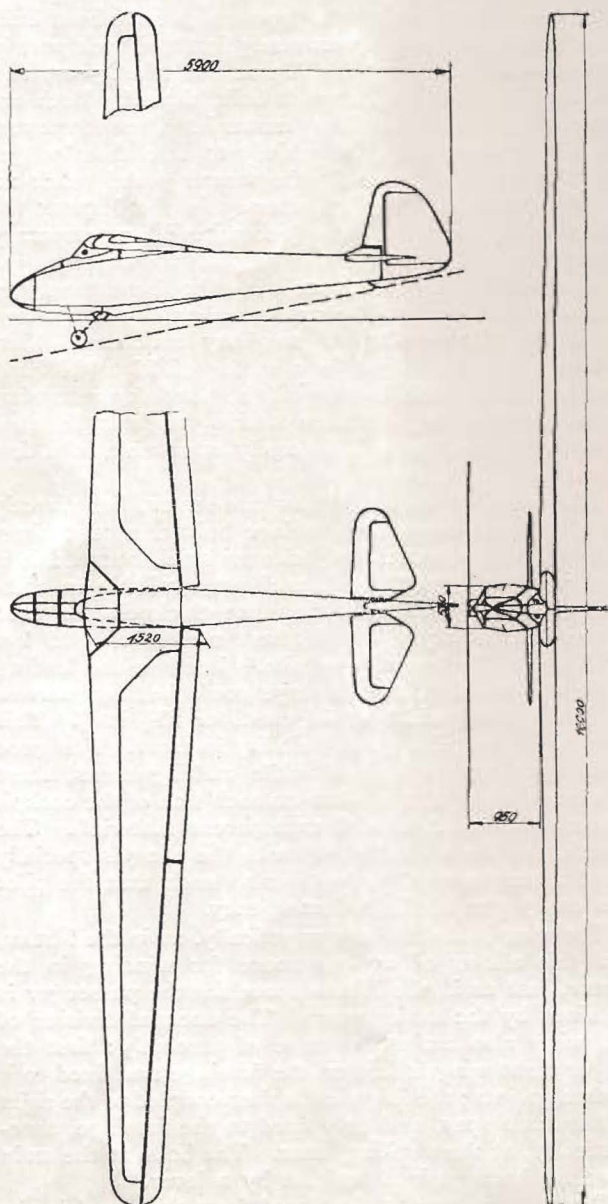
Ball bearings are extensively used for the controls.

There are two movable surfaces on each wing, the outer ones being the ailerons and the inner ones trimming flaps. Both pairs have a framework of steel tubing, to get rigidity with little depth. The ailerons can also be used for trimming. An ingenious and useful feature, in the ATALANTE only, is that the trimming can be carried out unequally on each side, in such a way as to make the machine more efficient when



The cockpit of Kurt Schmidt's "Atalante," with its cover removed to show the steel tube construction.

[Photo by H. L. Richardson.]



Plan of the "Mü 13."

[Reproduced from "Flugsport."]

doing tight turns. The connections to the inner flaps are made automatically when the wing is being assembled.

The elevator (pendulum) is in one piece, and is secured quite safely by screwing up only one wing-nut. The rudder is just as simply secured. In fact, what with the easy assembly of the wings, too, the whole machine can be assembled, it is claimed, by two men in three minutes.

The undercarriage includes a double wheel which, when pushed out, raises the body 16 inches off the ground.

The dimensions, etc., are: Span, 16 m. (52 ft. 6 ins.); area, 16.5 sq. m. (178 sq. ft.); aspect ratio, 15.5; chord at wing root, 1.52 m. (5 ft. 0 in.); empty weight, 145 kg. (320 lbs.); additional loading, 90 kg. (198 lbs.); weight in soaring flight, 235 kg. (518 lbs.); motor, etc., about 40 kg. (88 lbs.); flying weight with motor, 275 kg. (606 lbs., which, it is claimed, is no worse than the average modern high-performance sailplane without motor); wing loading without motor, 14 kg. per sq. m. (2.87 lbs. per sq. ft.); with motor, 16.6 kg. per sq. m.; elevator area, 1.35 sq. m. (14.5 sq. ft.); rudder area, 0.90 sq. m. (9.7 sq. ft.); aileron area, 2.40 sq. m.; least sinking speed, 58 cm. (1 ft. 11 ins.) per second at about 45 km. (28 miles) per hour; best gliding angle 1 in 24 at about 60 km. (37 miles) per hour.

The flying properties are remarkable. A complete circle can be turned in $6\frac{1}{2}$ seconds, with the machine's efficiency maintained by unequal trimming of the flaps. With the help of the flaps the machine can be flown as slowly as 22 to 25 m.p.h., while it takes a speed of 53 m.p.h. to increase the sinking rate beyond one metre per second. Manœuvrability is helped by the low inertia, due to the short fuselage and to the taper of the wings, which enables their tips to be built very lightly. When the machine was at the Rhön, everyone remarked on the way Schmidt would overhaul his competitors shortly after the start; he attributes this to his ability to use narrower thermals than anyone else.

Thus is the tale told of how Kurt Schmidt did no flying for two years, went along to the Wasserkuppe with an untried machine, and proceeded forthwith to win the competitions.

Gliding Certificates

The following gliding certificates were granted by the Royal Aero Club at the committee meeting held on January 25th:—

"A" Certificates

No.	Name.	Club.	Date.
619	L. de L. Humphreys	Midland	29.11.36
620	G. L. Coates	Newcastle	29.10.36
621	K. L. Wood	Newcastle	13.12.36
622	R. H. Miller	Cambridge Univ.	16.12.36
623	Miss M. N. Searl	London	22.7.36
624	H. W. Allen	Midland	4.10.36
625	W. M. Taylor	Newcastle	26.12.36
626	E. R. Wilson	Midland	25.10.36
627	W. E. Crease	London	23.12.36
628	C. Hossle	Channel	3.1.37
629	S. H. Rutherford	London	6.12.36
630	J. Wareing	Yorkshire	13.8.36
631	J. J. Nolan	Yorkshire	10.8.36
632	S. K. Hambling	London	28.11.36
633	J. J. Walker	Kent	10.1.37

"B" Certificates

No.	Name.	Club.	Date.
532	W. L. Hatcher	Southdown	22.11.36
524	R. H. Bolton	London	31.5.36
141	F. G. Whitnall	Channel	13.12.36
603	A. A. J. Sanders	Midland	19.12.36
626	E. R. Wilson	Midland	29.11.36
628	C. Hossle	Channel	3.1.37
630	J. Wareing	Yorkshire	13.8.36
631	J. J. Nolan	Yorkshire	13.8.36

"C" Certificates

No.	Name.	Club.	Date.
466	M. F. Barnes	Midland	19.4.36
520	L. S. Holt	London (Imp. Coll.)	6.12.36
366	H. K. S. Smith	London	14.11.36
626	E. R. Wilson	Midland	29.11.36
524	R. H. Bolton	London	3.1.37

A name which occurs three times in the above list is that of Mr. E. R. Wilson, secretary of the Pwllheli Gliding Club, the only known club in Wales. The club began flying activities at the beginning of 1935, and carried on gallantly with only a very small population to draw upon; but has now had to suspend operations. Its secretary thereupon joined the Midland Gliding Club, whose site is near the Welsh border, and obtained all three gliding certificates within five weeks.

It is now possible to count up the number of gliding certificates which were not only qualified for but also applied for during 1936. There are still a number of pilots, however, who have not yet applied for certificates although they have done the qualifying flights during the year; in the London Club, for instance, there are 22 "A," 21 "B" and 8 "C," and in the Midland Club 9 "A," 10 "B" and 6 "C" flights thus unaccounted for in the official returns.

The following table gives the numbers of certificates obtained so far for which qualifying flights were made during 1936, arranged according to clubs. It should be noted that the Imperial College Club is now part of the London Club, under which some of their members' certificates are listed instead of under Imperial College. As we are unable to sort these out, perhaps it would be best to add together the figures for both clubs.

Totals for 1936

Club.	"A"	"B"	"C"	"Silver C"	Total.
London	37	21	21	1	80
Imperial Coll.	3	3	2	—	8
Midland	16	14	24	—	54
Derby and Lincs.	17	11	12	2	42
Yorkshire	15	12	12	1	40
Southdown	3	3	—	—	6
Cambridge Univ.	2	4	—	—	6
Newcastle	5	—	—	—	5
Ryedale	1	1	1	—	3
Channel	—	2	—	—	2
Furness	1	1	—	—	2
Essex	2	—	—	—	2
Kent	1	—	—	—	1
Totals	103	72	72	4	251

It will be seen that, for the first time in history, a provincial club is leading in the number of "C" certificates qualified for and applied for during one year. The Midland Club is to be congratulated on its achievement, the more so as the club is only two years old, and all the "C" flights were made since the middle of April last, when the club's soaring site at the Long Mynd, Church Stretton, first came into full use.

