GLIDING

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QUARTERLY

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GLIDING

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Meteorologists Join In

IN the early days of the British Gliding Association, a certain phrase was bandied about from mouth to mouth and from pen to pen: "To be a sailplane pilot you have to know all about meteorology." Just that and nothing more. It soon became evident that these words were a mere parrot cry which raised no mental picture whatever in the minds of those who repeated them.

In the succeeding few years, eminent meteorologists would occasionally come along and watch the gliding, ready to help with their expert knowledge, but too often found themselves being asked questions to which the answers were quite unknown to meteorological science. But they could only devote their spare time to gliding affairs, and in any case the pilots would hardly have been in a position to co-operate in any organized research work.

It even took some years to persuade sailplane pilots that they could find out things for themselves which were not in the text books, but which they nevertheless needed to know. In 1932, for instance, someone went over to the Wasserkuppe, talked with the experts, and came back with the information that individual cumulus clouds usually last for about twenty minutes. Everyone was most grateful to him, for it was assumed on all sides that there could have been no other method of securing this valuable information. It had never occurred to anybody to spend twenty minutes watching a cumulus cloud.

With the formation of the Research Committee of the B.G.A. in 1946, some useful lines of meteorological research with the help of sailplanes were planned; but it would have needed Government money to carry them through and the money was not forthcoming.

Now, at last, 1951 has been made a memorable year in the history of British gliding, for meteorologists have begun to devote their professional time to co-operating with sailplane pilots in research work. This has been due to the fortunate circumstance that the Imperial College of Science and Technology possesses a Gliding Club, a Meteorology Department and an Aeronautics Department, and that Mr. F. G. Irving belongs to the first and third and Dr. R. S. Scorer to the second; and further to Frank Irving's faith that, if only the met. men and the gliding men could be thrown into each other's exclusive company for a week and a half on end, the ice would be broken, and thereafter would never be allowed to re-form.

So we have had the Clwyd expedition at Easter, which produced the piece of research published in the last issue of GLIDING on p. 70, and the meteorological team at the Championships, who are not only responsible for two researches published on pp. 119 and 120 in this issue, but have asked for a lot more information (p. 108) and got up a competition (p. 104); and since then a further visit to Clwyd whose results should be ready for our next issue. The meteorologists have been well and truly "bitten," and it is highly gratifying.

Weather During The Championships

by F. H. Ludham, D.I.C.

DURING SUNDAY, 21st July, an anti-cyclone which had been centred over Britain moved away eastward into the Continent, and a depression in the Bay of Biscay moved across the Channel into the North Sea. Ahead of this depression out-breaks of thunderstorms occurred over much of England and Wales, mainly from clouds at medium levels, but for most of the day in northern England the cloud was well broken and during the afternoon there were isolated large cumulus and cumulonimbus, in one of which Stephenson reached nearly 15,000 feet. On Sunday night more wide-spread cloud and thunderstorms spread across northern England, and over an inch of rain fell at Ringway, the Manchester Airport.

On MONDAY the winds near Camphill became northerly behind the depression and the neighbourhood was covered with very low cloud and hill fog associated with a cold front which had moved across from Ireland. This front was expected to continue moving eastward, and the cloud was forecast to lift and break into cumulus by mid-day. However, both the depression and the front became very slow-moving and although the sky at Camphill became brighter about noon, afterwards the cloud thickened and lowered and there was some light rain for the rest of the day.

The transition to skies of broken cumulus did not occur until TUESDAY; on this day and the following two the cumulus tops spread out at about 7,000 feet and formed a layer of stratocumulus which persisted until evening and so shaded the ground from sunshine that the cumulus became scattered and feeble. The conditions under which this happens are not properly under-stood and deserve investigation.

During the period TUESDAY-THURSDAY the winds gradually backed to S.W. as a ridge of high pressure moved eastwards across the country and a new cold front approached from the Atlantic.

On FRIDAY morning the cold front had reached Ireland, but its progress was slow and small wave disturbances moved along it north-eastwards. Ahead of the front layered medium cloud spread across northern England, but at low levels the region was sheltered by the Welsh mountains and the low cloud remained broken and above hill-top level. Later in the day, hill lift intensified, as had been anticipated, and several gliders reached heights of about 9,000 feet near lenticular clouds over the Pennines.

The cold front obligingly passed across the neighbourhood in the small hours of SATURDAY morning and once again well-broken cumulus skies spread from the west. Tops soon reached 6,000 ft. and were forecast as likely to reach 15,000 ft. here and there in the afternoon. Unfortunately another small wave disturbance formed on the receding cold front and prevented the depth of cold air from increasing, at the same time producing a spread-back of high cloud which displayed the most intricate structure and beautiful patterns, but which also shaded the task route (to Booth Ferry Bridge) and greatly weakened the thermal activity. This small wave, which was hardly detectable on the synoptic charts, thus spoilt what had seemed likely to be a good forecast, and well demonstrated how a forecast which is quite satisfactory for a flight by a powered aircraft can be very disappointing to the glider pilot. When the high cloud had passed away with the travelling wave, a few large cumulus with tops a little over 10,000 feet were seen over hills to the northwest, but by then the sun was sinking fast and it was too late.

On SUNDAY the winds fell very light, and probably largely for this reason the thermals below cloud were vigorous, occasionally reaching 20 ft/sec. The cumulus bases were expected to rise gradually to 5-6,000 ft., which was also about their summit level, and this duly happened, the competition ending as it had begun, in a blaze of sun-shine from an almost cloudless sky.

In retrospect I think the weather forecasts were on the whole fairly accurate, but could have been better. To achieve the

required improvement it will be necessary to put still more effort into the collection and analysis of weather information. This is difficult at Camphill because of the distance—over 30 miles—from the nearest Meteorological Office. I also think that ideally a written forecast and map should be supplied to every crew at least twice a day. In fact, a fully equipped meteorological office is required at the site for the duration of the Competitions, and I am sure we all look forward to the time when it will be possible to arrange this. In the meantime it is a pleasure to record the very helpful co-operation of the meteorological staff at Ringway Airport.

National Championships 1951

DURING the period of the Championships, 809 hours 23 minutes were flown by 34 sailplanes from 456 launches, compared with 535 hours 31 minutes by 29 sailplanes from 286 launches at last year's Contests; and 171 cross-country flights were made totalling 7,208 miles, compared with 104 flights and 6,050 miles last year.

The list of competitors was published as an inset in the last issue of GLIDING, so need not be repeated, but the following emendations should be made:—

Additional entry: No. 22, T21 B. type, entered by Air Training Corps (Home Command), pilots Flt. Lt. A. D. Piggott and H. R. Watson.

The following were transferred to the Individual Class after cancellation of the second pilot's name: No. 13 (pilot W. H. Ingle), No. 20 (D. E. Cooke flying the Kranich solo), and No. 35 (R. C. Forbes).

Changes of pilot: No. 4, for Foord read Thompson. No. 8, for A. N. Other read J. D. Jones. No. 14, delete A. de Redder. No. 19, for Ladley read Pelling. No. 29, delete W. E. Crease. No. 34, for A. N. Other read I. Radley.

Trophies Awarded

DU GARDE PEACH TROPHY to G. A. J. and H. C. N. Goodhart, pilots of leading entry in Team Championship.

KEMSLEY CUP to Royal Naval Gliding and Soaring Association, entrants of same.

LONDONDERRY CUP to R. C. Forbes, winner of Individual Championship.

FIRTH VICKERS TROPHY to G. H. Stephenson for performance in British-designed sailplane.

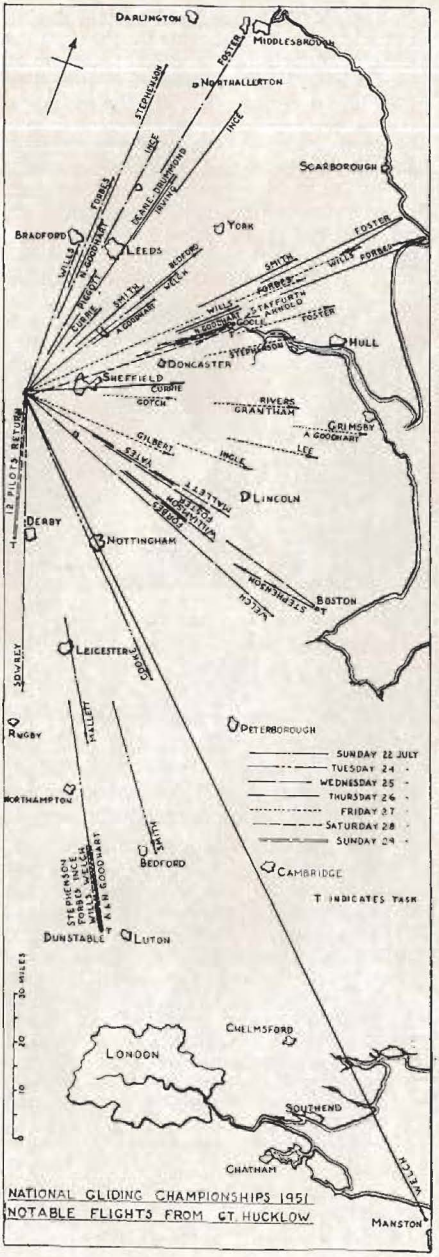
EON CUP to D. H. G. Ince for highest score in an Olympia sailplane.

Individual Championship Placings

No.	*Type*	*Pilot*	*Marks*
35	Sky	Forbes	877
12	Sky	Stephenson	873
11	Weihe	Welch	804
3	Weihe	Wills	800
9	Rhönbussard	Foster	770
4	Olympia	Ince	677
10	Olympia	Smith	398
13	Weihe	Ingle	253
15	Olympia	Bedford	191
20	Kranich	Cooke	185

Team Championship Placings

No.	*Type*	*Entrant*	*Marks*
2	Meise	R.N.G.S.A.	754
1	Mu-13A	R.N.G.S.A.	645
26	Olympia	London G.C.	543
32	Olympia	R.A.F.G.S.A.	396
6	Olympia	C. J. Arnold	382
23	Olympia	R.A.F.G.S.A.	372
17	Olympia	Army G.C.	363
29	Olympia	W. E. Crease	339
8	Olympia	Bristol G.C.	330
27	Olympia	London G.C.	300
16	Olympia	E.T.P.S.	299
28	Olympia	Imp. Coll. G.C.	265
22	Sedbergh	A.T.C.	264
21	Olympia	Surrey G.C.	261
34	Gull IV	R.A.F.G.S.A.	231
30	Olympia	Surrey G.C.	230
24	Sedbergh	A.T.C.	223
5	Olympia	T. Rex Young	192
18	Prefect	Camb. Univ. G.C.	183
33	Sedbergh	Imp. Coll. G.C.	150
25	Sedbergh	A.T.C.	148
19	Grunau	R.A.F.G.S.A.	137
31	Kranich	Camb. Univ. G.C.	121
14	Petrel	O'Grady and Pick	96



Flying Technique at the Championships

We are indebted to many of the pilots for a great amount of information from which these remarks have been sifted.

Saturday, 21st July, was not a competition day, but Stephenson won a Daily Prize for altitude by gaining 7,700 feet. Over Mam Tor he struck a good patch in a vague cloud street and climbed in the cloud, mostly at 10 ft./sec., till he came out at the top of one of several towers which, he thinks, grew while he was inside it. He has noticed before that one can only get into a tall cloud while it is still growing.

Sunday, 22nd. Between 4,000 and 16,000 ft. was an unstable, moist layer, but not till afternoon did thermals from the site go up high enough to join up with it, the visible sign of this being cumulus clouds growing rapidly upwards. Away from the site, however, Stephenson found that ground thermals were prevented by too much overcast (probably overgrown cumulus), and the only way he could stay up was by keeping close to clouds. Later on, under a complete overcast, Foster found that only the darker patches gave some weak lift.

Under a cu-nim Stephenson found absolutely smooth air except for sudden violent bumps every now and then. Fifteen miles from the site he started a climb which gave him 12,400 ft. gain of height. Over high ground the cu-nims seemed to him to be bigger; this could be explained by the upper air being so moist that a good upward heave was enought to trigger off the instability without the aid of ground thermals.

Tuesday, 24th, brought to competitors the problem of racing to Dunstable after the sky had become nearly overcast by the spreading out of cumulus into strato-cumulus at an inversion. This had already happened over the site by 11 a.m. B.S.T., and later reports from elsewhere brought similar news. Pilots could only wait in hope while soaring over Bradwell Edge in the N.N.W. wind.

The first sizeable breaks in the overcast appeared soon after 2 p.m., enabling five

machines to get away under a growing cumulus at 2.20. Another five, quickly followed by seven more, were off under a cloud street at 2.45. Those who circled away from the site at other times were unable to get far.

On the way to Dunstable there seems to have been nothing to choose between keeping in or out of clouds. Stephenson climbed inside clouds and Forbes kept below them so as not to get lost, yet they remained close to each other all along the route. Stephenson made his navigation easy by previously marking distances on his map, and carrying a graph showing distance against time, on which he put a dot whenever he recognized anything. After half an hour, there were enough dots to lie on a straight line, and thenceforth he knew where he was by referring to the graph. He climbed higher than he need have done in his last cloud, but nevertheless won the race at 42.6 m.p.h., Forbes coming second at 42.3 m.p.h. Others completing the course were Wills at 37.5, A. Goodhart at 36.9, Welch at 34.2, N. Goodhart at 34.0, and Ince at 32.0 m.p.h. There was a 20-knot following wind.

Wednesday, 25th, frustrated all attempts to get to Boston and back, though Stephenson, the only one to get there (73 miles), made 18 miles of the return journey. Cumulus was again spreading out at an inversion, though thinly, but he and Welch both penetrated this layer to where unstable cumulus stuck up through it, and climbed nearly 6,000 ft. Cumulus below the inversion was, on the contrary, mostly small and ragged.