"Silver C" Certificates

There are now 11 British pilots who hold the international "Silver C" badge and certificate. This award, the highest a sailplane pilot can earn, is given for soaring flights of 50 km. distance (31 miles), 1,000 metres climb (3,280 ft.), and 5 hours duration. It was instituted in 1931.

The first British "Silver C" pilot was the late G. Eric Collins; he was awarded the certificate in May, 1934. Since then nine other pilots have earned the award by flights made in England, and one British pilot, Miss Heron-Maxwell, in Germany.

The full list is as follows:—

1934.	G. E. Collins	...	No. 26
"	P. A. Wills	...	No. 45
1935.	R. G. Robertson	...	No. 75
"	S. Humphries	...	No. 85
"	J. C. Neilan	...	No. 174
"	C. Nicholson	...	No. 177
1936.	N. Heron-Maxwell	...	No. 208
"	P. M. Watt	...	?
"	H. C. Bergel	...	No. 244
"	A. L. Slater	...	No. 291
"	G. O. Smith	...	No. 298

Further aspirants to this coveted badge (and may there be many this year) are reminded that certain certificates and records are required as evidence that the necessary flights have been made before the "Silver C" can be applied for. These were set out in THE SAILPLANE for July, 1936, on page 123.

Impressions from South Africa

By P. A. WILLS

1

OF the best moments of the trip I am unqualified to write. A category of facts or theories is one thing, but experience is built up of the impact of a multitude of impressions and personalities which can only be adequately described by a born writer.

The really unforgettable things were such as the silence of the veldt from one's bunk in the hut at Quaggapoort; the good fellowship of the campers; their ardent shovings of the primary in the heat of the frightfully rocky hillside; the long waving tail of a widow-bird in flight accompanied by his five or six insignificant wives; the startling colours of Frank Hatfield's shirts or the equally startling exiguity of Pat Retief's feminine shorts; the startled look on my wife's face when she lifted a boulder which was hindering my take-off and exposed a large scorpion underneath it; and the equally startled look on Johannes the nigger's face when I landed the KITE beside him in the veldt and borrowed his push-bike to get to the nearest telephone seven miles away; the brown veldt which, in a week of summer rains, became green and starred with wild flowers.

Wherever a gliding enthusiast may go to-day, he can be sure of instantly finding a number of friends ready-made, with common interests and of uncommon niceness.

2

The finish of the KITE, a perfectly standard one, evoked gasps of admiration from everyone who saw her—gliding enthusiasts, power pilots, and just ordinary landlubbers. She quite put to shame the GRUNAU BABY of German manufacture, both as regards finish and quality of workmanship and materials. Let us not fail to be thankful for our blessings.

3

We have already had from THE SAILPLANE tantalising glimpses of huge Air Force gliding activities in other



The club house at Quaggapoort during the instruction camp held by the South African Gliding Association; showing also, from left to right, the "Kirby Kite's" trailer, the "Avis" sailplane, and the "Grunau Baby."

countries. As one of the results of my trip, a South African Air Force gliding club was, when I left, in process of forming, and I left the KITE in their charge. Over 300 members of the Air Force had signified their interest, which must be quite a percentage of their total strength. Now, a large number of these people were from ranks, which in the ordinary way get no chance of learning to fly. I suppose that for every pilot in an Air Force there must be at least five able-bodied men employed on the ground as riggers, fitters, and so forth; it must be a most valuable thing if they can be given an opportunity to learn to fly, as many of them are anxious to do.

An Air Force gliding club seems to be the ideal way to achieve this, without great expense. Curiously enough I read the other day in an aviation magazine a complaint on the subject from a member of the Air Force, but the solution does not so far seem to have occurred to anyone in this country. The present



Manhandling the "Avis" sailplane up the slope at Quaggapoort; a photograph showing the rough and rocky nature of the slope.

feverish rush in our Air Force will presumably put off the glad day for a while, but sooner or later it seems to me that every Air Force in the world must have its own club, with aero-towing facilities; which is something for our manufacturers to look forward to.

4

The week-end of aero-towing into thermals which we did convinced me that this method of launching must be greatly developed in this country before our advanced pilots can be expected to put up flights comparable to continental ones.

The average pilot in this country gets no more than from three to six chances yearly to indulge in thermal soaring. The wind has to be right; it has to be a Sunday, or occasionally a Saturday; conditions have to be unstable; and there is no doubt that the weather in this country is far less favourable than on the



Soaring in South Africa: P. A. Wills carries out a thermal flight over Roberts Heights aerodrome.

continent. There the cloud base is often 7,000 or 8,000 feet, whereas here it is commonly at 3,000 feet, and the very best conditions give one 5,000 feet as the limit, short of blind flying.

Of course, it must be remembered that hitherto there have been only two or three advanced sailplanes in the country (from the high-speed angle); but this will be altered with the advent this year of the latest Slingsby product.

What has held back aero-towing so far is partly the cost, which is in turn partly due to officialdom regarding "B" licence pilots for the aeroplane and the usual expensiveness of powered flight in this country; and partly an erroneous idea that the method is difficult and even dangerous for the pilots of both machines. Efforts are now being made to cheapen the system; as regards the second point, experience in Germany and elsewhere should surely now have taught us the error of this view.

We persuaded a sporting private owner at Roberts Heights, and he towed us up in perfect style (the sailplane pilots, including several Air Force pilots who have never previously flown a sailplane), and ended up the day by exchanging places and bringing down the Rand Club's GRUNAU BABY without more than a reasonable number of hairs being raised. In South Africa one could, nearly every day, have an aero-tow to 1,000 feet, and then stay up as long as one wished, which, on a light wind day, was delightful. But even here in England thermal soaring should be possible during the summer months at least one day out of two, and the skill and opportunities of advanced pilots thereby immensely increased.

5

Weather was too much for my limited meteorology. The wind invariably blew from the north. Perhaps I was lucky, but during the 50 odd days I was there, it must have been up the hill on 45 of them. The altitude and the heat combined seemed to increase the sinking speed of the KITE by from two to three times. Thermals were frequent and violent, 15 feet per second being usual, and 20 feet per second not uncommon; but they would often fade out quite low—around 2,500 feet.

The greatest height I reached was 5,400 feet. The barograph chart of my cross-country from Quagga-poort to Germiston published in the December *SAILPLANE* (p. 267) was not corrected for height. The launching point at Quagga-poort is about 5,800 feet above sea level. With this correction it will be seen that the maximum height reached was about 11,200 feet above sea level, and the KITE fell out of this thermal like a Lost Soul.

The cloudless days were the best, as the streets of strato-cumulus that covered the sky from horizon to horizon on some days were usually at only 1,800 to 2,000 feet, and were quite shallow. The lift underneath them and inside was not more than two to three feet per second, and was erratic, as I found to my cost when I tried to do a cross-country on the last week-end but one. Before that I had not dared to try anything ambitious, as in the absence of repair facilities the slightest damage would have been the end of the whole trip. The high veldt is covered with millions of ant-heaps, baked as hard as bricks, and from six inches to three feet high; just enough to buckle in the bottom of the fuselage if one was unlucky. But for these, it must be the world's best forced-landing country, being rolling grassland, unfenced for hundreds of miles.

SEEN FROM THE BOWL AT DUNSTABLE.
 Sun August, 1934: 9.0 a.m.



Queer Soaring at Dunstable

ON Sunday, January 10th, a number of soaring flights were made at the London Gliding Club's ground in conditions which, according to accepted ideas, should have made it impossible to soar at all. The soaring was done in a wind which had reached the club ground by blowing obliquely down a slope 250 feet high, and the area of lift remained stationary for over three hours over almost flat ground.

The best soaring was found over a particular field at all heights from about 300 feet to 1,250 feet, though at intermediate heights between these two extremes the soaring area was somewhat larger. The field extends north from the "Gully" marked on the accompanying map. The map shows the club's soaring ridge which faces north-west and west, and which at its north end bends round into a projecting knob, the inside of the bend being known as "The Bowl," and the knob as "The Knob of the Bowl." The full list of flights is given in the Club News section, but the principal flights will be described here.

D. G. Hiscox was the discoverer of the extraordinary zone of lift. He went up in the *FALCON III*, two-seater with a passenger at about 1.15 p.m. This and every other launch was by winch cable, the winch being placed at the foot of the hill in a direction S.S.E. from the clubhouse; each launch started from in front of the clubhouse and was carried out directly into wind. The wind was strong, also cold; its direction was about S.S.E., or more accurately S. by E. Most machines were lifted by the launch to about 300 to 350 ft. above the start, or about 100 ft. above the level of the hill-top. They then cast off and turned down wind to the field just north of the "Gully," where they would manoeuvre for a landing into wind at the starting point, but in many cases were astonished to find themselves gradually climbing instead, without apparent cause.