Ince described these two layers of curiously differing cumulus as being separated by a layer of wave-like lift, and other pilots reported waves, such as N. Goodhart, who glided 12 miles from a single one without encountering any thermals.

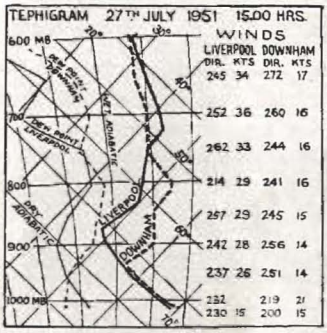
Thursday, 26th, brought a new type of overcast in the form of alto-cumulus. It had spread out from a front to the west, not from cumulus, whose development it hindered. Frustrating experiences were Foster and Wills finding a strong downcurrent over Sheffield, and Stephenson being brought down after 24 miles by underestimating the distance of the next cloud.

Northumberland was reported free from alto-cumulus and eastern England partly free, presenting Welch with a difficult choice whether to fly across wind to north or south, the coast downwind being too near. He decided on south, but the overcast kept chasing him east of his direct track to Lympne. His route was Mansfield, Northampton, Kettering, Bedford, Chelmsford, Southend and Canterbury, where he realised Lympne was out of reach upwind. Clouds, he found, were in lines, not streets, and he would use two succeeding clouds and then glide across to the next line and use two more, and so on.

In the late evening Sowrey, Currie and Staffurth got across country in waves—a foretaste of Friday.



Contrasts in overcasts. Above, on Tuesday, 24th July, at 4.30 p.m. looking N.: strato-cumulus has spread out from cumulus to cover the sky; few fresh cumulus are appearing and many competitors have not yet got away. Below, on Thursday, 26th, at 10.40 a.m.: an alto-cumulus layer has broken temporarily to let the sun shine through and start cumulus forming.





Friday, 27th, was the great wave day, probably unique in soaring history. The horizontal distribution of the waves is better depicted than described (see map). Vertically, there were two cloud layers: below, strato-cumulus masses corresponded roughly to the wave positions, and above there were perfect lenticulars, except for the best-developed one by Sheffield which showed cumulus-like domes. These lenticulars were at about 7,000 ft., but succeeding ones tended to get lower and give less lift.

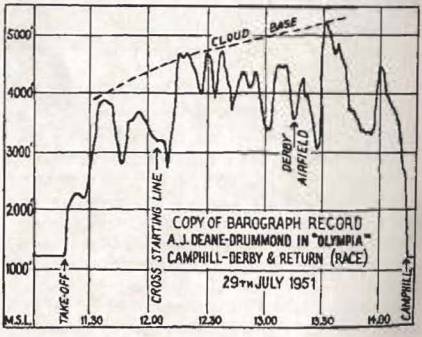
Maximum lift in the best wave was 9 ft./sec. (Gilbert), 7½ ft./sec. (Lee) of 5 ft./sec. (Stephenson), but Rivers, who charged downwind through nearly all the waves, found mostly 1½ ft./sec. lift on the up side and 6 ft./sec. sink on the down side. Maximum height in the Sheffield wave was 8,600 ft. a.s.l. (Lee). The wave over the competition site was continually shifting and most pilots spent over an hour trying to get up in it. At one period its down-current almost cancelled out the slope lift.

Saturday, 28th, started well for once with good cumulus, but nearer the turning point at Booth Ferry, 45 miles away, some high cloud had spread back from a retreating front. Of the many who got there and part of the way back against a 20 m.p.h. wind, Forbes made 25 miles of the return journey at 8 m.p.h. and was then brought down by high cloud, while Wills took 1½ hours over 16 miles coming back. His intended technique for getting back was to look for sure thermal sources, such as a wood or a town, instead of searching in open country, but he reached Doncaster at only 1,200 ft. and caught nothing. Ince, during his partial return journey, usefully found a string of thermals upwind of each cumulus.

In the early afternoon a curious strip of cumulo-nimbus, passed by south of the site; its spreading anvil chased Ince and brought Neuman down, while N. Goodhart had to land in the compensating sink which cleared the neighbouring sky of cumulus.

Sunday, 29th, was ideal for the race to Derby and back. Techniques were various: Charman-Thomas, in a Sedbergh with passenger, left every thermal at 3,000 ft. before it weakened; and after the clouds vanished, Foster still found that "nobbles" on the surface of the haze layer showed where the lift was, as long as you weren't more than 2,000 feet lower down. But the technique which came off best was that of the winner, who now proceeds to describe it.

A.E.S.



Trying to Go Fast

by A. J. Deane-Drummond

MUCH has been written on cross-country soaring technique, many graphs have been published showing the gliding ratio obtainable at various air speeds, and various devices suggested for use in the air to indicate the best speed to fly at in different wind and thermal conditions.

Until a pilot's thermal circling technique is reasonably certain it is perhaps best to extract the maximum distance out of each thermal, but as soon as this stage is passed it becomes obvious that the distance that can be flown is only limited by the setting sun. In other words, it is speed across country that matters and not extracting the maximum distance out of each thermal, though this may be important in the marginal thermal conditions experienced in early morning and towards evening.

At the beginning of this summer I carried a graph showing the best speed for the Olympia under different thermal conditions. I soon found this to be impractical and reverted to flying at 55 between thermals regardless of how strong they were. I made a practice of adding 10 m.p.h. when flying through the downdraughts near a thermal, and for most of the summer tried to improve my circling technique and therefore reduce the amount of time spent in thermals, which is usually at least half of every cross-country flight. There seemed to be more to be gained by better circling than adding a few m.p.h. between thermals. My experience is that the fast-moving central cores of thermals seem to wander quite a lot, but that if every single circle is carefully adjusted towards the maximum lift, this core can be followed and the average rate of climb nearly doubled.

The task for the last day of the 1951 Championships was an out-and-return race to Derby Airport and back, a total distance of 60 miles. My first thoughts on taking off were to ensure a safety-first policy of completing the out-and-return flight, and not worry too much about the speed. On the way out I followed my usual technique and took 1 hour 15 minutes to go 30 miles, or an average of only 24 m.p.h., including a 5 m.p.h. following wind. Thermals were very frequent and there was plenty about going up at 3-6 feet per second and an occasional one could be worked up to 15-20 feet per second. I then and there decided to do a bit better for the return trip and flew at 65 m.p.h. between thermals. A thermal had to produce 15 feet per second within 3 circles of hitting it, or else it was discarded and we were off again at 65 m.p.h. This rough-and-ready policy paid off and the return flight took only 55 minutes or an average of 33 m.p.h., against a 5 m.p.h. wind.

I was still far from satisfied with my technique, and felt that something more accurate was required, but yet easy to apply in the air. I also knew that I lost a lot of height in the downdraughts round thermals, and like many pilots my policy had been to straighten out on course and continue to fly slowly whilst still in the thermal in order to extract the last few feet before hitting the downdraught on the outside. As soon as the downdraught hit me, which usually had the effect of partially stalling the Olympia, I would put the speed up to about 70 m.p.h. A little reflection showed this to be very wasteful of hard won height, and I decided to put on the increased speed necessary to cross the downdraught as quickly as possible at the top of the thermal and if possible before leaving its limits. I would thus arrive at the downdraught area travelling fast and get across as quickly as possible. This might save as much as 100 feet on each thermal, and would be worth a lot after 5 hours of thermal soaring in, say, 20-30 thermals.

The next part of the technique that obviously needed attention was the best speed to fly at between thermals and in downdraughts. It is quite easy to show this on a graph, but I personally find this too difficult to use in the air, and I have now adopted a rule of thumb that is very nearly correct and does not require any thought to apply. As the best gliding ratio of the Olympia is achieved at 50 m.p.h. in still air, I add the numerical value of the average rate of climb in feet per second of the

thermal to 50 m.p.h. to give me my air speed to the next thermal. All downdraughts I treat alike and add 10 m.p.h. to the above figure, and I always expect one after leaving a thermal. Thus, having worked up a 10 feet per second thermal to cloud base flying at 38 m.p.h. in the Olympia, I must get up to 70 m.p.h. before leaving the thermal, and having crossed the downdraught area, can steady down to 60 m.p.h. This method is self-compensating for different thermal strengths.

Championship Chortles

by Corunus

THE Cambridge Club's historic car
Seemed made before the first Great War
They thus became the only team
To carry out retrieves by steam.

* * *

Bill Bedford's cockpit
Made all of us blink;
There wasn't a single
Unoccupied chink.
There were switches you stirred
Whereupon something whirred;
There were needles that flicked,
There were gadgets that clicked,
And numerous gyros
And dials to inspire us.

He wasn't too free
With his L/D,
But omitted to think
Of min. sink.

* * *

Camphill to Derby out and return!
Charman-Thomas made us learn
What can really be done
With a moustache and a T-21.

* * *

Ten thousand thanks
To the Derby & Lancs
Who worked on the ground
Whilst we floated around.
We are sure that in Heaven
Their aspect ratios will be 11
Whilst ours will be less than 7.

* * *

GOODNIGHT PRAYER
Oh Lord may I
Before I die
Please have a Sky?

Prize Competition in Meteorology

A PRIZE will be offered for the best description of a meteorological phenomenon submitted by a glider pilot before 30th November, 1951. Entries should be sent to Dr. R. S. Scorer, Imperial College, London, S.W.7. They must describe observations made in Great Britain by the pilot, together with any made by associates on the ground or in other sailplanes. The phenomenon described should preferably be a common one, and the paper should aim at describing it as precisely as possible with the object of confirming or rejecting some current idea or theory, or of establishing some fact. The papers will be judged mainly on the value of the observations (rather than on theories) to the sciences of meteorology and soaring. Photographs, diagrams, and quantitative measurements of airspeed, altitude, updraught, winds, temperatures, etc. are to be encouraged. The times and places of the observations must be given.

Second and third prizes will be given, and any papers considered worthy of publication will be published. Prizewinners will receive 40 reprints of their published papers. The prizes which amount to £11 in all, are offered by Sir Simon Marks.

A small prize will also be given for the best "line" in soaring. Entries must not exceed 50 words, or one diagram and six words. They must be impossible according to expert opinion and yet credible to the uninitiated. It is hoped that entries will merit publication.

Note that this competition has no connection with the Questionnaire on page 108, which should be answered by all readers who can do so.

The 1951 National Championships, and After

by Philip Wills.

DRIVING back from Camphill after these, the first British National Championships, although personally practically potless, I must confess to a feeling of elation greater than after any of our previous contests. The lessons of Samaden and Orebro had borne fruit.

The whole spirit of the meeting has altered. Task flying, and the split into Individual and Team classes, put everyone on their mettle. Enthusiasm and the competitive spirit were at top levels, admirably tempered by the marvellous sportsmanship that characterises the gliding fraternity the wor'd over. And the whole meeting was lubricated by the well-nigh flawless organisation of the Derby & Lancs Club.

What a feast of many courses we pilots had! Every day brought different conditions, and each day a new surprise. Much of the weather was of the kind that, in ordinary circumstances, one would have hardly troubled to take off in; only in competition flying does one find out what can be done in apparently poor conditions.

The first Sunday, one took off mainly for the sake of getting airborne, there being no sign of lift by mid-afternoon. Yet Stephenson reached 12,400 ft., and Foster flew his Rhönbussard 87 miles.

Monday was the only wash-out. Came Tuesday, and derisive laughter when the Contest Committee (on whom be all praise) declared a 110-mile goal race to Dunstable. It was one of those greyish dead-looking days when one found oneself climbing gently under the only visible lump of amorphous cloud in the sky. From the top of the lift one set off to get the maximum possible distance in a straight glide to earth, only to find another gently lifting lump come into sight ahead. No-one was more surprised than I when Dunstable came into view, but my surprise increased to amazement when I found the two Skys already on the ground, and after I had landed, four other machines quickly followed.

Wednesday looked an even more hopeless day, and the task of an out-and-return flight to Boston and back a nonsense. Yet Stephenson reached the goal and came back to Cranwell, and Welch got nearly there, by finding a small cu.-nim. that took them up above the 8/8th stratus that defeated the rest of us into a more favourable layer.

Came Thursday, with a fairly strong S.W. wind, and we all set off for the Yorkshire coast. All except Welch, that is, whose 186 mile cross-wind flight to Manston came as an almost physical shock, and is surely in the running for the finest flight ever carried out in this country.

Then Friday. Determined to give us the whole spectrum of experience, Camphill laid on its standing wave. To most of us, this was the first wave flying we had done. It was a quite unforgettable day. Gently and silkily, the Weihe climbed in the cool grey air, and the lazy torrents of stationary lenticulars fell away below. Around the site itself, I couldn't make much sense of them, but after an hour or so I reached 7,000 ft. a.s.l. and turned downwind. Approaching Sheffield, we came out into clear air, and there ahead, over the town, was a text-book wave cloud. Five ft. per second climb in front of it at 5,000 ft. fell off gradually as we climbed, until at 9,200 ft. Stephenson and I came to rest side by side. Nothing stirred or whispered in the cockpit. It was exactly like flying in a dream.

Turning downwind, I flew through the wave-cloud and emerged on the east side of Sheffield. At 7,700 ft. I heard the factory hooters below blowing at the close of the day's work. Those who find this difficult to believe must seal their cockpits properly and then fly in the unbelievable calm of a wave.

Saturday brought the out-and-return task to Booth Ferry Bridge. This was perhaps the least spectacular day, but the attempt to batter our ways home against the 20 m.p.h. headwind was at least instructive.