This is what happened to Hiscox in the two-seater. He got a little genuine "slope lift" off the Knob of the Bowl, but then flew west to the Tring Road (marked on map); admittedly the ground there still sloped slightly into wind, but on previous occasions, with the wind in the same direction, the gentle slope has never been found to provide appreciable lift. This

time, however, Hiscox gradually climbed to 1,000 feet above the start by beating to and fro between the Tring Road and the "Knob."

He then came down in order to get out his own *KIRBY KITE*, in which he was launched at 2 p.m. and continued soaring till 4.17. By 3 p.m. the *KITE* had found its ceiling at 1,400 feet (above start), and by 3.30 this had increased to 2,250 feet. It was found that at this greatest height the zone of rising air was very narrow—in fact, it was always located over a particular spot near the middle of the aforementioned field. At lower levels, however, the area of lift was much larger, so that the region of lift had an upper surface shaped like a cone.

This *KIRBY KITE* is fitted with an Askania variometer calibrated in metres per second. At no time during the flight did it register as much as one metre per second rise. Most of the time it showed about 9 inches, though at 3 o'clock it went up to about 2 feet a second while Hiscox was flying over the outer knob of the Bowl towards the flagpole in front of the hangar (i.e., about S.S.W.). In spite of exploration in all directions, the variometer always showed best reading at that location. But the region of 6 to 9 inches rise persisted as far as the Tring Road to the west, about 100 yards beyond the hill-top road to the east (i.e., over the golf course—see map); as far as the Gully to the south, and about over the swimming pool to the north (this is half-way between the Bowl and the "Rifle Volunteer"). Outside that area there was mostly a 6 to 9 inches sinking speed, which actually means a rising current of 2 ft. 3 ins. to 2 ft. 6 ins. per second, since the *KITE*'s normal sinking speed is 3 ft. per second. Over the swimming pool the pilot usually found it a little rough, but almost everywhere else it was absolutely smooth—in fact, the phenomenal smoothness of the air was remarked by all the pilots.

Further points noted by other pilots as well as by Hiscox were the presence of haze up to 1,000 feet, above which height a "haze horizon" could be seen below; and the warmth of the air in which they were soaring, in contrast with the air at the ground. In some places Hiscox found patches of cold and warm air close together, and in such places it was apt to be



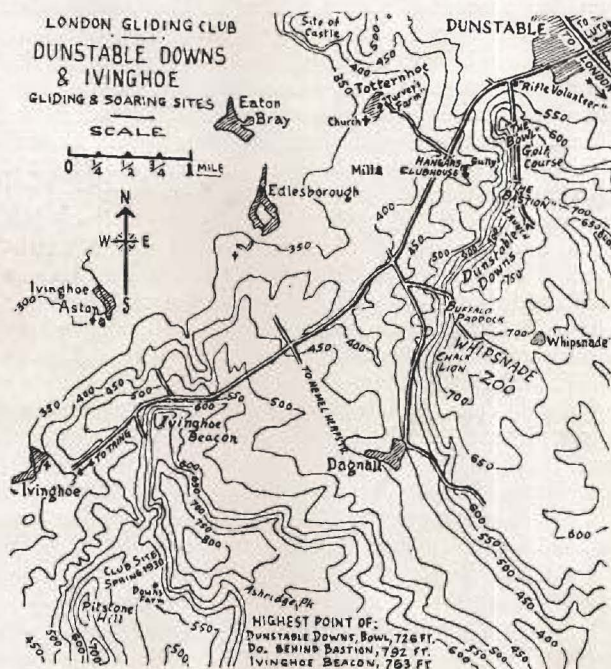
The London Gliding Club ground seen from the "Bowl" at the north end of the soaring ridge: a panoramic photograph extending from about S.S.E. to W.S.W. The main soaring slope, referred to in the accompanying article, is left centre, with the "rim" of the Bowl in the foreground. The "Knob" of the Bowl is at the extreme right, and at its foot is the field over which some extraordinary soaring flights were done on January 10th. Beyond this field a dark line of bushes marks the "Gully," above the far side of which are the hangars and clubhouse (now replaced by a new building). A portion of the Tring Road is on the right, while on the left the hill-top road approaches the horizon at the point from which the wind blew on the occasion described.

[Photo by R. A. Restall.]

bumpy, but the presence of such patches of cold air did not seem to affect the strength of the lift. Another thing he noticed was that at the location of greatest lift one wing was several times raised, necessitating flying back into the extra lift thus indicated.

W. B. Murray flew the FALCON III. two-seater from 2.13 to 2.30 and again from 3.7 to 3.33. He made the interesting observation that the warm air was always found above 500 feet, although the rising current started from a lower level at which the air was cold; the contrast was very marked. When he had cast off the winch cable, he would fly along the west-facing slope, rising all the way from a point opposite the hangar along to the Bowl, as if there had been a wind blowing *up* the hill instead of, in fact, a wind blowing obliquely down it. He would then fly west from the Bowl to the Tring Road; then turn round and re-trace his course, first to the Bowl and then along the west slope—still rising. On his second flight he spent a considerable time west of the Tring Road, trying to reach Eaton Bray, and losing height only slightly (actual loss unknown as the FALCON III. has no variometer).

J. C. Dent flew a club GRUNAU BABY from 3.2 to 3.45. On casting off the winch cable, he proceeded to gain height all the way to the Bowl. He continued climbing rapidly and in 10 minutes had got level with Hiscox. Having no altimeter, he got as near Hiscox as he dared and asked him the height, being told it was 1,400 feet. He then flew west out to Totternhoe and beyond, but found himself losing height, so he returned, still losing, until he crossed the Tring Road at a point opposite the clubhouse, whereupon he immediately found lift again. He describes the area of lift as pear-shaped, with the stalk end at the knob of the Bowl.



G. B. Baker was up for nearly an hour in his own GRUNAU BABY from 3.13 to 4.2. He had a variometer and altimeter, and was able to reach a maximum height of 1,800 feet. He wandered about all over the area of lift, exploring its boundaries and the strength of the up-current. Once, starting from the Bowl, he flew half a mile west, then half a mile south, then half a mile east, and found lift at 2 ft. per second all the way—that is, a rising current of 2 ft. per second *plus* the machine's normal sinking speed. Another time he flew southwards across the club landing ground at 45 m.p.h., at a height of 1,000 feet, and found lift as far as a point opposite the Chalk Lion at Whipsnade Zoo (marked on map). In general he found that at 1,000 ft. the lift was about 3 ft. per second; above that height it was less. He found, further, that the area of lift enlarged from 3 p.m. onwards "as the sun got round." The western boundary ran about due north from the "Plough" Inn (this, on the map, is at the point where the road from Dagnall and Whipsnade enters the Tring Road). The northern boundary was very sharp, and ran W.N.W. from a point a little to the north of the Bowl. And Baker always got a "bump" at a point just west of the Knob of the Bowl. The wind above 600 feet, he says, was blowing from the south.

J. S. Fox flew the FALCON III. from 3.40 to 4.2. He reached a height of 1,400 feet. While soaring near the Bowl, he got the impression that he was getting some "slope lift" from a small valley that runs up to the golf course from the south-east (see map). After flying from the Knob up-wind over the clubhouse and beyond (i.e., the wind at that height was S.S.W.), he turned right and noticed that as soon as he crossed the Tring Road he got into cold air.

Mr. Ellis, who flew the club GRUNAU BABY from 3.53 to 4.15, states that he found the best lift along the road which goes from the "Rifle Volunteer" to Totternhoe (not marked on map); it was present as far as Totternhoe. He found no lift over the Bowl. To get

down, he proceeded south as far as the road which climbs the hill to the Zoo (by Buffalo Paddock—see map), losing height at about normal sinking speed. On returning to the club ground he felt a bump as he crossed the rabbit warren just south of the hangar.

The last soaring flight of the day was by W. Liddell in his own KIRBY KITE; he kept up from 4.3 to 4.30, thus showing that the soaring conditions persisted till after sunset.

And now for some observations from the earth-bound. The day was cloudless, but there was a considerable haze. The wind was cold and blowing perhaps 15 to 20 m.p.h., from S. by E. High up where the machines were soaring, the wind was evidently S.S.W., as they often flew in that direction with no sign of side drift. Their "ground speed" at such times suggested that they had a wind of 25 m.p.h. against them.

An interesting observation was made at the house of J. M. Noble, on the Totternhoe—Rifle Volunteer Road, which was that the wind there was blowing *towards* the hill—parallel to the road—while the soaring was going on; this would make it about W.S.W. He also noticed that at the garage by the Rifle Volunteer the air was nearly calm, with a light drift from the north.