Then Sunday. In all previous years, the last Sunday has been an irritating anti-climax. The need to get home for the morrow's work has meant a half-day's

flying, with good conditions wasted. But this Sunday's out-and-return race to Derby proved the climax of the whole week, not only for the pilots, but for the ground teams and spectators too. With the light wind blowing, every get-away was a struggle, but once away, conditions were excellent.

My own get-away was marginal, but my return was worse than that. I underestimated the strength of the westerly headwind, arrived below the south slope, dived for the corner to get around onto the west face, at the last moment found some telephone wires ahead, scraped under them, round the corner onto the west slope almost at its base, found lift which took me safely up, turned in and landed. Not a recommended arrival.

The scene round the briefing room was one of extraordinary excitement. Crowds were ranked round the scoring board, and as each successful arrival appeared, he was greeted with cheers and handclaps. The race gave us the most exciting day in the history of contest flying, and at practically no cost.

Ladies and gentlemen, I have much pleasure in declaring that this stone, engraved "Contest Flying, the Cinderella of the British Gliding movement," is at long last well and truly laid. Fate cannot harm me, I have dined to-day.

And after? Now that the dog has seen the rabbit, I have no fears for the future. But we must keep up with the times. At the F.A.I. meeting in Brussels in July, a set of Basic Regulations for future World Championships were laid down, of which two, applicable to our Nationals, are noteworthy.

1.—The different tasks were defined, and "gain of height" becomes optional. This means that the holding nation may decide, at its discretion, to wash out height marks, and so the need for calibrated barographs, though presumably the need to carry barographs remains, to obviate the possibility of one landing behind the nearest pub for a drink, and carrying on by aerotow.

Personally, I hope we continue with height marking in this country, because, although this gives work to the judges, and is difficult to assess relatively to distance or speed, in our small country distance alone is apt to be restricted. Furthermore, I set great store on the intrinsic virtue of blind flying, and the difficult part of blind flying is apt to lie in squeezing the last 1,000 rough feet out of a cumulus, which are not worth while for distance alone. Also, at Camphill, wave flying in competitions would lose much of its savour if height were not valuable in itself.

2.—The basic rule for the daily factor was laid down. I have always favoured a daily factor, and its value became, I think, apparent from our 1951 Championships. On many days, the set task made it impossible, with the marking system in use, to gain or catch up on a substantial lead, even by an outstanding performance, except in the negative sense, by someone else failing to achieve the task. Then, unexpectedly, a day would arrive when an outstanding flight could put its performer almost out of sight ahead of everyone else. A daily factor is intended as far as possible to equalise the potential value of each day's flying.

The agreed F.A.I. system is based on the Dutch proposals mentioned last year (GLIDING, No. 3, p. 136). The maximum number of marks obtained each day by the best performance will always be a constant, say 200. Put mathematically, the daily factor will be $\frac{200}{m_{max.}}$ Within this general principle, marking systems can be decided at each country's discretion. There is no need, unless we want to, to alter our present marking system next year, except to multiply each pilot's marks each day by this factor. If the best flight on one day wins 150 marks, the factor becomes $\frac{200}{150}$, and so on. I suggest we might use this factor *within each class*, so that the best Individual and Team flight each day will score 200.

What have we achieved this year? Firstly, we have brought our basic approach to contest flying up to the highest standards achieved elsewhere. Secondly, we have conclusively shown that in the Sky we have an excellent British 18-metre sailplane in production. Thirdly, we have achieved a system which will greatly facilitate the future selection of our International teams, and give our pilots a real idea of what they are up against. Lastly, we have lighted a candle which will not go out. All our visitors commented both on the extra-

ordinary enthusiasm shown, and on the efficiency of our organisation. The effects on the official and public attitude to British gliding as a whole are likely to be far-reaching.

It was a heroic meeting, and we were all heroes. When I am old and grey and full of sleep, and nodding by the fire, and my grandchildren clatter in to tell me of their safe return from the moon, I will reply: "Welcome back! But, you know, the spirit of you young folk is not what it was in *my* day. I recall the 1951 Gliding Championships, when George Charman-Thomas did the out-and-return race from Camphill to Derby and back in four hours in a T-21 . . . Ah me! Those were the days . . . . . "

Reflections on the 1951 Championships

by Alan Goodfellow.

ON the principle (a) that onlookers see most of the game and (b) that an absence of too much technical knowledge prevents the wood from being obscured by the trees, I venture to set down these thoughts in retrospect on the National Gliding Championships.

In the first place there was an innovation this year in making the meeting an official championship contest in which the winner of the individual section became the National Gliding Champion. In this connection the Contests Committee was asked to give a ruling as to what minimum requirements were necessary in order to create a championship contest. They ruled that a "Championship Day" consisted of a day in which all the competing aircraft had been given the opportunity to fly, and at least 10% of such aircraft had scored marks under the contest rules. They further decided that a minimum of three championship days were required in order to constitute a championship meeting. In practice this ruling gave rise to no difficulties in marking, as three out of the first four days proved to be "Championship Days," but it might have given rise to difficulties as to whether or not any marks at all were to be scored by competitors, had the minimum number of championship days not been achieved.

The general line of the contests followed that of previous National Contests and was divided into two classes, individual and team, but it varied from previous contests in that a "task flight" was set for each day of the meeting. Although the general view of competitors was that this was an improvement and resulted in an improved standard of flying, and although the tasks set by the Contests Committee for each day also met with general approval, it was obvious that the tasks were beyond the reach of many of the aircraft taking part in the contests. In one case—the out-and-return goal flight to Boston—the task proved beyond the ability of anyone, though this was largely due to an erroneous met. forecast which promised a reduction in the westerly wind during the afternoon, whereas in fact it increased. Most of the other contests proved beyond the capacity of all except the Sky and the Weihe, together with one or two pilots of outstanding merit in such machines as the Olympia, Meise and Mu. An outstanding exception was the last day's task when a Sedbergh successfully flew to Derby Airport and back.

The writer suggests that for next year's contests, two alterations should be introduced. Firstly, the tasks for the individual class and for the team class should be set separately so as to give a higher standard for the individual class, and to give the intermediate types of glider in the team class a reasonable chance of completing their tasks. Secondly, the rules as to a championship meeting should apply only to the individual class, and only to the decision as to whether or not the winner of the individual class is to be acknowledged as the National Gliding Champion. In other words, so far as the prizes are concerned, the ordinary contest rules should apply to both classes, and all marks scored should count towards these prizes from the commencement of the meeting. The special rules as to the championship meeting should have no effect on these prizes, but should merely decide whether or not the winner of the individual class is

recognised as the champion.

I should like in conclusion to pay, as the Senior Steward of the meeting, a very sincere tribute to my old friends the Derby and Lancashire Gliding Club on the standard of their organisation. The Camphill site gave of its best to the competitors, providing them with seven days' most interesting sport under widely varying conditions. If I add that the organisation was worthy of the site, it is the highest praise that I can give.

Can You Tell Us ?

WE have set out below some questions to which we would like to know the answers. Opinions seem to differ over some of them and so we hope to publish a summary of the replies. The answers are just as important in meteorology as in soaring because the vertical motion of the air is all-important in both. Please send your answers to us at Imperial College, London, S.W.7. Naturally we do not expect everyone to answer all the questions; we want you to tell us the answers that come in your flying experience. Dates, times and places are always helpful, but please be fairly brief, and though you may wish to hint at explanations it is mainly observational fact that we are after here.

I. Waves.

1. Have you ever soared in a wave above the highest wave cloud?
2. Have you soared in a wave with no increase of wind with height?
3. Do cumulus ever occur at the same level as stationary wave clouds?
4. Is there any turbulence or bumpiness in wave lift?
5. What is the horizontal extent of any turbulent layers, and are they accompanied by wind shear or any obvious temperature change?

II. Hill Soaring.

1. What is the greatest height reached (as a multiple of the hill height) by hill-soaring in the absence of obvious waves?
2. Does hill lift vary with time of day according to the direction in which the hill faces? Is it best when thermals are good?
3. Do "evening thermals" occur after any particular kind of day (e.g. good thermals or waves, or after poor hill lift)?
4. Where is the best lift over a conical hill?

III. Thermals.

1. How does the updraught strength vary with height below cloud base?
2. How does the updraught strength vary with time of day?
3. Is there a representative updraught strength at any time or can a great variety of strengths be found simultaneously?
4. Do thermals rotate? In which direction do you prefer to circle?
5. Does the lift ever decrease just below cloud base, and if so, under what kind of cloud, and what is the lift like in the cloud?
6. Do cumulus clouds have flat bases?
7. What happens to your airspeed on entering and leaving a thermal?
8. Have you ever measured temperature excesses inside thermals?
9. Are thermals usually sharp-edged (a) below cloud base (b) above cloud base?
10. Have you ever found rain in an updraught, and if so at what level?
11. Have you ever found lift or downdraughts outside clouds above cloud base?
12. Have you ever found updraught in cloud very smooth?
13. What are good thermal sources?

IV. Sea Breezes.

1. Under what conditions of wind have you found sea breeze lift (a) out to sea (b) inland; i.e. was the upper wind blowing towards the sea, towards the land, or along the coast?
2. What is the greatest distance out to sea you have found sea-breeze lift, and at what level?

V. Other Phenomena.

Have you observed any other phenomena which you think we ought to know about?

R. S. SCORER AND F. H. LUDLAM.

Possible 500-Kilometre Flights from Pont Saint Vincent

by Guy Borgé

A few pilots hold the "Diamond C" leg of 500 km. (311 miles) in a straight line—perhaps 14. These are:—

In U.S.A., two pilots: John Robinson with 520 km. (322 miles) in his Zanonia, and Dick Johnson with 510 km. (317 miles) in goal flight, and he has already recorded another distance of 502 km. (312 miles) several years ago. [Note : further flights have been made since this article was written. See page 114—Ed.]

In Germany, in 1935, on the same day during the Rhön competitions, four pilots covered 504 km. (313 miles): Bräutingam (D.B. 10 sailplane), Heinemann (Rhönsperber), Oeltschner (Condor) and Steinhoff (Rhönadler). In 1939 Erich Vergens travelled 523 km. (325 miles) in a Minimoa, the present German distance record to-day.

In France, Andre Suisse holds the French record with 551 km. (349 miles) in a Weihe flown from Lognes to Cazaux, and from Wichita Falls Eric Nessler has covered a distance of 506 km. (314 miles) in an Air 100.

In Poland, T. Gora flew 578 km. (359 miles) in a P.W.S. 101, and another pilot 535 km. (332 miles), a nice achievement because in goal flight.

In Russia, if we look at the figures of world records we see that three Russian pilots (at least) should hold the 500 km. leg: Olga Klepikova with 749 km. (465 miles), Rastorguyev with 652 km. (405 miles) and Savtzov with 602 km. in goal flight (374 miles).

We observe from these figures that the number of flights made in Europe is not indeed very great: one in France, five in Germany, two in Poland. In fact, the 500 km. leg appears possible only in a few countries, and if we eliminate England, Switzerland and Spain for geographical reasons, and Germany, Hungary, Poland and any country behind the Iron Curtain for political causes, we believe the maximum of favourable possibilities exists to-day in France. Several sites own a good position for some 500 km. starts and offer the necessary installations and performance sailplanes.

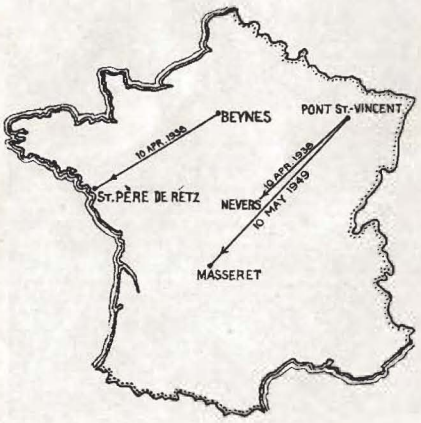


Above: M. Guy Borge wearing the "Pont Saint-Vincent tie." Below, a photo of Pont Saint-Vincent airfield taken by M. Borge from a Weihe sailplane.

Choice of the starting point must, of course, be influenced by the existence of good winds, blowing with strength from a nearly constant position during the flight, also across flat plains for getting the best forward speed; they must bring unstable air masses with formation of numerous cumulus and preferably of long cloud streets. Two winds seem to offer these properties in France, south-west and north-east winds. We shall eliminate the first one

for the following reason: from active centres like Beynes, Pont Saint Vincent, Lognes, Chaveney and so on, this direction brings the pilots to Germany and distance flights ending in Germany are now forbidden in France. Certain sites more to the south-west would be all right for keeping the path in France or Belgium, but no sufficiently long tests were carried out from these airfields, such as Chateauroux, Tours, Cognac, Bordeaux, Cazaux and so on.

There remains the north-east wind which, from the results already recorded, allows us to consider the possibilities of 500 km. flights. Best start will be made in the north-east of France, because on



certain occasions the wind becomes east near the Atlantic coast and carries pilots coming from Beynes, Lognes or other airfields around Paris, to the sea. We think the best centre for the start is that of Pont Saint Vincent, near Nancy, which is excellently equipped with high-performance sailplanes.

The best time for this favourable north-east wind occurs in spring, in April-May. But during certain years it remains infrequent and the necessary conditions are difficult to group on the same day. Together with strength and constant direction of wind, instability must be good for thermals to begin early and end at a late hour. Instability must exist above the whole of France, but without excess causing deterioration of weather in certain parts of the country.

We have chosen two examples when all these conditions were satisfied and confirmed the possibility of 500 km. distances from Pont Saint Vincent with certainty. We shall see why, in spite of favourable weather, not one pilot succeeded in making a 500 kms. on either of the two days: in fact, the "Diamond C" badge did not exist at this time.

First Example: 10th April, 1938.—On April 10th, 1938, a stable anticyclone, centred on the British Isles, brought to France a flow of north-easterly unstable (Indirect Polar or Arctic Maritime) air. At Lyon-Bron (unfortunately it was impossible to obtain data concerning other meteorological stations), cumulus were forming at 7.30 U.T. and decaying at 17.30 with their base between 1,000 and 1,200 metres. At 1,000 metres the wind was north-east, 40-50 km./hr. No cumulus to south-west of the line Brest—Nevers—Marseille.

On this day M. Didion, then the C.F.I. of the Pont Saint Vincent centre, covered the distance Pont Saint Vincent-Nevers, 296 km. (184 miles), in 3 hours 30 minutes. During the first hour he travelled 120 km. (75 miles) under cloud streets. He landed only because he was suffering from severe cold, but at Nevers he was 1,800 metres high and could easily have covered a much greater distance. In his opinion the complete crossing of France from Pont Saint Vincent to the Spanish border, 820 km. (508 miles), was possible on this day. He was, however, flying a very slow machine, an Avia 40 P, in which he maintained an average speed of 84 km./hr. (52 m.p.h.). With a fast performance machine like the Weihe or the Air 100, it would have seemed very possible to make a 500 km. distance from Pont Saint Vincent; but not from an airfield like Beynes, for instance, because of the curved isobars of the anti-cyclone which caused an east wind in the west of France.

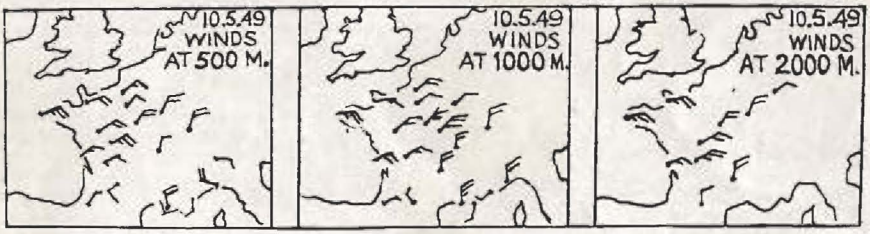
On the same day M. Eric Nessler travelled 347 km. (215 miles) from Beynes to Saint Père de Retz and was obliged to land because a strong easterly wind brought him to the sea.

Second Example: 10th May, 1949.—On May 10th, 1949 a stable anti-cyclone of 1036 millibars is centred over the Irish Sea and brings to France some moderately

unstable air masses (Indirect Polar Maritime air) on north-east winds. Some cumulus are forming in the north and north-east of France at 800-1,000 metres in the morning and their base rises to 1,200-1,500, top to 1,600-1,800 metres; they decay at 18.00 T.U. But the sky remains clear to the south-west of a line passing across Brest-Nevers-Marseille, exactly as on 10th April, 1938. The wind at ground level blows from north-east with a speed of about 20 knots.

On this day, M. Weiss, a young pilot of 18 years, flew 490 km. (304 miles) in a Nord 2,000 "Olympia" from Pont Saint Vincent to Masseret, near Limoges. He started at 10 hours (legal time) and landed at 17.30. The flying time of 7 hours 30 mins. gives an average speed of 65 km./hr. (40 m.p.h.), excellent for an Olympia on so long a path. It was his second cross-country flight after his "Silver C" distance. We estimate that a pilot with more experience and flying a better machine could easily record the 500 km. leg.

We hope that plenty of similar meteorological conditions will be found in France in coming years to allow pilots to qualify for the 500 km. leg, which, in our opinion, appears the most difficult one in soaring to-day. And, as in Heaven, there are "Beaucoup d'appelés mais peu d'élus."



Comparison of Barograph Charts

by Martin Warner

Sydney Soaring Club

DURING an idle hour on the Christmas gliding holiday with the Sydney Soaring Club, when both gliders were off on cross-country flights and a spot of "spine bashing" was being indulged in, it occurred to me that a comparison of the barograph charts made at that time would be of interest;—anyway, the book I was reading had been pinched by someone else.

In fact, it proved so interesting that I decided to pass it on, and now, after much contemplation and changes of front, I have at last plucked up sufficient energy to compile these notes.

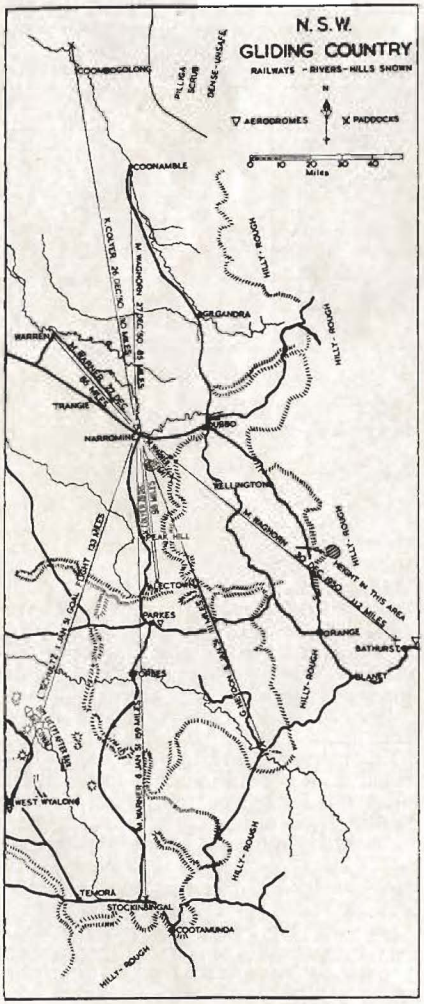
My earlier attempts were in the nature of a semi-scientific comparison, but on reading them again seemed to be uninteresting and incomplete. In any case your own analysis is much more interesting and at least you will agree with it.

Our records were made on two different recorders, and for ease of comparison I have re-drawn the odd one to the same scale of our Short & Mason Tycos instrument of ancient vintage, which originally had a scale showing 30,000 ft. against 40 minutes—just about right for one particular flight. However, we modified it and the time scale should be multiplied by six, making a five-minute scale equal to 30 minutes—that is, four hours for one complete revolution of the drum.

Height has not been interfered with, and the resultant record gives a fair picture of a cross-country flight, though exact analysis of height is difficult and not very accurate.

No. 1 and No. 3 flights can be compared, as reference to the map shows they are over the same country and the track flown would be very similar as conditions were alike.

M. Waghorn on chart 3 found no lift after Coonamble, though he did try further north. No. 1 chart started at 10.30 a.m. and No. 3 at 12.00, and both stayed in the vicinity of Narromine for a period. Because of the similarity of the conditions, allowing for the 27th being somewhat the worse, there is still a noticeable difference in pilot technique evidenced by the use of every thermal. K. Colyer in No. 1 terminated his flight because of rough flooded country and not because there was no more lift.



No. 2 and No. 4 charts can then be compared, as both were out and return flights.

No. 2, by M. Warner, started with a light cross wind and finished against the wind, which changed at the turning point, so that the average speed out was 27.7 m.p.h., and return, which took 3 hours 41 minutes, 11.7 m.p.h. in better thermals but with a strengthening wind. No. 4, by K. Colyer, started late in the afternoon with no wind, and was flown below a cloud street over the Harvey ranges, averaging 27 m.p.h. out and 30.6 m.p.h. on the return—somewhat marred by misjudging the point at which to leave the lift if speed had been aimed at. Altogether an excellently judged flight, as the direct route was not productive of lift.

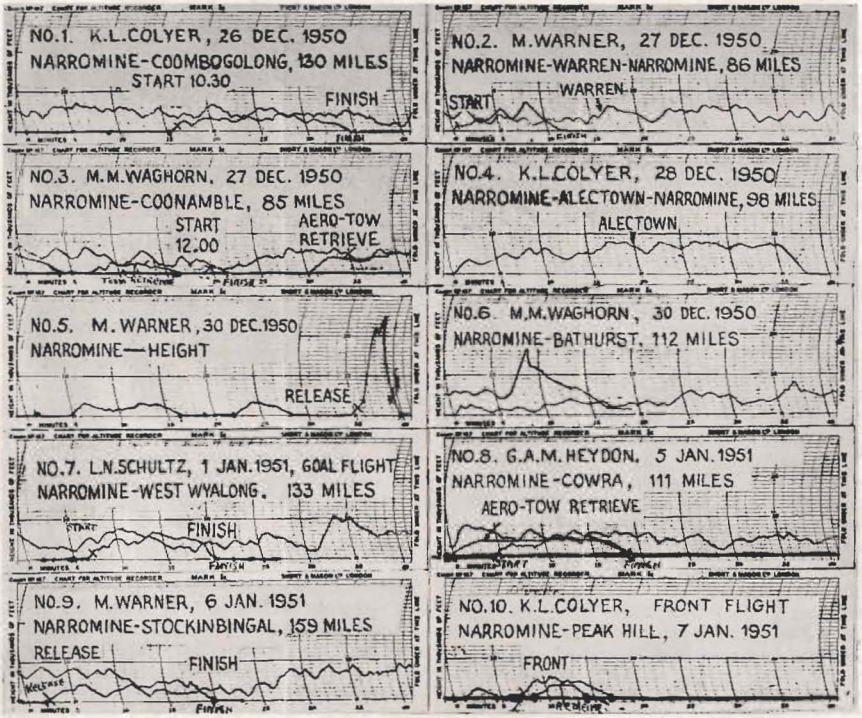
No. 5 and 6 charts are also somewhat comparable. No. 5 records early flights of no real note and then M. Warner's climb in a cumulo-nimbus to 23,500 ft. and rapid descent.

After entering the cloud at 6,000 ft. visibility was lost till tree-top level on a 600 ft. timbered hill, since the down-current encountered ceased at the ground and took down with it dense rain or cloud streamers plus glider.

As a point of interest, the second peak on the chart was reached with the dive-brakes out, indicating a vertical velocity of the up-current of 31 m.p.h. followed by a down-current of the same velocity. These occurred in a second cell in the storm, encountered after extending dive-brakes and trying to descend.

The climb was called off at the recorded 22,000 ft. indicated, because oxygen was not carried and, therefore, the climb above this made against all possible resistance from the pilot. It is also to be noted that the barograph was reading high above 6,000 ft.

The flight by M. Waghorn also finished with a climb in cloud to 16,500 ft. without seeing the top, and also without oxygen. The rate of climb and the severity of the down-current are similar to No. 5, but cloud was broken at 12,000 ft. only to find clouds on both sides and below. A long glide then took the pilot into safe country, though when the ground was first seen after getting out of the unwelcome cloud "valley" it was extremely rough and uninhabited.



Nos. 7, 8, and 9 show no direct comparison, though they do indicate somewhat different handling. No. 7 represents a goal flight which could have been continued, though probably not to the next town, and L. Schultz entered several clouds at heights above 6,500 ft.

M. Warner in No. 9, however, did not enter any cloud, but used cloud base to fly straight without loss of height till the end of the cloud was reached, when a small extra bit of height was gained by circling, instanced specially between 35 and 40 on the chart, which was a particularly noteworthy example of a flight under cloud slowing up in the best lift followed by a short climb along the edge.

This flight was continued with the progress of the clouds, there being no lift in front, and terminated with rain storms all round and rough country in the only likely direction for lift.

No. 8 chart made by G. A. M. Heyden shows a particularly hard day's work in poor conditions.

No. 10 of a short front flight by K. Colyer does not show very much, as the path of the front was directly into rough country, so a track was flown across the front but no lift was found beyond it.

I have found this approach new to us, and comparisons between the average frequency of thermals used by the different pilots, and the heights gained against the low points on the flight, things to think about.

Comparison with charts produced in the United Kingdom also is of interest showing the nature of the country traversed—a very strong factor when considering a cross-country.

So concludes a very different note to that at first attempted, but I trust not too boring and at least somewhat different from the usual description of flights.

International Distance Record

by R. H. Johnson

LAST summer during the 17th National Contest I made three rather successful flights from Grand Prairie to various points in West Texas and of course I was quite impressed with the thermal velocity and high cloud base that I found there. My final flight of the meet was to a goal at Odessa, Texas, where Jack Stafford, the donor of its goal prize, resided. Odessa looked like a wonderful place from which to record distance flying. Pop Krohne spent some time there just after the National and his reports of his flights in his "Comet" L-K confirmed what I had seen.

I should have stayed there that year with "Pop," but my ship, the RJ-5, was then too new and needed a good deal of work and modification to get it in shape for this kind of flying. By working most of the year and carrying on systematic flight tests, we at Mississippi State College were able to increase the glide ratio from 31 to close to 40 and thus be in a position to seriously attempt to exceed the long-standing Russian distance record.

At first I thought that Shelly Charles,



with his Weihe, and I were going to be the only ones on this expedition, but I soon found that many others also planned to come, which made it better yet.

Pat Mulloy with his Schweizer 1-23 and I arrived there 24th July, and we both made a local survey flight the following day to familiarise ourselves with the area.

Now began the serious task of waiting and watching the weather for the right day that would be good enough to go 500 miles. Unfortunately we had no weather maps available and had only information from teletype reports available by telephone from near-by Midland Airport.

The 27th July looked promising, so I set out as early as possible. Taking off at 10.45 a.m. was a little early, as the air was smooth above 2,000 feet. I released at 2,800 feet anyway and had to descend to 1,800 feet before lift was encountered. The thermals quickly grew stronger and I was on my way. However, by noon the little cumuli, which started to form at 11 a.m., had turned into occasional cumulo-nimbus. This made endless detours necessary and of course slowed down my progress. However it was a thrilling flight and I did end up 403 miles away, near Johnson, Kansas.