The writer went for a walk up to, and round, the Bowl between 3 and 4 p.m., to note the wind direction in different parts of the ground. The wind was light in the Gully, gradually increasing up to the Knob of the Bowl, where it was 25 or 30 m.p.h. and very cold; the direction was S. by E. or S.S.E. This was also the direction all round the rim of the Bowl, and 50 yards to leeward of the rim (though less fierce there). But inside the rim the air was rising slowly from the centre of the Bowl towards the rim all round, irrespective of the wind direction above the top. Along the west slope there are a series of indentations (seen on the left side of the panoramic photograph); inside the first of these the air was drifting lightly down-hill

from the N.E. On shaded slopes there were actually bits of snow lying about.

A curious sight to be seen from the top of the Bowl was a dip in the "haze horizon" in a direction between N.W. and N.N.W. An indistinct top to the haze layer could be made out all round the compass, except that in this particular direction there was a cup-shaped depression in the surface of the haze, where the outline was much more sharp than anywhere else. The same phenomenon was seen by R. H. Bolton, standing by the winch over half a mile further south, but he saw in addition, to the left of the dip, a compensating "mountain" of haze sticking up, apparently over the very place where the best soaring was being done.

Observation from the top of the hill showed that machines could get a certain amount of "slope lift" from the Knob, but apart from that, the lowest level at which the lift was strong enough to counterbalance the sailplane's sinking speed was at the height of the hill-top. Below that level there was still rising air, but its only effect was to delay the inevitable descent, once the machine had got so low.

All the ascertainable facts have now been marshalled, and it remains for this extraordinary phenomenon to be explained. Here, throughout a winter's afternoon, over one particular piece of ground, was a body of smoothly-rising air half a mile deep and something like a square mile in area. It cannot be explained as "slope lift" because the slope was insufficient and the lift extended too high; it cannot have been an ordinary thermal current rising from the particular field, because the strong wind would have blown its top two or three miles down wind, over Dunstable. Yet it was undoubtedly heated air, since the pilots could feel its warmth. Under what conditions will such conditions occur again, if ever; and can the same thing happen over other club's grounds?

In the next issue of THE SAILPLANE an explanation will be attempted.

A.E.S.

Among the Books

AN EARLY GLIDING CLUB

IT was a glider that started the light aeroplane club movement. This is revealed by John F. Leeming in his autobiography "Airdays," published by Messrs. Harrap at 7s. 6d. After having already built, and crashed, four gliders, the author heard of the soaring feats in Germany in the summer of 1922, and that was quite enough to start him on a fifth. He got permission from the "Avro" works to search among their scrap for something to build it out of; the search brought him not only the materials, but two other enthusiasts, Tom Prince and Clement Wood; hence the glider was named "L.P.W.," after the initials of its three builders.

Then, in October of the same year, there was the Ilford (not Ilford, as in the book) soaring meeting in England, and Mr. Leeming relates how, when the news of the flights there reached the group of constructors in their little garage near Manchester, "Lacayo, a new

recruit to our band, became quite ill with excitement, and had to retire home early."

As more helpers came along, it was decided at last to form a club, and so the "Lancashire Aero Club" came into existence. It is in existence still, and can therefore claim to be the oldest British gliding club, if the term can properly be applied to a club which now does all its flying with the help of engines. (It cannot, however, call itself the *first* gliding club in the country, for that honour probably belongs to the club run by members of the Polytechnic Institute, who flew a Wright type glider on Amberley Downs in 1912.)

It was hearing of this glider club in Lancashire which gave the late Sir Sefton Brancker the idea of the "approved light aeroplane clubs," as he admitted some years later to the author of the book, for it showed him that the necessary enthusiasm was in existence, and only wanted stimulating.

When the machine was nearly ready to fly, the usual recruiting meeting was held to gather in new members. The local Press advertised it well, handbills were distributed all over Manchester, and a large hall was taken for the occasion. The result was—ten club members on the platform, and a dozen other people in the body of the hall. Of these, two found they had come to the wrong place and left; one immediately fell asleep and resisted all efforts to rouse him, and of the remainder, six joined the club. But the six were really keen, and on May 24th, 1924, the "L.P.W." was at last got into the air.

The method of launch was to tow it behind a car (at full speed, of course) with a 200-foot rope, which could be cast off from the glider. After a little practice it could be got to fly 6 feet above the ground for 100 yards—if it got off at all. But what usually happened was that

- (a) the tow-rope broke, or
- (b) the glider stood on its nose, or

(c) a wheel came off. As the wheels were the only really valuable part of the glider, Mr. Leeming's first question after a crash was: "What's happened to the wheels? Are they all right?" After being reassured on the point, he would then ask if the pilot was hurt.

The climax came one day in September, 1924. The local Press had been asked to a demonstration, at Alexandra Park aerodrome, where the club operated. When the great day arrived, however, the wind was blowing half a gale. Nevertheless the "L.P.W." was got out and hitched to the rope behind the car, which was then driven off, as usual, at full speed. After a bit, the driver thought he would look back to see if the glider was all right. He could see nothing. Then he chanced to look up, and there it was, almost vertically overhead. Its terrific air speed had lifted it up there like a kite. The sight was too much for the car driver. "With a terrified yell he switched off the engine, jumped from the car, and ran madly from the spot where at any moment the thing might dive upon him." The "L.P.W." just stalled.

When it had been subsequently rebuilt, an engine and propeller from the "Parnall Pixie" were installed in the machine. But this proved its undoing. It was neglected, allowed to rot, and finally broken up for firewood.

An amusing incident is related of someone called Meade (is this a misprint for our Basil Meads?), who had been induced to lecture to the club on "Gliding," on the score that he had once seen a glider in Germany. In consequence, his name got into *Flight*, and when he again visited the German gliding centre, he found himself regarded as a great expert on the subject, with the result that, says Mr. Leeming, "before he properly understood what was happening Meade—who had never been in a glider in his life—found himself about to be catapulted off over the edge of a great hill, and it was only by considerable agility that he avoided this unpleasant experience."

The rest of this autobiography deals chiefly with aeroplane flights and attempts to establish an airport for Manchester, but there is a passage worth quoting here in which Mr. Leeming describes how the late Bert Hinkler introduced him to the sport of cloud-chasing:—

"'You find a level bit and pretend it's solid ground,' he said. 'Then you throttle back the engine and glide

down to land upon it. The rules are that you must get on to the cloud before it changes, while it is still fairly level—they change shape in a few seconds . . . ' I have known him follow a cloud that pleased him for twenty miles or so, playing in and about its hills and valleys. And once he showed me how to pick clouds that would travel over a certain destination and remain in them—hidden from observers on the ground—until that destination was reached."

It is evident that Hinkler was unique among aeroplane pilots in his understanding of the clouds and their changing forms; it is a pity he never took up gliding, for he would have made a sailplane pilot of the first rank.

Meteorology for All.

A section on "Gliding and Soaring" has actually been included in a book on Meteorology. This statement will appear less incredible when it is explained that the book in question is by the Chairman of the British Gliding Association, Professor D. Brunt. It is included in Messrs. Watts & Co.'s "Changing World Library," costs only 2s. 6d., and is called "Weather Science for Everybody." "Everybody" should include all those readers of *THE SAILPLANE* who wish they knew more of the scientific side of the subject but are afraid to tackle one of the standard text-books for fear of getting out of their depth. For the author has omitted those "parts of the subject of meteorology which cannot be discussed clearly without mathematical reasoning," yet everything of importance is dealt with in simple language and with scientific accuracy—two qualities not always easy to combine.

We learn that "it is the ground, and not the sun, which warms the air by day, and cools it by night." The only portion of the air which can be appreciably warmed by the sun directly is the water vapour it contains. The "blanketing" effect of a layer of cloud in damping out the usual daily variation of the temperature is shown to be more pronounced the thicker and lower the cloud sheet. In fact, the way in which the physical basis of everything is explained is one of the delights of the book, and particularly useful for sailplane pilots, who often have to try and find their own explanations for phenomena which are apparently unknown to meteorological science.

The pattern of the distribution of up-currents in unstable layers is a subject on which Professor Brunt has specialised, and his remarks on cirro-cumulus, the highest type of cloud in which such a pattern is present, may be taken as representing the latest scientific opinion on its mode of formation. He says: "These clouds take their very peculiar form largely on account of the radiation of heat from the upper surface. The top of the cloud is cooled so much that it becomes unstable."

Forecasting, which the public looks on as the whole of meteorology, is dealt with in one short chapter, for the author believes it to be "more useful to give the reader some idea of how he may determine if the official forecast is working out as anticipated than to encourage him with the vain idea that he may himself improve on the official forecast." And to this end the reader will find all he needs to know about "fronts," depressions, and the other weather systems which determine whether he will get a good day's soaring or remain earthbound for another long week.

News from the Clubs

London Gliding Club

January 2nd and 3rd.—A soaring wind throughout the week-end; rain on Saturday, fine on Sunday; an hour's soaring on Saturday, 20½ hours on Sunday. R. H. Bolton, the author of last month's article on fast-motion films of clouds, got his "C" certificate. In ordinary life he is a leading light at the famous Peckham Health Centre, which provides all the local families with medical supervision and healthy recreation (gliding excepted), charges them almost nothing for it, and yet manages to make ends meet.