Although I was rather happy with this flight, it was to exceed the 465 miles International Distance Record that I was there—especially since the Russian girl had made it from a tow to some twenty-odd thousand feet of altitude. This we did not feel was entirely sporting.

Since on the days that followed the weather was not what I needed, I did not fly the RJ-5 but acted as tow plane pilot for the many others who had arrived in the mean time.

On 3rd August, the weather improved markedly and cumuli formed early, at 9 a.m. The cloud base was low, starting out at only two or three thousand above the terrain but increasing during the day. I feared that the thunderstorms would form with the air as moist as that, but very few did.

Most of the pilots took off that day for a try at their Golden and Diamond "C" distance legs. Since there was a shortage of

retrieving drivers, my driver, Joan Brouillette, went after Joe Irvine and I chased off after Shelly Charles. The day was better than I had anticipated, and it was after midnight before I got to Shelly, who landed 348 miles away—almost to Colorado. This completed his "Diamond C"—number two for the U.S.A. Joe went 290 miles.

There was no chance of my getting back to Odessa in time to fly the next day, so we slept in a hotel and enjoyed a leisurely trip back afterwards. That day, the 4th, was a very good soaring day. The cloudbase was higher, a decent tail-wind prevailed, and the dust devils were in sight everywhere. There was little doubt in my mind that my sailplane could have exceeded the 465 miles that day, and for a while I regretted having left my post at Odessa.

These things seem to have a way of working out for the better and now I am certainly glad that I did take the time to get Shelly back, as the following day, the 5th, was better yet. Had I not gone with Shelly, I would have flown on the 4th and not been back for the 5th—the best we had.

Now the air was even drier and the south wind improved in velocity. This was my idea of cross-country weather and I joyfully set about to go. Texas Soaring Association's grand old president, and temporarily broken-down soaring pilot, E. J. Reeves, took the controls of the Stearman and made the tow at 10.16 a.m. We knew it was too early for thermals, but we planned to level off at 2,000 ft. above the airport and release when the thermals started popping. By the time we got to 1,400 ft. I realised that we didn't turn on the barograph, so down I went for a new start. The second time we took off at 10.29 a.m., found a thermal, and released at 2,300 ft. above the airport or 5,300 ft. A.S.L.

This thermal took me slowly at 1 metre per sec. to 6,400 ft. A.S.L., where it weakened. Downwind the next weak thermal went to 7,000. Downwind again approached the area where cumuli were starting to form and the thermals started to get stronger and higher. Average climb in the next one was 330 f.p.m. up to 9,600 feet.

Now that conditions were better, I increased the indicated airspeed from 65 m.p.h. to 75 m.p.h. in accordance with that indicated most efficient by my cruising speed chart. This chart is merely the curve of best cruise speed vs. the thermal average rate of climb, which is calculated using the flight polar of the sailplane and assuming an average downdraught between thermals.

From now on the going was good—just hopping from one small cumulus to another. Every half hour, if I could remember to do it, I marked my position and time on the maps so that we could later analyse the trip. The accompanying table gives these check points in the first column, the time in the second, the distance and altitude in the third and fourth. In the fifth column I have corrected the arrival time for the altitude that I had when over the point, using an average rate of climb of 400 ft./min. and correcting back to take-off altitude. This gives the time that one would arrive if he did not spend more time climbing but merely arrived there at 2,990 ft. A.S.L. Using this, one can get the true cruising speed.

At the first check point a bit north and east of Andrews the speed turned out to be a glorious 67.8 m.p.h., so I was quite encouraged.

At 12.45 p.m. I arrived over Lubbock with 11,000 ft. A.S.L., still doing almost as good. From there on north, almost to Amarillo, the cumuli no longer existed, but extended north far to the west of me and not quite so far to the east. Here was a serious decision to make: detour east or west to stay with the cumuli, or take my choice on making the next 100 miles in the clear air. Since time was extremely valuable (a mile a minute at least), I decided to stay on course if I was going as far as I intended. Also I could see several dust devils ahead, so it couldn't be too bad there. Sure enough the thermals were still good, averaging about 450 ft./min. all the way.

The upper-air wind report received that morning showed good south wind velocities up to 8,000 ft. A.S.L. and then decreasing considerably. Therefore in order to get better tail-winds I decided not to climb very high, but try to stay in the layer of air with the best winds. Also, as usual, I would pass up a thermal if it couldn't give a 350 ft/min. rate of climb or better.

This worked well until my luck ran out south of Amarillo. I found myself down to 1,800 ft. above the ground and only zero sink available. This was costing me and I knew it. There was one small dust devil to my left about two miles, but I did not go

there but kept on downwind hoping to save time. 1,600 ft.—that darn ground looked awfully close—what a sad ending to my 500 mile flight this would make! By the time I saw another dust devil two miles upwind, I was ready for anything and turned around to get it. When I arrived there only 1,400 precious feet of altitude was left, but I was going up in the weak lift.

That cured me on the low altitude flying and I stayed high after that. The ground speed dropped to a mere 36.5 m.p.h. between Canyon and there: I was determined not to let that happen again. Also here at Amarillo the wind had shifted to the south-west, so I decided to change my course for the maximum distance. My goal, Colby, Kansas, which is 527 miles straight north of Odessa, had to be abandoned, but it did not matter much if I could beat the Russians.

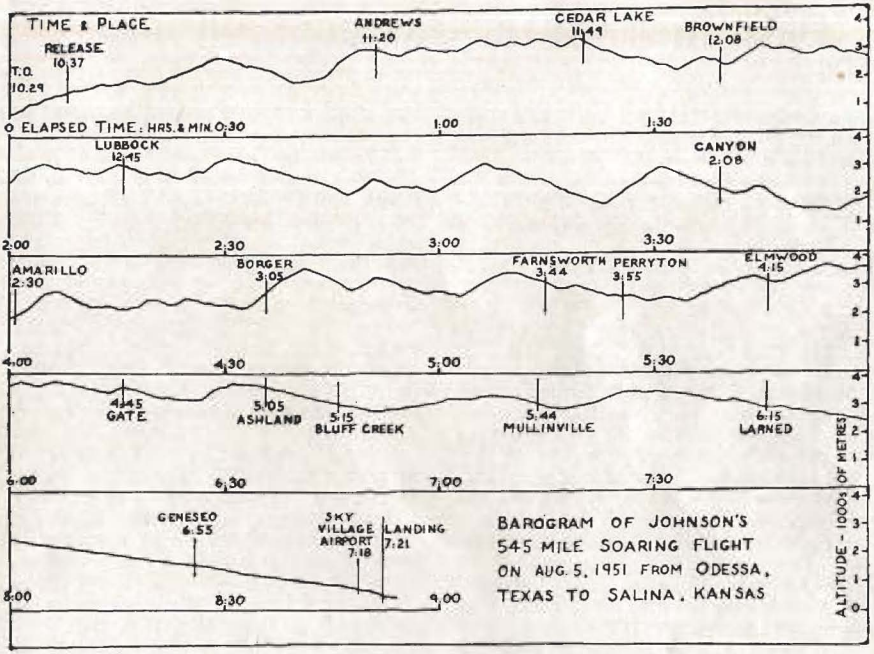
Ground speed picked up nicely to 82.7 m.p.h. from Amarillo to Borger. It was here that one of my best thermals was found over a carbon plant. It averaged 620 ft/min. to 12,400 ft. A.S.L.

Now I increased the cruising speed to 80 m.p.h. indicated, which when corrected for altitude gave me about 92 m.p.h. plus a tailwind of about 25 m.p.h. At 04.05 p.m. I arrived over the Texas-Oklahoma border and soon thereafter reached 13,000 ft. A.S.L. at the cloud base on several occasions. I pulled the nose of RJ-5 up into the base just high enough to read an even 13,000 ft. and then pushed it back down to 80 m.p.h. and went quickly on my way.

To me the next part of the flight now was the most critical. I was about 365 miles out, and from the altitude now on hand I could glide close to 100 miles without further help, if I slowed down to the speed at which best glide ratio is obtained (50 m.p.h.). It seemed sort of silly to go that slow because the chances were I would find more lift—it wasn't late yet. Therefore I decided to use a compromise speed of 65 m.p.h. until I had that 465 miles safely in hand.

There still were some thermals but they were decidedly weaker so I moved along more cautiously now. When the Kansas

Place	*Time*	*Distance from previous point (miles)*	*Altitude (feet)*	*Corrected time (see text)*	*Time from previous point (minutes)*	*Speed from previous point (m.p.h.)*
Release	1029	—	2,990	—	—	—
Odessa	1037	—	5,300	1031	—	—
N. Andrews	1120	35	10,230	1102	31	67.8
Cedar L.	1149	30	11,180	1129	27	66.7
E. Brownfield	1208	27	8,520	1154	25	64.8
Lubbock	1245	32	11,000	1225	31	62.0
E. Canyon	0208	97	7,480	0157	92	63.3
E. Amarillo	0230	14	6,960	0220	23	36.5
Borger	0305	40	9,570	0249	29	82.7
S. Farnsworth	0344	48	10,350	0326	37	77.8
Perryton	0355	13	8,930	0340	14	55.6
S. Elmwood	0415	20	10,500	0356	16	75.0
S.W. Gate	0445	28	12,100	0422	26	64.6
S. Asland	0505	28	11,900	0443	21	80.0
Bluff Cr.	0515	15	10,080	0457	14	64.3
W. Mullinville	0544	20	10,020	0525	28	42.8
S.E. Larned	0615	49	9,530	0559	34	86.4
Geneseo	0655	50	4,900	0650	51	58.8
Sky Village Airport	0718	29	1,270	0721	31	56.1
Landing	0721	—	—	—	—	—
—	—	*Total* 575	—	—	8.83 *hours*	*Average* 65.2



border came by (04.50 p.m.) I was working anything that could make the variometer read 1 metre/sec. I now had almost 12,000 ft. near Ashland, Kansas, but there was not much between me and some beautiful large cumuli west of Kinsley, which was 50 miles away. I shifted to high L/D cruise and painfully waited until I got there. By utilising one weak thermal I got there with 9,000 feet and was very pleased to find 1 metre/sec. lift at my end of this long line of large cumuli that appeared to be a weak squall line or front.

I climbed slowly to 11,400 feet, and should have stayed there and climbed to the cloud base, but I had visions of cruising along at a fearful clip under the beautiful cloud street until dark and not having to circle at all. If I had been there an hour earlier this might have happened, but it didn't. Outside of three spots of zero sink there was nothing, and I soon realised that my journey was drawing to an end.

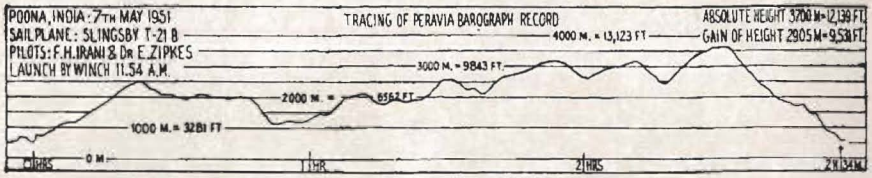
I now slowed down to 50 m.p.h. and while holding a downwind course I started some calculations as to where I was going to land. At 05.58 the final glide started. Even at this altitude my sink was less than 2 ft./sec. and I had my 40 to 1 glide ratio working for all it was worth.

At 06.15 p.m. I had 9,530 ft. A.S.L. Salina, Kansas, was directly on course, but its closest airport was 79 miles away still and it was 1,270 ft. A.S.L. This gave me 8,260 ft. to cover the 79 miles in; a minimum glide ratio of 50.5 was necessary to get there for a downwind landing. I wasn't too optimistic about it but kept on course anyway.

At 06.55 I arrived over Geneseo, Kansas, with 4,900 A.S.L. and 29 miles to go. Now a minimum glide ratio of 42.2 was all that was necessary, so I was going to make it after all. At 07.18 I arrived at Sky Village Airport, Salina, Kansas, with an even 1,000 feet to spare, and decided this would be a good place to stop. What with the tail wind, the RJ-5 had actually glided at a 57.5 ratio for the last 79 miles.

The maps showed the flight to be 575 miles by my route or 545 miles in a straight line—Happy Day!

First Indian Barograph-Recorded Flight



DR. Ernst Zipkes, formerly one of Switzerland's leading sailplane pilots and now Director of the Central Road Research Institute near Delhi, India, has found opportunities in his new home to carry on with his soaring as well as with his road research, and is now Chief Instructor of the Delhi Gliding Club, which he helped to form.

The Indian Gliding Association's headquarters at Poona, where Mr. F. H. Irani is the Chief Instructor to the Association, has been visited twice by Dr. Zipkes, who writes thus of his experiences:—

"In Poona they have been flying since last summer in Grunau Babys and Slingsby T-21 B's. My first trip there was in the dead season, last December. But recently, at the beginning of May, I stayed there for three days. I took my Peravia Barograph with me, so it happened that Irani and I did the first barograph-recorded flight in India. The record is enclosed. After my departure Irani did some other flights in which he gained a little more than 10,000 feet. But what is remarkable is that it is possible at that time of the year to fly up to the ceiling of the clouds and make on this occasion 7,000 to 10,000 feet. The Slingsby T-21 B is an open trainer, as you know, with a medium performance. We got long and wide thermals between 10 and 20 ft. per sec. as shown by the Cosim variometer (compare with the record). This one is not anything special—it is only an everyday flight, but it is the first one recorded and that makes it something like history.

"During the flight it was, of course, very cold; we reached an absolute height greater than the Piz Languard in the Engadine, and that in an open trainer! If we had had turn-and-bank and a compass we could easily have made a much greater height. We had reached cloud base and only at the top altitude we climbed for 2-300 feet into the cloud. Almost 3,000 metres in that slip and still below cloud base—is this not very remarkable!

"We have ordered another T-21 B for our Delhi Gliding Club. It should be on the way, and I am very curious whether we shall get similar conditions over Delhi. I don't think so, because Poona is very favourably situated, and only 80 miles from the sea.

"During the first initial steps here we are working in collaboration with the Delhi Flying Club for the use of a tug. All in all, we have to go very carefully, because gliding is just beginning here, and if we get one small failure, we shall be put back for at least five years. This is one of the main reasons why I do not wish to begin with a winch system."



Seated on this Eon Primary is the first Indian lady glider pilot to obtain the "B" certificate, Mrs. Roshan Dara Dastoor. She is a pupil of Mr. F. H. Irani.

Clutching Hands

by R. S. Scorer.

EVERY experienced glider pilot knows where "clutching hands" are likely to be found—on the lee side of a sharp edge on the ground. They are small-scale phenomena and are essentially different from downslope winds on the lee side of a hill or ridge. The full explanation of them is not possible at present because we do not know enough about the pressure field near these sharp edges, nor do we know much about the magnitude of the stresses produced by the turbulent mixing; but they are a phenomenon of the friction layer of the atmosphere, that is about the lowest hundred feet. As their name implies, if a glider facing into wind flies into one it will either sink rapidly or stall, or both, clutched to the ground by the unseen hand.

A qualitative description of the kind of air motion that occurs in clutching hands can be given, and the knowledge may be of use to those who may be caught in one or may be compelled to land in one because of unsuitable ground in the neighbourhood.

The first kind consists of a region behind the sharp edge where the air is slow moving, slightly turbulent, but not containing downdraughts and containing no reversed flow. The streamlines are indicated in Fig. 1 and the successive positions of a smoke puff are shown. The spreading out of the puff across the streamlines indicates that the air is turbulent. The danger of this kind of clutching hand is that for a glider flying in the direction of the arrow there is much less lift at C than at A or B, and if in attempting to land one follows the track BC on entering the clutching hand one's rate of sink immediately increases because of the decrease of airspeed. Therefore to land in one of these plenty of airspeed is required. This kind is to be expected on days when thermals are good and the air near the ground is moderately or very unstable.

The second kind, often called "curl over," occurs when the air is more stable, on cloudy days when only hill lift or waves can be used for soaring. This is very analogous to the separation of the boundary layer in aerodynamics, and the pressure field produces back flow near the ground. This

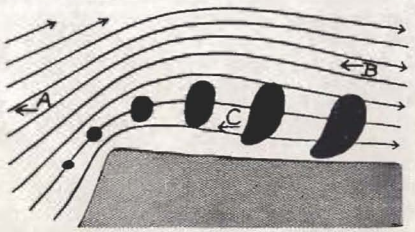


Fig. 1.—Flow over edge in moderately or highly turbulent conditions. Successive positions of a smoke puff are shown. The puff is spread by the turbulence and retarded by friction near the ground. The streamlines are further apart in the lower layers behind the edge and so the wind is less there. A glider at B receives more lift than at C with the same into-wind groundspeed and so an approach to land along the line BC will result in increased sink or even stalling as the ground is approached. Successful landings are made by approaching almost across wind and turning into wind more as the ground is approached.

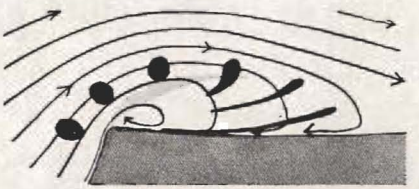


Fig. 2.—"Curl over", that occurs in more stable conditions and nearly laminar flow. A smoke puff passes over the edge almost undisturbed and is then stretched out and laid down on the ground as it gradually enters the downdraught region. The reversed surface wind is very shallow—2 or 3 metres thick perhaps. There is a thin region of intense mixing by small eddies backward from the edge indicated by shading and it is dangerous to fly close to this because if only one wing enters the curl-over the aircraft will be immediately turned upside down.

kind is shown in Fig. 2. It is generally much more sharp-edged than the first kind and contains actual downdraught. A smoke puff tends to be stretched out and laid down on the ground, and because there is less mixing, it remains visible even when stretched out. In Fig. 2 it is not possible to draw continuous streamlines for there is nowhere for the reversed flow at the ground to go to. This means that it is partly mixed in with the other air close to the edge in the shaded region and partly spreads out sideways, so that the flow is not strictly two-dimensional. Even in a "curl over" the change in airspeed on flying into it is more serious than the actual downdraughts except close to the edge.

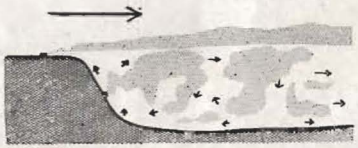


Fig. 3.—"Dead air" lying under a fast air current coming over a hillock. Smoke from the top generator extends as a long smooth wedge, but that from one on the slope shows variable slow air currents slowly spreading the smoke downwind. If flying upwind and this region is entered, plenty of spare air speed should be used to avoid stalling.

A third kind of clutching hand which is most often found in the lee of a small hill is a mass of almost dead air which does not mix much with the air above. There seems to be a free streamline coming off the top of the hill, and smoke in the dead air below moves slowly and in a variety of directions. In contrast with the first two kinds, if a smoke generator is placed in the air above, say on top of the hill, a clear cut division can be seen, the smoke not penetrating into the dead air for a considerable distance downwind. Typical plumes from smoke generators are shaded in Fig. 3. This kind is more likely to be found in the lee of an isolated hill than in the lee of a long ridge, and the flow is not two-dimensional. In unstable air the dead air becomes gradually more and more mixed up downwind with the surrounding air, whereas in stable air the flow is more likely to take on the form of a standing eddy with fairly well marked boundaries. It must be emphasised, however, that the roughness of the surface (trees, hedges, walls, houses, etc.) and the strength of the wind have as much effect on these friction layer phenomena as the static stability of the air.

Thermal Slope Soaring at Camphill

by M. Davies.

On Saturday, 21st July, slope soaring took place along the south slopes of the Derby and Lancs site, although the upper wind was light and westerly, i.e. parallel to the ridge. Yet on the following day, when the upper wind was southerly, no slope lift could be obtained. These facts are certainly contrary to expectation if we think in terms of mechanical slope lift solely; but whereas the first day was sunny, the second day was overcast, and herein lies the explanation of the phenomenon.

By the release of hydrogen-filled balloons from a point well in front of the ridge, and tracking them with two theodolites, one at each end of a measured base line, the structure of the air flow over the site was revealed. Simultaneity of observations was ensured by the use of walkie-talkie radio. The plan trajectory of one such balloon, released in the afternoon, with heights of the balloon in metres above the point of release indicated along it, is shown in Fig. 1, and a vertical cross section of the ridge in Fig. 2.

It will be seen that the balloon turned through some 90 degrees as it ascended, showing conclusively that up to about 700 metres above the plain, i.e. approximately seven times the height of the ridge, the wind had a considerable component at right angles to the ridge.

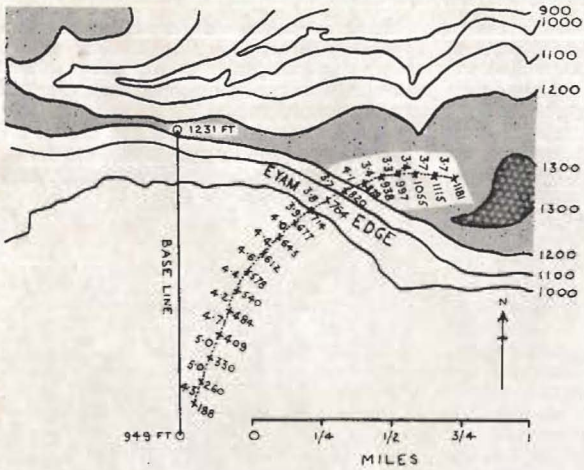


Fig. 1.—Plan trajectory of balloon released at 14.20 G.M.T. on 21st July, 1951, indicating wind speed and direction, as obtained by two theodolites, one at each end of a measured base line. The contours are given in feet, at 100 ft. intervals. Along the trajectory the heights at ½ min. intervals are given in metres, and the mean horizontal speed in metres per sec. The maximum error in the height is ± 3 metres, and in the speed ± 0.1 metres per sec. Ground above 1,200 ft. is shaded.

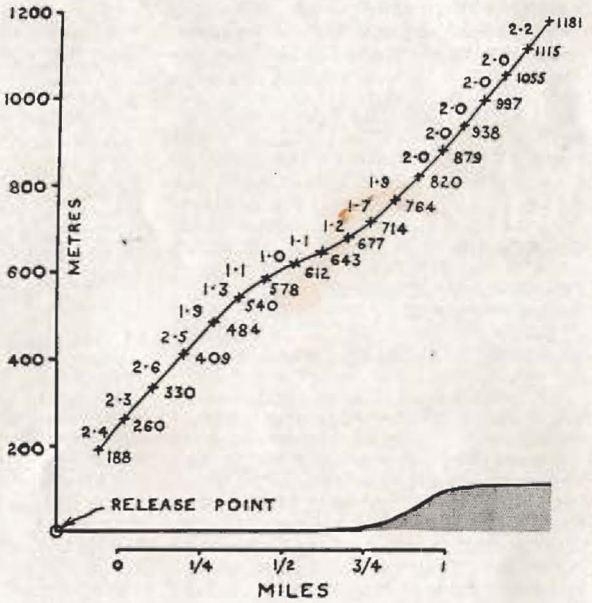


Fig. 2.—Vertical trajectory of balloon. Horizontal distances are measured along the plan path of the balloon, which is shewn in fig. 1. The vertical scale is exaggerated in the ratio 2 : 1. Heights of the balloon in metres at ½ min. intervals, and mean vertical velocities of the balloon in metres per sec. over these intervals are given along the trajectory. The hill itself is shaded.

A simplified description of the process may be given by appeal to general thermo-hydrodynamic reasoning for which purpose we introduce the concept of potential temperature, the atmospheric equivalent of ordinary temperature for an incompressible fluid. Just as the latter is stably stratified when the temperature increases with height,

the isothermal surfaces being horizontal, so the atmosphere is stably stratified when the surfaces of equal potential temperature, or isentropic surfaces as they are called, are horizontal and potential temperature increases with height. The effect of local heating is to make the isentropic surfaces descend in the vicinity on account of the increase of potential temperature there. The effect of gravity is to level the surfaces out and make them horizontal.

Now the atmosphere receives its heat almost entirely from below; the sun's rays pass through the air practically unabsorbed, but are finally absorbed by the ground which in turn heats the air. So when the sun shines on level ground the lower layers of the atmosphere are warmed first, and the lower isentropic surfaces descend. At a later stage the isentropic surfaces at higher levels descend as the heat is communicated upwards, but by a smaller amount since the heating is less there.

But if we consider a hill slope in juxtaposition with an extensive plain then it is clear that an isentropic surface originally horizontal will bend down towards the hill as heating proceeds, for out over the plain the descent is small where the heating is small, and near the hill it is large where the heating is greater. Gravity is meanwhile operating to level these surfaces out, and the result is that there is an upsliding of warm air over the hill with a much slower down-current of air out over the extensive plain. If the heating were cut off the air would come to rest with the isentropic surfaces horizontal, but under the influence of continuous heating the curving down of the isentropic surfaces towards the hill is maintained, with the air flowing through them.

The resulting pattern of flow is not unlike the familiar land and sea breeze circulation. The wind system we have described is, in fact, an *anabatic* or thermal up-slope wind, the reverse of the katabatic wind which sets in on clear nights. The return currents can take place through the entire depth of atmosphere above and beyond the proximity of the ridge, so that they are much weaker in strength than the up-slope current. From a gliding point of view, a ridge overlooking an extensive plain is more favourable than a ridge flanking a valley with a similar slope facing it on the opposite side, since the down-currents are then limited in areal extent and consequently increased.

Note that although there is a bodily up-sliding of air over the ridge the atmosphere is nowhere unstable. A particle of air, if displaced vertically upwards, is surrounded by potentially colder air and therefore tends to return to its original position. But if the heating near the ground is sufficiently large, or if the slope of the hill is only slight, then the isentropic surfaces may curl right over,

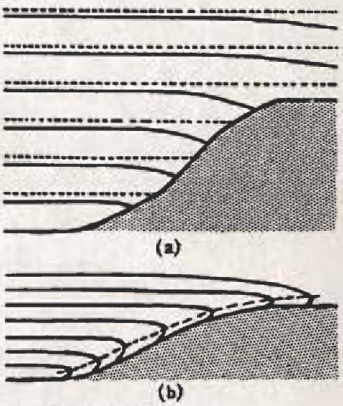


Fig. 3.—Schematic diagram shewing vertical sections of isentropic surfaces. In (a) the broken lines shew these surfaces before heating, and the solid lines after heating. (b) shews the effect of intense heating or a slight slope. The isentropic surfaces curl right over near the ground, resulting in a shallow layer of unstable air, which may lead to penetrative convection (thermals).

and in this region the air will be convectively unstable. Thermals may then be expected to occur.

Summarising, the favourable conditions for an anabatic wind suitable for gliding appear to be: fairly uniform sunshine—but not too strong—on an exposed steep slope overlooking an extensive plain. The overall winds must be light so that the air may have time to heat up.

It is proposed to call such lift 'thermal slope-lift' to distinguish it from purely mechanical slope lift, which requires a considerable cross-ridge wind component for it to be effective.