January 10th.—This was the great day when the club put in nearly seven hours' soaring in a wind which blew down the hill instead of up it. The precise direction of the wind depends on who tells the story; all agree that it was between south and east, but the easterly component increases with the telling. Actually the direction on the ground was south by east, but as the wind approached the club ground over a part of the slope facing north-west, it can fairly be said to have been blowing down the hill.

As is the usual practice in such a wind, the winch was got out to enable any who wished to practise descents.

Hiscox was first off in the FALCON III. with a passenger; he flew round by the Bowl, getting a little slope lift in passing, and came out to prepare for the expected descent. Instead there was an unexpected ascent, gradual but unmistakable. So down he soon came in a hurry to get out his KIRBY KITE in the hope that the lift would still be there. It was. A particular field—the one over which approaches to landings are made—seemed to be responsible, and as it had a slight slope into wind and the sun was shining on it, "slope lift with thermal reinforcement" seemed the obvious thing to say—until Hiscox went on up and up till, at 2,250 feet above the ground, he was almost invisible through the haze. Whereupon all attempts to explain the phenomenon were given up, and several people contented themselves with saying: "I suppose there'll be reams about this in THE SAILPLANE," though who was to write the reams was not indicated—presumably the work was to be done by somebody else, as usual.

In all, three private and two club machines went up during the afternoon, the former with variometers and altimeters and the latter without. Most of the pilots managed to soar for as long as they wished; Dent in a club GRUNAU got up alongside Hiscox and, with only one span separating the machines, carried on a conversation. Details of the individual soaring flights are given on an earlier page; here, however, is a list of all the flights made off the winch, in tabular form:—

Pilot and Machine.	Launch.	Duration.
Hiscox: FALCON III. ...	?	15 mins.
Bergel: FALCON III. ...	?	5 "
Hiscox: Hiscox's K. KITE ...	2. 0	137 "
Simpson: GRUNAU BABY II. ...	?	3½ "
Murray: FALCON III. ...	2.13	17 "
Bergel: GRUNAU BABY II. ...	2.22	5 "
Wills: FALCON III. ...	2.40	19 "
Grant: GRUNAU BABY II. ...	2.48	8 "
Dent: GRUNAU BABY II. ...	3. 2	43 "
Murray: FALCON III. ...	3. 7	26 "
Baker: Baker's G.B. II. ...	3.13	49 "
Fox: FALCON III. ...	3.40	22 "
Ellis: GRUNAU BABY II. ...	3.53	22 "
Liddell: Liddell's K. KITE ...	4. 3	27 "
Bergel: Baker's G.B. II. ...	4.20	5 "
Ivanoff: FALCON III. ...	4.30	5 "
Ruffle: GRUNAU BABY II. ...	4.38	4 "

At tea, after it was all over, club members were able to spread themselves on the subject of "opening up vast new possibilities," etc., etc., and "Who said this was nothing but a west wind site?" and so forth. Dent went to the telephone and told the Press Association all about it, with the result that the London dailies actually printed what he said, in intelligible form, without giving it a write-up—one supposes because no members of the staff could make head or tail of such unaccustomed material.

A Prize Offer.—As a direct result of the extraordinary soaring flights on January 10th, Mr. C. Espin Hardwick, who learned to fly with the London Gliding Club and subsequently founded and became chairman of the Midland Gliding Club, has offered a purse of £50 for the first sailplane pilot in a British machine to fly from Dunstable to the Long Mynd. An aero-towed start within



The London Club's "Falcon III" two-seater taking off on the winch cable: showing, for the information of all concerned, the right moment to drop the launching wheels. If dropped from too high, they may break: if from too low, they rebound and make a hole in the fuselage. Some judgment is needed to strike the happy mean.

a ten mile radius of Dunstable is allowed. The offer stands open for two years. (Note: a flight in the opposite direction does not qualify for the purse.) This generous offer should give rise to quite a lot of fun before the prize is actually won.

Summary of Flying.

Date.	Ground-hops.	Winch launches.	Hilltop launches.	Flying Time. h. m. s.
Jan. 2, Saturday ...	6	—	3	1 4 0
" 3, Sunday ...	15	—	39	20 36 0
Jan. 5, Tuesday ...	—	—	3	— 16 0
" 9, Saturday ...	14	—	—	— — —
" 10, Sunday ...	74	17	—	6 52 0
Jan. 11, Monday ...	22	—	—	— — —
" 13, Wednesday ...	15	—	1	— 32 0
" 16, Saturday ...	—	—	13	2 13 37
" 17, Sunday ...	21	6	—	— 15 0
Jan. 18, Monday ...	5	—	—	— — —
" 24, Sunday ...	15	—	—	— — —
Jan. 31, Sunday ...	51	22	—	— 46 12

Certificate Flights.

January 3rd.—Bolton, "C."
January 13th.—Douglas, "A."

Totals.

Week ending	Launches	Flying Time	Certificates
January 3rd ...	63	21 hrs. 40 mins.	1
January 10th ...	108	7 hrs. 8 mins.	—
January 17th ...	78	2 hrs. 29 mins.	1
January 24th ...	20	—	—
January 31st ...	73	46 mins.	—

List of Machines.

It is just over a year since we gave a list of club and private owner's machines, and as there have been several changes in both categories, it is time for a revised version to be given.

Club machines are:—

DAGNALL primaries: one with nacelle and six with open seats; of the open ones, two are for ground-hopping, two for the hill-top, and two in reserve.

Secondaries: One TOTTERNHoe, one KIRBY KADET, one FALCON I.

Sailplanes: One GRUNAU BABY II. from Slingsby's and one from the Brooklands College of Aeronautical Engineering. One modified GRUNAU BABY I. largely built by the late Louis Desoutter; this

is the "posh" machine of the club, and may only be flown by people who are thought unlikely to break it. At present it is under repair from being blown over on the ground.

One two-seater **FALCON III.**, with launching wheels.

In addition, another **TOTTERNOE** is expected shortly, and there is talk of getting up a subscription to buy a **HJORDIS II.** for the club. It is also of interest that a new launching winch has been ordered from A. L. Slater of Derby; it will have all the latest refinements.

Private machines are:—

HJORDIS I., owned by Wills and Buxton; now for sale, as the owners are getting a **HJORDIS II.**

RHÖNSPERRER, owned by Dewsbery, Nicholson and Cooper.

RHÖNBUSSARD, owned by Cooper. (For disposal?)

RHÖNADLER, owned by Vigers; at present at Slingsby's for alterations.

CONDOR II., owned by Eustace Thomas.

SCUD II., painted cream, owned by the two Davis brothers. This is the first **SCUD II.** ever built, and on it Buxton put up the British height record when he owned it in 1934.

SCUD II., painted green, owned by Wood.

SCUD II., unpainted, owned by Dent, Fox and Armstrong, but now for sale, as they have a **KITE**.

CRESTED WREN, owned by E. Thomas, but kept in Derbyshire.

GOLDEN WREN, also kept in Derbyshire, is part-owned by a club member, R. G. Robertson.

GREEN WREN, formerly yellow, owned by Slazenger, of the Cambridge Club, whose members occasionally bring it over.

WHITE WREN, built and owned by Morland and Richardson.

BLUE WREN, owned by A. E. Slater; some parts need replacing, and when the cost of this is known it will be for sale.

KIRBY KITE, owned by Hiscox. He will shortly be getting a new one in part exchange.

KIRBY KITE, painted grey, owned by Dent, Fox and Armstrong.

GRUNAU BABY II., owned by Baker; has a closed-in cockpit.

GRUNAU BABY II., under construction for Captain Heath.

CAMBRIDGE I., owned by Slazenger, kept at Cambridge.

CAMBRIDGE II., owned by Rattray and Furlong.

SCAUP, of Totternhoe type, owned by Seth Smith.

HOLS DER TEUFEL, owned by a group of uncertain identity, except that it includes Mrs. Baker, and possibly Pringle. It is six years old, and was once Hiscox's.

PRÜFLING, painted blue, owned by the two Adcock brothers, of Leicester.

SCUD III., the second one to be built (the first one had a little engine: this one hasn't); owned by Barker, but has not yet turned up.

We don't know for sure whether F. G. Enser is a member, but if so, his **WESTPREUSSEN** and **KASSEL 20** can be included; both have recently been put into working order by him, and are for sale.

KASSEL 25, owned by G. Toth, but not at present airworthy. Noble has a **TERN**, which he has not yet finished.

Keeble is building a high-performance sailplane of his own design at Dart Aircraft Works, and at the same place Roy Scott is building himself an "H.17."

And that, as far as we know, is the lot. Seven years ago the club commenced activities with two primary gliders—a **DAGLING** and a **ZÖGLING**.

Cotswold Gliding Club

On January 3rd Mr. W. G. Edwards (former owner of the club's **DICKSON** primary machine) gave a demonstration before a small but very interested crowd. Unfortunately the wind was far too strong for a primary to be launched from the slope we had hoped to use, but Mr. Edwards made a few hops from a more gentle slope just to show the crowd that the "mouse-trap" (as one onlooker was heard to call it) really would fly.

The club is very grateful to Mr. Edwards and his brother for their hard work. Towing a light trailer 70 miles in half a gale is no joke, and then to have to rig and fly the machine under the worst conditions (wondering all the time, no doubt, what the **KITES** at the Mynd were doing) must have seemed very hard. Other visitors to whom we extend our thanks are Mr. C. T. Cuss and his son, who were both extremely energetic and helpful, and Mr. Dugdale, who appears to have made a splendid recovery after his argument with his **SCUD**.

For the next few weeks a flat field at Kencott will be used for elementary training, and later the club will move to the slopes at Cassey Compton, near Northleach.

Cambridge University Gliding Club

The most notable feature of the club's recent activities at Caxton Gibbet has been a marked improvement in the technique of high winch-launching. In suitable conditions **CAMBRIDGE I.** can now be climbed to a fairly certain 1,000 feet by the quartet of pilots who regularly fly her. The record height is at present 1,200 feet, held by Simpson. The length of cable used is about three thousand feet.

These heights permit a certain indulgence in what the Germans call "abnormal flying attitudes," and last November **CAMBRIDGE** was looped off the winch launch by Lingford. The more timid pilots, however, content themselves with practising circling, or trying stalled turns. Attempts have also been made to spin her, but without success. The recent weather has not been conducive to thermal soaring, and no one has yet been able to exceed his point of release by more than about a hundred feet.

Instruction in the **NACELLED ZÖGLING** continued at an average rate of 24 launches per term-time week until the black day of January 24th, when a doubtless well-meaning pilot landed downwind into a hedge and broke everything except himself and one wing. Thus occurred the crash which averages showed to be well overdue after two years of nearly damage-free operation. The old machine died a fitting death, and we are not going to disturb her remains.

Those public-spirited members who frequent the workshop have now nearly completed a modified **NACELLED DAGLING**, and this will probably have taken the air by the time these words are in print. It is proposed to reserve it for the use of "B" pilots only.

Since the last notes appeared in *THE SAILPLANE*, "A" certificates have been obtained by Maufe, Miller, Pringle (Pat) and Thomas; and "B's" by Gardiner, Pringle and Thomas. This brings the total number of certificates obtained at Caxton, since operations began nearly two years ago, up to 25.

Lingford, J. W. S. Pringle, Simpson and Turner have now been approved by the University Proctorial Syndicate as instructors. The University require that no gliding shall take place unless such an approved instructor is present.

A concern offering "motor-cycles of the air" for hire has lately been operating from one of our three fields. The Lure of the Engine has naturally proved too much for a few of our members; all, however, report that the more they motor-cycle in the air, the more they enjoy gliding. When our winch recently gave one of the motor-cycles a helping hand in its take-off, rumour had it that the pilot wanted to know what it was like to be 1,000 feet up!

Channel Gliding Club

During the Christmas holidays, and almost all of November, 1936, owing to inclement weather very little gliding was possible. Two "A" and two "B" licences were obtained on Sunday, January 3rd, while one "B" was obtained during October and one during December (all with our **B.A.C. VII.**); and we have a group of pupils who may get their "A's" at the first available opportunity.

Earlier in the year some time was spent in erecting a hangar 60 ft. by 30 ft., in which three rigged machines are now kept. The **B.A.C. VII.** two-seater is kept rigged at the Hawkinge aerodrome, $\frac{1}{2}$ mile distant, where dual instruction is given to pupils with the aid of a 30-90 Vauxhall for auto-towing. Up to 750 feet of cable is available, the length used depending upon the nature of the flight required.

Soaring is carried out from the site where our own hangar is built; this is a long field within 50 yards of, and parallel to, the hill-top which overlooks Folkestone and extends for four or five miles. Soaring is carried out along this ridge when the wind is S.W., which is the prevailing direction locally.

One recent flight provided some of the biggest thrills ever (our Mr. Turner looping his **PROFESSOR** might be considered mild by comparison). Passing clouds suddenly enveloped our **B.A.C.** after it had released the cable; it reappeared about a minute later doing a stalled turn, and in the opposite direction; Mr. Hossle, who was piloting it, obtained control after a series of dizzy aerobatics, the sight of which nearly froze our blood. After a perfect landing, Mr. Hossle assured us that we had not witnessed half the fun; whilst in the cloud he had lost sense of direction and found himself doing horrible evolutions, during which his air speed indicator once showed 85 m.p.h.—in fact, the whole incident was reminiscent of a nightmare. Needless to add, we are particularly careful about low clouds which appear to be approaching, after that episode.

Yorkshire Gliding Club

October 31st.—Wind N. to N.W., 5 m.p.h. To-day we were pleased to welcome J. C. Neilan, who was paying us one of his now infrequent visits. The chances of soaring on such a cold, damp day, and with such a poor wind direction and strength, were very remote, but he put up two half-hour spells on KIRBY KITE, reaching 600 to 700 feet. Below him, GRUNAU BABY bobbed up and down at intervals, piloted successively by Heath, Wordsworth and A. O. Pick for periods up to 10 minutes each.

November 1st.—Wind S. to S.W., 25 m.p.h. After a long lapse in his training, during which he had shown considerable interest and given many helpful suggestions about ground organisation, Mr. Hartness resumed with several hops on HOLDS.

Slingsby took up the KIRBY KITE to 2,000 feet and later Neilan (J. C.) flew her for 50 minutes during which he performed a series of loops. Six machines were up and down during the afternoon, and included GRUNAU BABY, FALCON I., FALCON III. and KIRBY KADET. FALCON III. carried passengers, piloted alternately by Sharpe and Heath, and KADET, being tested by Holdsworth, reached 700 feet. Later Fisher (Joe) took her up for 40 minutes. Watson climbed easily to 1,200 feet on FALCON I. and remained there for an hour. The thrill of the day was provided by A. O. Pick, who had followed Stedman and Wordsworth on GRUNAU BABY. It was near dusk when he was launched, and after appearing to gain considerable initial altitude, he vanished from the atmosphere, and it was thought that he must have lost himself in the dusk. A search party set off to look for him, but while it was away he climbed over the wall and entered the club-house announcing that he landed further up the moor after only 10 minutes' flying.

November 4th.—Wind W., 15 m.p.h. Oh! to be able to live on the spot, or as near to it as Slingsby and Sproule. An admirable day happens, ideal in all conditions, and those two "down tools" and climb into KIRBY KADET, disporting themselves, one after the other for the whole of the afternoon. Wednesday—I suppose they called it their half-day holiday. On Saturday, when the week-end party arrived from 40 or 50 miles distance, they were welcomed by a howling rainstorm from the east, which just shows you that most week-ends are in the wrong part of the week.

November 8th.—Wind S.S.W., 20–30 m.p.h. By Sunday the storm had not quite blown itself out. Heavy, low clouds kept the maximum flying height down to 1,200 feet, and fast flying was fairly general in order to keep out of clouds and maintain visibility.

Here is the log:—

GRUNAU BABY.—Hastwell, 28 minutes; Wordsworth, 19 minutes; A. O. Pick, 52 minutes, 1,000 feet.

KIRBY KITE.—Sproule, 1 hour 37 minutes, 1,200 feet (barograph); Stedman, 5 minutes (why?).

FALCON I.—Tuck, 45 minutes, 1,000 feet; Watson, 17 minutes, 1,000 feet.

KADET.—P. Shaw, 58 minutes, 1,000 feet.

FALCON III.—Heath, 11 minutes with passenger.

Roy Watson's flight was cut short owing to a cloud blowing up the hill and enveloping him. In his haste to get out of it he found himself low down near the main road on top of the hill, where he landed safely.

November 14th.—Wind N.W., 40 m.p.h. During a short spell of less turbulent weather Wordsworth flew GRUNAU BABY for 20 minutes.

November 15th.—Wind S.S.W., 30 to 40 m.p.h. With a considerable amount of low cloud about, and in such turbulent conditions, it was something of an achievement to get in three hours' flying with all machines intact at the end of it. GRUNAU BABY was flown by A. O. Pick, Wordsworth and Hastwell for periods of 40 minutes, 5 minutes, and 10 minutes, respectively. In KIRBY KITE Sproule appeared to be fairly comfortable for 45 minutes, but several terrific surges of lift and consequent disconcerting wallowings suggested that he ought to carry several stones of ballast. Stedman, during half-an-hour in the same machine, showed considerably more steadiness—natural ballast, evidently. Peter Shaw flew FALCON I. in fine style for 20 minutes.