Accident Prevention in Gliding Clubs

by Lorne Welch

BEFORE attempting to deal with this tedious subject, it is as well to consider exactly why an accident is a bad thing. There is first of all the obvious objection to killing or injuring people, and secondly there is the financial side—the cost of repairs and the loss of revenue due to gliders being out of service. Since people rarely get hurt without gliders being damaged, these two reasons can be considered as one; so it can be said that the main incentive to reduce accidents is purely a financial one. This may seem to be a surprising conclusion, but if one could imagine a happy state of affairs in which gliders were made of large indestructible pneumatic tubes incapable of injuring their pilots, an "accident", e.g. landing in a hedge, would not matter at all, apart from the damage to the hedge. In fact, it would be rather fun! However, we do not yet possess this sort of glider, and accidents are a serious matter from a financial point of view, although it is well to appreciate that there is nothing sinful in them.

The cost of accidents increases with bad equipment, with the difficulty of the conditions of both weather and site, and with the lack of skill of those operating the gliders. If gliding is to function on an economical basis, it is up to those in charge to judge and to use the operating conditions in such a way that the accident rate is held at an acceptable figure. No one is perfect and accidents will always happen, however great the experience or easy the conditions. But if the pilots are competent the accident rate should be extremely low. On the other hand, if conditions are difficult or the operators are inexperienced, the rate will be high.

Perhaps an example will help to bring out this point. It might be found that a group of pilots flying from a particular site in winds of less than 10 m.p.h. had an accident rate of 1d. a launch. When flying in winds of 50 m.p.h., this figure might rise to £1 0s. 0d. a launch. Although it could be argued that improved technique might reduce this latter rate, it must be accepted that flying in strong winds is inherently more dangerous. It is useless to suggest that all flying must be done in winds of less than 10 m.p.h. in order to keep the accident rate down, because the utilisation would then be so low that the cost per launch of the other operating costs would go up. The right solution is to attempt to find out at what wind speed it ceases to be economical to operate.

Similar arguments can be applied to all the other aspects of gliding—when to send a man solo, when to let him go across country, when he is sufficiently competent to become an instructor, etc. No absolute figures are available on which to base a statistical analysis, and they never will be, but the same problem is there none the less; the sooner that this is appreciated the better.

There are three main methods of reducing the accident rate:—

(a) Improved design.
(b) Not flying in unsuitable conditions.
(c) Greater competence.

Dealing with these in greater detail:—

Improvement in design

1. A large proportion of accidents are due to bad landings. If gliders could be made stronger, worse landings could be made without damage and the number of accidents from this score would be reduced. Most gliders have practically no springing in their undercarriages; properly sprung main and tail skids and larger or sprung landing wheels would help a lot.

2. Another large proportion of accidents are due to bad approaches, caused by the inherent difficulty of judging the very flat approach path. The biggest single improvement in the design of gliders in the past twenty years has been the introduction of air brakes. This has made landing, and particularly landing in small fields, very much easier.

If all gliders, other than primaries used for solo training, were fitted with air brakes and their use taught from the very beginning, all "S" turns could be eliminated with a very real reduction in the number of approach accidents.

However, the introduction of any new gadget or control is always a potential source of trouble. Air brakes have proved, to be no exception to this rule. People open the air brakes instead of pulling the release knob and *vice-versa*, or open the brakes when they want to close them. It seems that nothing, other than better training, can eliminate these difficulties. But another frequent occurrence is pilots allowing their brakes to open accidentally when in flight, or even taking off with them open. Both these types of incidents could be eliminated if the control of air brakes were re-designed.

The mechanism could be arranged in such a way that when the control was unlocked the brakes would be held shut by springs powerful enough to do this at speeds of up to about 70 m.p.h. Above this speed the air loads would overcome the springs and the brakes would ride open.

3. Most gliders in club use have extremely good stalling and spinning characteristics (if it were otherwise the accident rate would be appalling), but their controls are often badly balanced. On many gliders the elevator control is much too sensitive, and frequently the inadequate directional stability leads to difficulty in making accurate turns.

4. Gliders often get blown over on the ground, the main reason being bad ground handling. But tying down gliders is difficult to do; properly designed picketing points would help.

5. Glider cockpits are so small that the pilot can sit only on a small cushion, or even on no cushion at all. If the cockpits were bigger and a sensible cushion part of the glider's standard equipment, not only would the risk of injury to the pilot be reduced, but the chance of damage to the glider in a heavy landing would also be lessened.

6. Some gliders have their tailplanes fitted very close to the ground; fitting them higher would reduce the chance of damage when landing in tall crops.

7. A good view for the pilot reduces the number of landing accidents and also the risk of collision. The introduction of moulded hoods has helped a lot, but the conventional glider still has an inadequate backwards and sideways view.

8. Improving the design of the ground equipment would help to reduce the number of accidents, not only directly, but also by eliminating the urge to press on which always arises when something goes wrong with the launching or retrieving methods. In particular, some method of avoiding jerks on winch launch take off (hydraulic clutch, electric winch, etc.) would help, and so would a scheme which ensured that launches were always made at the correct speed.

9. Apart from the above suggestions of improvements in design which would result in a reduced number of accidents, there is another aspect. That is, improvements in design which would reduce the cost of repairs. With our conventional methods of wooden construction it is doubtful if any very real improvement can be made. However, more and larger inspection panels, a greater use of self-locking and anchor nuts and improved accessibility would help. Some gliders have skids which are actually glued to the fuselage instead of being bolted; this may be stronger, but it makes a skid change an all-day job.

Not flying in unsuitable conditions

Ideally the basis of judgment of what is and what is not acceptable should be the probable accident rates. Any operation which seems to involve an undue risk is obviously uneconomic. In practice, however, the actual relative risks are not known; all that is known is that some activities and some types of people appear to be more hazardous than others. With certain equipment and with pilots of a known degree of skill, there are three factors which affect the safety of the operations: the site, the presence of other aircraft, and the weather.

Someone has got to assess the conditions, and since it is really his skill which will decide what operations can be carried out with an acceptable degree of safety, it is impossible to draw a hard line between the two methods of reducing accidents: (b) not flying under unsuitable conditions and (c) greater competence. This brings us to the next and most important section.

Greater competence

It can be argued that, in the same way as the early upbringing of a child will, to a large extent, decide his behaviour throughout the rest of his life, so will a pilot's manner of flying be determined by the thoroughness with which he is taught when he is learning to fly. If this argument is accepted, the entire responsibility for ensuring adequate safety rests with the

instructor. The instructor has two quite distinct jobs, firstly to teach the man to fly and to operate safely under his orders, and secondly—and this is often forgotten—to lead his pupil gradually to the state where he is competent to make decisions by himself: when and how to fly, and when not to fly.

The principles of the first part, that is to teach someone to fly, are fairly well understood. Various methods have been developed, using both single and two-seaters or a mixture of the two. Personally I feel that the two-seater method is inherently superior, but the single-seater system has been made to work with an extremely low accident rate. An excessive number of accidents in early training can be due only to the incompetence of the instructor, because of insufficient experience, because he does not set and insist upon a sufficiently high standard, or because he is unable to teach. The instructor can never sit back and apply a magic formula—send a man solo after x circuits; each person is different and must be treated differently.

However, it is chiefly in the second part of the instructor's job, that of getting people to be completely competent by themselves, that there is the greatest weakness in this country. This failing shows up, not only in accidents in "advanced flying," but also in elementary flying, due to the shortcomings of the instructor himself. Because of the comparative inexperience of most instructors, pilots, once they have learned to fly, are, to a large extent, left on their own, with the result that they have to learn things for themselves—frequently with expensive results. Proper training in the craft of thermal soaring and cross-country flying would not only reduce the number of accidents, but also raise the whole standard of gliding in this country.

In the past few years a number of accidents have happened when pilots have attempted to land in fields after cross-country flights. The accidents have been due either to the pilots' inability to pick suitable fields or their incompetence to get into them. That the number of accidents has not been larger is really rather surprising when one considers how little instruction the ordinary pilot receives in this subject and also the amount of faulty information which is frequently given. For example, pilots are often told to pick fields near a main road and a telephone, in order that the retrieve may be made easily. This is nonsense: a glider can be carried several miles in the time taken to put on a small plywood patch, and it could be taken half-way round the world in the time it would take to build a new glider. Surely, until the pilot is very experienced, he should be told to pick the best possible field regardless of its accessibility.

It is easy to say that the way to reduce the accident rate is by raising the standard of instruction; it is much more difficult to suggest methods of doing this. Owing to the irregular attendance of his pupils, the number of them, and the inherent complications in the method of launching, the instructor's task is difficult. It is bad enough for the full-time instructor, but it is many times worse for those who instruct only at week-ends. The B.G.A. Instructors' Panel has, by focusing attention on instruction, by organising meetings where the problem can be discussed, and by insisting upon certain qualifications before a category can be obtained, done much to raise the standard of instruction. But the fact remains that it is still low. It has been shown that good instruction can keep the cost of accidents down to a penny or so per launch; with bad instruction this figure may be ten shillings or more. It would, therefore, surely pay clubs to spend some money on improving the quality of their instructors, by eliminating those who are temperamentally unsuitable and subsidising the training of those who it is thought would make good instructors.

Another difficulty with the present arrangement is that there are so few experienced members in each club that a large proportion of the instructors' time is spent dealing with other matters—with maintenance, with the administration of the club, with running the bar, etc. If the ordinary club member would only realise this, and give more help in this sort of work, the instructor would be able to devote more time to his real job, and would thus be much better at it.

Accidents are frequently said to be due to a lack of discipline, and so they may be, but it all depends on what one means by discipline. Nowadays most people use the word in the sense of obeying rules and regulations. Any attempt to reduce the accident rate by rigidly enforcing regulations as such will do no good. What we want to do is to introduce a higher standard

of flying by getting people to understand the need for flying in a particular way, not by introducing hard and fast rules. Self-discipline is what is needed; it can only be taught by example.

The B.G.A. Accidents Analysis Panel has done good work in the past two years. It has made clubs think about their own accidents, and by telling them how other accidents have occurred has given them a chance to avoid making the same mistakes.

So far no mention has been made of accidents due to bad maintenance. The condition of the ground equipment in use in this country is, in general, lamentable. A number of the winches and auto-towing cars would not be used by any self-respecting farmer. This state of affairs is tolerated because the failure of the winch or tow-car is not in itself necessarily dangerous. The fact that such failures do directly lead to accidents from time to time is dimly appreciated, but the much more important fact that bad launches or inefficient methods cause a sense of frustration, and consequently bad flying, is not realised at all.

With gliders the position is quite different. Since the war, as far as I know, there have been no accidents due to bad aircraft maintenance. As most club gliders are maintained by amateurs this is a most remarkable and gratifying state of affairs. The reason for this high standard is primarily due to the fact that a glider which is in bad condition is an obviously lethal device. People take good care to see that their main spar pins are locked properly, because they know that if they were not, the wings would actually fall off in flight. Another reason is because it is generally appreciated that the work needs some knowledge and skill. Glider maintenance is therefore left to people with these qualities.

If only a mentality similar to that which is at present associated with glider maintenance could be applied to the maintenance of ground equipment and, above all, to the methods of instructing and of operations in general, the accident rate would be reduced to a very small figure indeed.

Spanish Soaring Survey

by Philip Wills

I FLEW to Madrid on 31st August to survey the country where the 1952 World Gliding Championships are to be held, and returned on 11th September, after one of the most interesting ten days of my gliding life.

The first thing that strikes one as one reaches the southern side of the Pyrenees is the brown-ness of everything. The Spaniards must have been the first to invent the word "brown." The whole landscape consists of shades of brown, from whitish brown through greyish brown via yellowish brown to reddish brown and all shades of dark greenish brown to blackish brown. The towns and villages are light greyish brown. The rivers are brown. Apart from a coastal perimeter and a few river strips of dark green, the parts of Spain I saw consist all the year round of great areas of huge brown fields, all apparently ploughed, broken up pretty frequently by areas that look as if in Spain was also coined the dreaded phrase "soil-erosion," where extraordinary flat-topped knobs and hills break up out of the flat plain, with edges stratified as if the whole land had been cut out of multi-ply wood. It is a country that brings to mind the word "Biblical."

These great agricultural areas are cut every hundred miles or so by east-west lines of steep and jagged Sierras, ranges of mountains rising to peaks of 2,000 to 2,500 metres and running right across the Iberian peninsula. If the wind ever blew for a reasonable period from the north or south, the world's distance record might still be broken by a gigantic hill-soar right across Spain and Portugal. But, oddly enough, it doesn't.

In Figs. 1 and 2 are given the wind-roses of respectively Barajas (Madrid) and of Zaragoza (pronounced with a full-scale lisp: Spanish Z equals TH), which is about 270 kms. N.E. of Madrid and 60 kms. S.S.W. of Huesca. In these diagrams Spring (Primavera) covers March, April and May; Summer (Verano), June, July and August. The figure in the central circle gives the percentage of days with no wind.