Health Note.—If you want to avoid fog and its consequent ills, go to Sutton Bank. Sounds impossible, I know, and many won't believe it, but during the great fog of November Sutton Bank (top, at least) was clear of it. The ground engineer said he had only seen the fog on the plain below and around him. The plateau had basked in comfortable sunshine, and on Sunday, November 22nd, when the fog elsewhere was at its worst, several members enjoyed the sunshine, and in the calm air circled with winch launches all day.

November 29th.—Rain fell throughout the week-end.

Midland Gliding Club

January 2nd and 3rd.—A W.S.W. wind of about 28 m.p.h. and a low cloud base made conditions a little difficult.

FALCONS I. and III., a KADET and "H.17" put in a total of 8 hours during the four hours in which flying was possible.

James went home with a "C" certificate—the first for 1937—after a very nice steady flight of 40 minutes. His landing was particularly well judged, which wipes the slate clean as far as his previous attempt is concerned.

Towards the close of play the wind suddenly freshened to about 40 m.p.h. and took Horrel and Hannay unawares, so that both were blown back and landed off the club ground, which cost them 2s. 6d. each; this is the customary fine, and goes to the landowners concerned.

Jersey Gliding Club

There is little to report with regard to flying, as the weather has been very adverse, and everyone is very anxious to get started at Les Landes. We have at last had permission to commence work on the large Army hut which is there, and this we are converting into a hangar and club room. By the end of next month we hope to have the job finished and will then start work in earnest.

On the 9th inst. we held a very satisfactory dance under the patronage of the Bailiff of the island, Mr. A. M. Coutanche, and the patronage and presence of H.E. the Lt.-Governor of Jersey, Maj.-General H. de C. Martelli, C.B., D.S.O.

First Annual General Meeting.—This was held on January 26th at the Town Hall, under the presidency of Lieut.-Col. J. Gourlie, D.S.O. The President gave an outline of the club's past activities, and made a point that the club was a sporting society entirely, having no political ideas whatsoever. At the new site at Les Landes, he stated, it would be possible to soar over the cliffs in three directions, and in a northerly wind to beat up and down the cliffs all the way from Grosnez to St. Catherine's.

Mr. George Thomas, a power pilot, gave his views on the advantages of gliding over aeroplane flying in Jersey. He estimated that for a Jersey man to go to England to learn to fly and get his aeroplane "A" ticket would cost around £50, and then when he got back to Jersey he would find no facilities for power flying. In the gliding club he could, for £5 per annum, learn to fly in his spare time, without having to give up a holiday to it. Moreover, he would have had practice in making what were really forced landings on as many Thursdays and Sundays as possible throughout the year.

The following officers of the club were elected:—President, Lieut.-Col. J. Gourlie; vice-presidents, F. Le Quesne and Major J. C. M. Manley; chairman, A. S. M. Glassford; vice-chairman, K. J. Carter; hon. secretary and treasurer, A. J. Scriven; hon. auditor, J. R. Roberts, A.S.A.A.; committee, R. A. Wagstaffe, G. Thomas, V. Baudains, A. Harvey, A. J. Le Soeur, J. Bisson, J. Manley and N. A. Parker. A committee of non-flying members was also elected, one of their chief duties being that of running the club house at Les Landes.

To Club Secretaries

THE SAILPLANE AND GLIDER will be published in future in the middle of the month. News of club doings up to the last week-end of the previous month can be included, provided they are sent in immediately after the week-end. News can be sent to the editorial office or, to save time, addressed to the Editor at Dell Farm, Whipsnade, Beds.

Dates should be included in a paragraph, not written in the margin or on a separate line. Names of sailplanes and gliders are in small capitals, not between quotation marks. The following conventions are used in preparing MSS. for printers: italics, one straight underline; small capitals, two straight underlines; heavy type (as for dates, etc.), one wavy underline.

All matter for publication should be written or typed on one side of the paper only. It is best to use double spacing between the lines; this not only makes it easier for the printers, but ensures that any corrections or alterations shall be legible.

List of British Gliding Clubs and their Secretaries

This list is intended as a guide to those who wish to join a gliding club, or to see gliders and sailplanes in action. Not all the clubs mentioned are active, though it is hoped eventually to confine the list to active clubs. The list will be published as often as space permits, and club secretaries will oblige by helping to keep the particulars up-to-date.

England.

ACCRINGTON AND DISTRICT.—67, Eagle Road, Accrington.

AIRSPED (Portsmouth).—R. G. Worcester, Airspeed, Ltd., The Airport, Portsmouth. Flying on Sundays and occasional weekdays. Primary training on Municipal Flying Ground; soaring at Portsdown Hill.

BEACON HILL (Essex).—W. P. Harris, 22, Hamlet Road, Southend, Essex. Primary training ground at Canewdon, Essex. Workshop at Southend. Subscription, 10s. 6d. p.a.

BILLINGHAM.—J. Tunstall, Nth. Mt. Pleasant Street, Stockton-on-Tees. Primary training. Subscription, £1 p.a. (10s. for those under 21).

CAMBRIDGE UNIVERSITY.—K. W. Turner, Trinity College, Cambridge. Flying ground at Caxton Gibbett (Tel.: Caxton 39); winch launching. Soaring at Dunstable Downs, where members have use of London Gliding Club's site and machines.

CHANNEL.—F. G. Whitnall, 16, High Street, Cheriton, Felkestone. Auto-towing at Hawkinge Air Station; soaring at Arpinge, 2 miles N.W. of Folkestone. Hangar at Arpinge.

CORNWALL.—J. W. Graham, Red House, Tywardreath. Flying ground at Rosenannon Downs. Primary training; soaring possible.

COTSWOLD.—J. D. Pether, Culver's Close, Burford, Oxon. Primary training at Kencott, or at Cassey Compton (near North-leach).

CROYDON.—A. Lindsey, 20, High View Avenue, Wallington. Primary training ground 8 miles from Croydon.

DERRYSHIRE AND LANCASHIRE.—C. Kaye, 63, Clarkhouse Road, Sheffield. (Tel.: 62463.) Primary training and soaring. Headquarters at Camphill, Great Hucklow, Derbyshire (between Buxton and Sheffield), adjoining flying grounds at Bradwell Edge and Eyam Edge. Clubhouse and hangar. Subscription, £2 17s. 6d. p.a.; non-flying, £1 1s. (both include 5s. subscription to Royal Aeronautical Society, Manchester Branch); no entrance fee. Flying charges: from 6d. per flight; soaring flights from 2s. 6d.

DEVON.—S. G. Tolman, Journal Office, Exmouth. (Tel.: 76.)

DORSET.—J. Laver, 9, Commercial Road, Weymouth. Primary training and soaring at Maiden Newton; soaring also at Kimmeridge, Isle of Purbeck.

EAST GRINSTEAD.—G. J. Smith, "Tolskity," Sackville Lane, East Grinstead, Sussex.

EAST LANCASHIRE.—J. Crosby, 116, High Audley Street, Blackburn.

ESSEX.—W. Webster, 113, Coombes Road, Dagenham. Primary training.

FURNESS.—J. S. Redshaw, 18, Fairfield Lane, Barrow-in-Furness, Lancs. Training sites at Hawcoat, Birkkrigg and Gleaston. Soaring sites at Moorside (near Ireleth) and Bootle Fell, Cumb. Hangar at Moorside.

HARROGATE.—E. T. W. Addyman, The White House, Starbeck, Harrogate.

HEREFORD.—See Midland Gliding Club.

HULL.—R. E. Havercroft, 216, Park Avenue, Hull. Flying ground, Hedon aerodrome (auto-towing).

IMPERIAL COLLEGE.—L. S. Holt, Imperial College of Science, South Kensington, S.W.7. Members use London Gliding Club's machines and flying ground at Dunstable Downs.

KENT.—Miss R. H. Sinclair, Lady Place, Sutton Courtenay, Berks. (Tel.: Sutton Courtenay 46.) Primary training ground at Lenham, near Maidstone, Kent.

LONDON.—Tring Road, Dunstable, Beds. (Tel.: Dunstable 419.) Flying ground, Dunstable Downs (1½ miles S.W. of Dunstable). Primary training and soaring. Clubhouse and hangar; sleeping accommodation; 15 gliders and sailplanes for members' use. Subscription, 3 guineas p.a. (non-flying, 1 guinea); entrance fee, 1 guinea; flying charges, from 3s. per day. Resident full-time instructor; flying on Sundays and every week-day except Thursday.

MIDLAND.—F. L. Felton, 131, Edmund Street, Birmingham. (Tel.: Central 8181.) Primary training grounds at Handsworth (Vernon Avenue), Northfields and Hereford. Soaring site at Long Mynd, 3 miles W.S.W. of Church Stretton, Salop. Clubhouse and hangars; 10 gliders and sailplanes for members' use.

Subscription, 3 guineas p.a. (10s. 6d. junior membership); entrance fee, 1 guinea; flying charges, 3s. per week-end for primary or secondary training; 6s. per hour for soaring.

NEWCASTLE.—A. P. Miller, 25, Holme Avenue, Walkerville, Newcastle-on-Tyne, 6. (Tel.: Wallsend 63320.) Flying ground, Moat Law, near Matfen. Primary training and soaring. Clubhouse and hangar.

NORFOLK.—"Ivy Cottage," North Walsham, Norfolk. Primary training at Skepton, also at Mundesley (soaring possible).

NOTTINGHAM.—R. V. Sowerbutts, 426, Woodborough Road, Nottingham.

PRESTON AND DISTRICT.—L. E. Falla, "Lendor," Lawrence Road, Penwortham, Preston. (Tel.: Preston 2301.)

ROCHDALE.—F. Hodgkinson, 114, Higher Birches, Whitworth, Lancs.

RYEDALE.—F. Slingsby, Kirbymoorside, Yorks. Primary training; also use of Yorkshire Gliding Club's machines and flying ground at Sutton Bank.

SHROPSHIRE.—G. B. Muir, "Ireland," Halford, Craven Arms, Salop.

SOUTHDOWN.—A. York Bramble, 7A, First Avenue, Hove 3, Sussex. (Tel. Hove 4335.) Primary training and soaring grounds at Devil's Dyke, Brighton. Clubhouse and hangar, ½ mile S.S.W. of Devil's Dyke Station.

STOKE-ON-TRENT.—H. N. W. Goss, 36, Crewe Road, Alsager, Cheshire.

TEES-SIDE.—H. P. Dean, 11, Redwing Lane, Norton-on-Tees, Co. Durham.

WORKINGTON AND WEST CUMBERLAND.—C. D. Muntz, "Woodland," Ellerbeck Lane, Workington, Cumberland. Primary training ground at "The Hay," Cockermouth.

WHITLEY BRIDGE AND DISTRICT.—T. E. Armes, "Darrendale," Snaith, Yorkshire.

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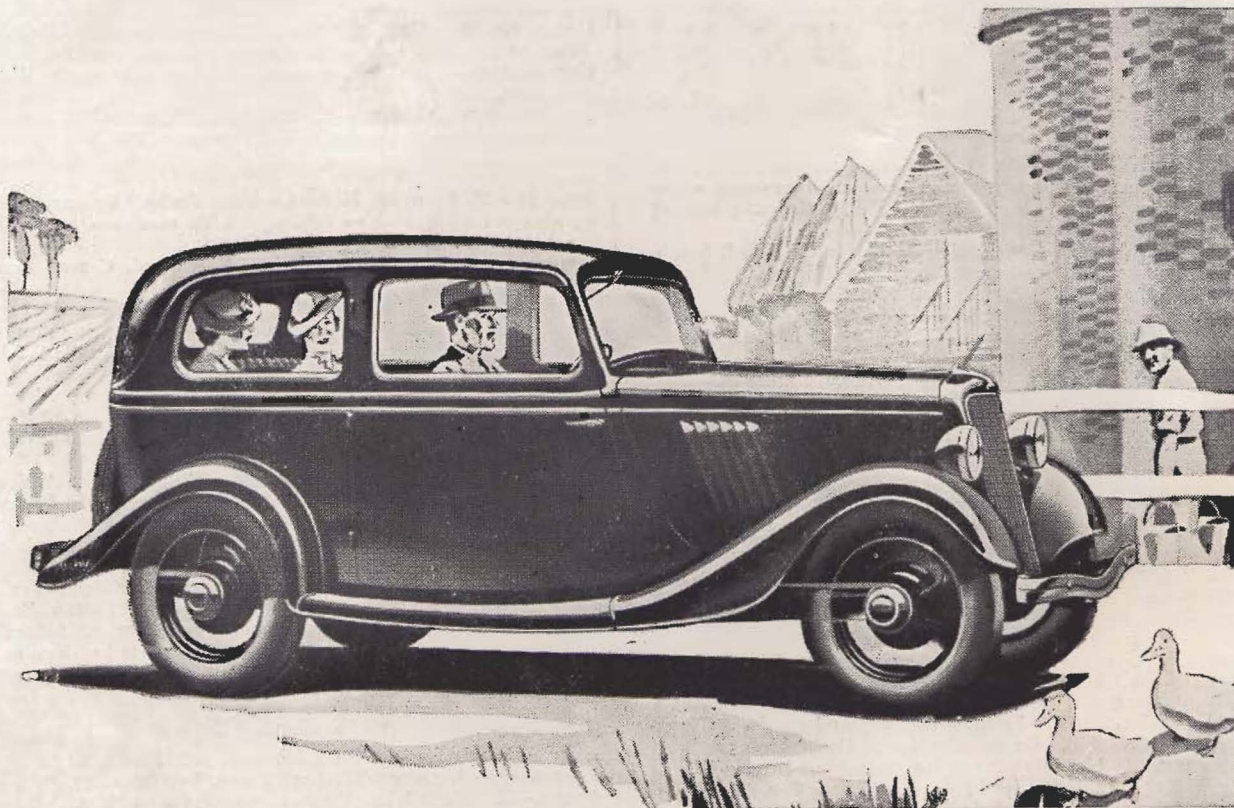
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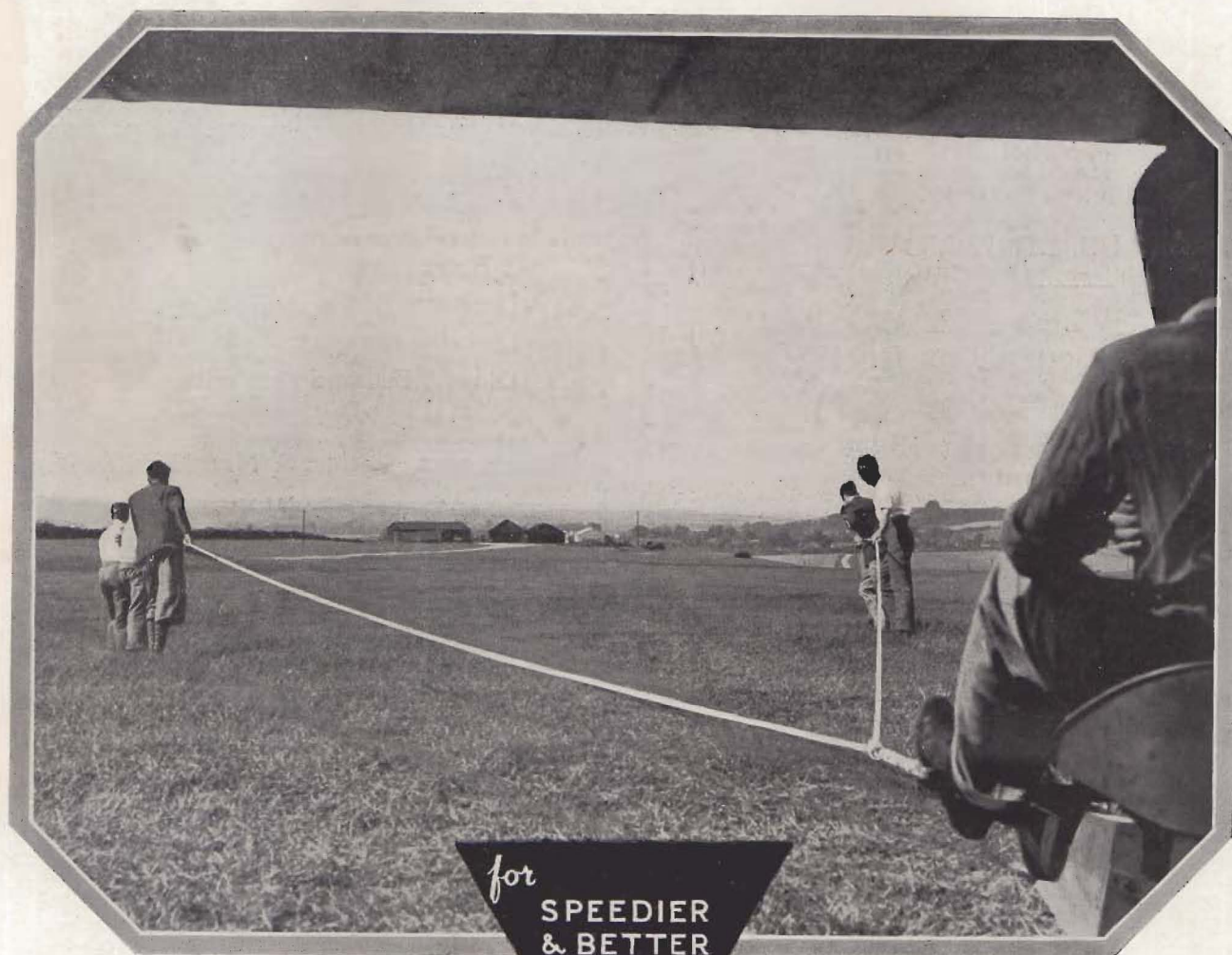
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