These wind-roses suffice to show that

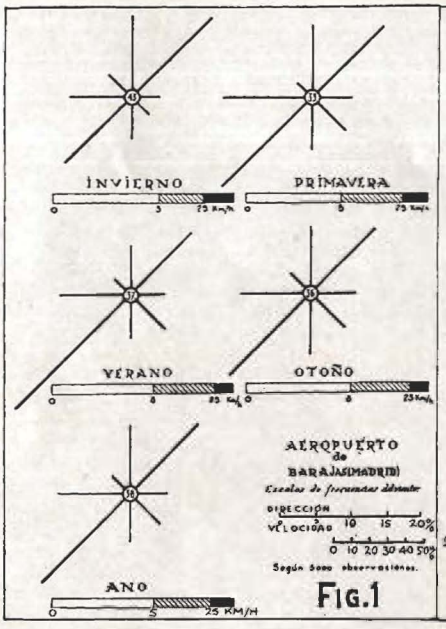


FIG.1

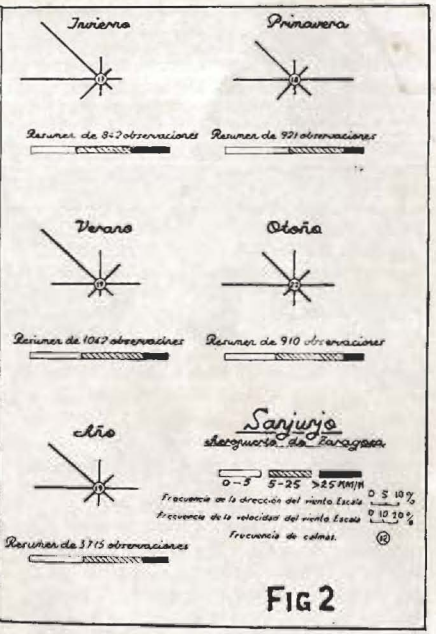


FIG 2

wind conditions in Spain vary greatly on any given day within quite short distances, so good met. forecasts will be vital to good flight planning during the 1952 Championships. The weather at Monflorite itself, although so near to Zaragoza, is affected by the proximity of the Pyrenees, and on any given day can be materially different. I flew there on several days with a surface wind 10 m.p.h. easterly, veering at only 700 m. to southerly, with an upper westerly wind, whilst at Zaragoza the surface wind was westerly at the same time.

Generally speaking, the best thermal wind at Madrid is the prevailing south-westerly, and at Monflorite the westerly, with wave conditions (mostly in November and March) when the upper wind is from the north. In these conditions the surface wind can conveniently blow along the line of the Pyrenees from the west, up Monflorite's soaring slope, so one can bunjy-launch into slope lift, transfer to thermal, and from the top of this contact the wave, never going out of sight of the home site. This, however, is a digression, as the 1952 World Championships are likely to be held in May or June, so waves are unlikely luxuries.

I have sketched first the terrain and the weather; now I come to the most important aspect of all, the people—the gliding folk on whom the success of the 1952 Championships wholly depend.

I must say at once there is a third word which may have been coined in Spain, and that word is "hospitality." The extraordinarily generous nature of the Spanish offer to hold the 1952 Championships at their entire expense, even extending to the offer of free sailplanes, cars and trailers to more distant entrants, had led me to suspect a great deal, but on this preliminary trip of mine I and my family received such kindness and hospitality as to make us despair of being able to repay it.

I was met at Barajas by Señor José Ordovas, the head of the Gliding Section of the Spanish Air Ministry, and by Commander Segrave, the Air Attache to the British Embassy. On Señor Ordovas' shoulders will fall the main burden of the organisation of the Championships, and it was immediately obvious that he brings to

the task an enthusiasm for gliding matters as great as anything I have ever met.

Señor Ordovas told me that there is now quite a possibility that the Championships will be held at Madrid instead of Monflorite, at the Spanish Aero Club's aerodrome at Cuatros Vientos, a few miles S.W. of the capital. The final decision will be made in October, and there are certain advantages in each site which will need carefully weighing up.

Madrid, being the capital, is the hub of a large number of first-class roads, which would naturally ease the retrieving problem. Communications and met. services are more adequate in the Madrid area, and, geographically, longer distances can be flown.

At Monflorite, on the other hand, is perhaps the most complete and well-equipped gliding centre in the world, with a set-up and staff of unequalled experience. I said "in the world," but in one sense Monflorite is almost "out of the world." It is a gliding pilot's Paradise, "clear as rock-water, crystal, undefiled." There are no cross-currents of other activities at or near Monflorite. People there think gliding, breathe gliding, and live gliding. If the Championships are there, we shall have a fortnight's concentration and exchange of views between the world's gliding experts unique in history.

Señor Ordovas took me to his office in the Air Ministry and explained the Spanish gliding set-up. The Government run four schools, one at Cerro del Telégrafo, about 20 miles S.E. of Madrid, one in the Somosierra, about 60 miles N.E., one on the coast west of Bilbao, and Monflorite, which is far the largest. About a thousand volunteers, men between the ages of 16 and 30 years, are accepted annually, and all candidates for the Spanish Air Force have to get their gliding "C."

At these four schools training is free. About 300 A's, B's, and C's are obtained annually, and from 5,000 to 7,000 hours flown. This scheme is in contrast to our own A.T.C. one, where a much larger number of boys are trained annually to a much lower standard at a much larger number of sites. Personally, I have always believed in a smaller number of schools and pupils and training to a higher standard, on the Spanish model. I first wrote to this effect as early as 1946, and A.T.C. policy does indeed seem to be moving in this direction. Although in this country we achieve about the same annual total of flying hours, most of these are put up by the civil and Service clubs, and the A.T.C. hours are quite small, since of course they don't train to soaring standard.

Only four types of glider are used, all pre-war German designs: the S.G. 38 primary, Grunau Baby, Kranich two-seater and Weihe. The first machines came from Germany, but now a large number of Grunau Babys have been built in Spain, and at a factory at Cuatros Vientos they are currently building 50 more Kranichs and 8 Weihes. It is a remarkable sign of the pre-war ascendancy of German gliding that German machines designed in the 1930's are still being built and flown all over the world. Yet they are not simple or cheap to build: the Spaniards estimate there are 9,000 man-hours in a Kranich. It's time someone did something about this.

Next, we went to Cuatros Vientos, a large (brown) aerodrome, as much as 3 kms. across. On one side is the Flying Club of the Spanish Aero Club, a magnificent building with luxurious restaurant, bars, playing rooms and rest rooms. Next door a large new building is nearing completion which would be used as dormitory for the International pilots, flanking a most beautiful open-air swimming pool.

I was offered, and promptly accepted, a flight in a Weihe, and was towed off behind a Fieseler Storch, the standard towing plane in Spain. I had been told that the best lift was along the course of the rivers, where the green strip gives the best thermal contrast to the prevailing brown. It was the usual (for September) cloudless blue day with the usual light S.W. wind; an unusual feature was provided by a partial eclipse of the sun, which, though invisible to the naked eye, presumably reduced the thermal activity. Lift of up to 2 m/sec. was abundant and I set off across Madrid to Barajos aerodrome, with the intention of flying up the Isabel Canal towards the heights of the Somosierra. But lift got poorer as I went north, I turned too late to retrace my course, and landed on the flat stubble near a little village called Fuente del Sar, about 29 miles from my starting point. It took some time to find the village telephone and get through my message, but the Fieseler then soon arrived, landing without difficulty alongside. Thereafter followed much *hospitalidad.*



At Monflorite: Mrs. Wills has on her right Tienente Coronel Antonio Penafiel, and on her left Julian Sevillano and Juez Gomez.

At 6.15 next morning (Sunday) Señor Ordovas fetched me from my hotel in his car and took me out to Barajas, where another Ministry friend, Señor F. Quintanilla, was waiting to fly me to Monflorite in a Stinson Air Station Waggon, a most sensible little metal four-seater with a Continental engine. In two hours we were at Monflorite, and most of the flight was over high, flat country, easy landing, with one range of Sierras to cross at Calatayud, where for about 20 miles "landing possibilities" were at a discount.

We were met at Monflorite by the 'Jefe,' Teniente Coronel A. Peñafiel, and his Chief Instructor, J. Sevillano, both old acquaintances from Samaden days, and immediately did a tour of the school. Accompanying photographs show the scale and number of the buildings, which have been greatly extended over the past two years. The main building contains just about everything one can think of, including radio and met. stations, feeding and living accommodation and classrooms for over 50 pupils, a pigeon loft, and a Chapel.

There are three hangars, a large and very complete workshop, with a complete set of jigs for the Grunau Baby and a large stock of spares for the four types operated, and a new block of which the upper floor, just completed, consists of visitors' sleeping accommodation, with bathrooms attached to each pair of bedrooms! My wife and three children fetched up at Monflorite the following night, so to the Wills family fell the honour of being the first visitors to use this grand building.

It is rather remarkable that, although many foreign pilots have visited and flown at Monflorite, I was the first British one to do so. I was told that they would be very pleased to see more of us, so I am quite sure I shall not be the last!

The whole atmosphere at Monflorite is happy, and one of an experienced competence. Señor Peñafiel started to glide in 1931, the school as such has been operating 11 years, and it is quite evident that everyone knows their job, and what is more, like it. Most of the Spanish gliding names we have heard of in England are there: Peñafiel, Sevillano, Gomez (who visited Bramcote in 1946), and Ara.

It is hard to convey the atmosphere of welcome we met. A complete strange family descended on a hard-working gliding school in the middle of a course of 50 pupils. We were told that we could do exactly what we liked and when we liked, and that is how it worked out. I can only give an example. The school had four operational Weihes. I was told I could fly them all, and then select the one I liked best and have that one at my entire disposal until I left! Three are standard, one is a special machine with no dihedral, modified wing-tips, and a smaller nose. Its minimum sink is remarkably better than the others, and it is the pride of Monflorite hearts. I was even allowed to fly this, the first pilot other than their star instructors to do so. The responsibility was so great—I felt that if I so much as scratched it I could never meet a Spanish eye again—that it was almost a relief, when I landed after a most interesting 3½-hour out-and-

return flight, to have to say that the cockpit was so small for my 6 ft. 3 ins. that if I flew it again I might be incapacitated from posterior bruises for the rest of my stay.

During my six days at Huesca I flew every day, a total of 13 hours. The weather was poor by Spanish standards, August and September being too hot, cloudless blue days with haze, a line of cumulus at, say, 5,000 ft. along the Ebro 60 kms. to the south, cu.-nim. developing every afternoon to ugly proportions over the Sierra de Guara and Pyrenees to the north, a few flat cu. appearing overhead around lunch-time, and good dry thermal developing all round up to 1,000 metres. Winds were light westerly or easterly.

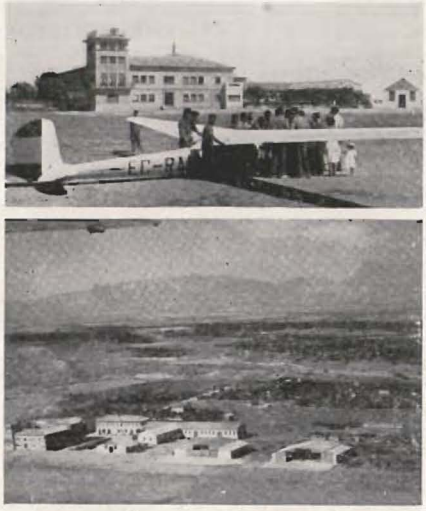
The school is on the edge of a 200-ft. west-facing slope, which runs north for about 7 kms. and then turns left and faces south for a further 7 or 10 kms. When there is a westerly wind component, the pupils are bunjy-launched in primaries to the bottom for their A's and B's, and an electric winch at the top pulls the machines up the slope again with a wire cable.

On top of the hill, 7 kms. north in the angle where it turns west, stand the ruins of just about the most desolate and eerie eleventh-century castle I have ever seen, with a permanent thermal built in above it. We walked up to it one evening and it would have needed a lot to have persuaded any of us to have camped there the night.

Standing on the top of the school slope, facing west, in the all-pervading aromatic scent of the scrub which grows on the plateau, one looks out over a flat plain, brown of course, with the small county town of Huesca 10 kms. away, dominated by its cathedral. At one's feet, and to right and left, the eroded and stratified slopes. To the south and south-east is also flat, with a low range of hills in the distance towards Zaragoza. Behind, to the east, the low plateau drops away to another valley. The whole northern horizon is barred by the forbidding line of the Sierra de Guara, rising jaggedly to over 2,000 metres. (Monflorite itself is 540 m.). From 1,000 m. above the site, the Pyrenees themselves come into view beyond the Sierras, a stern rampart of grey peaks flecked here and there with snow even in late summer. It's quite a view.

Señor Peñafiel told me that the Pyrenees were very dangerous gliding country, worse than the Alps, with less landing possibilities and less communications. He also said that the cu.-nims which develop over them so often were extremely dangerous and violent, with large hailstones and great turbulence. The ones I saw did not seem to go to extravagant heights, I should say around 6,000 metres, but they certainly formed large and confused masses all over the northern sky.

There are only three tarred roads radiating from Huesca, and on these I estimate a trailer speed of 30-35 m.p.h. could be kept up. The next grade down of road is quite passable; we deliberately chose to motor back over the central Pyrenees, and over the Sierras took a road marked on our Michelin map "Carretera en mal estado." It was rather narrow, untarred and very, very twisty, but beautifully graded with many tunnels. No trouble at all. At Jaca we rejoined the main Huesca-Jaca-Canfranc-Pau road, which is a double-track tarred road graded almost up to Swiss standards, up to 1,750 metres and over. The moment one crosses the border, over the divide on to the north-facing slopes of the Pyrenees—in ten yards—one is back into the familiar world of north-western Europe. Green again.



Monflorite. The aerial view of the School, taken from a Weihe, shows the Sierra de Garda in the background.

The Low Tow

by Allan Ash.

WHEN aero-towing was first introduced by Gottlieb Espenlaub in 1927 it was considered to be a novelty which might have some use, but little thought was given to the regular use of towing as a means of launching sailplanes. When, at last, towing did come into popularity, severe restrictions were introduced for reasons of safety, and only expert pilots in special sailplanes were permitted to try.

As the design of sailplanes improved and the technique of towing became more widely known, most of these restrictions disappeared, but the method advocated to-day is much the same as it was twenty-four years ago. The accepted position for the sailplane is slightly above the level of the towing aircraft, thus giving a horizontal drag on the tail of the tug.

Theoretically this is supposed to be the best possible position; but is it? The following account of experiments carried out by the Hinkler Soaring Club, of Sydney, show otherwise. Necessity, they say, is the mother of invention, and in this case it was necessity that led to the development of the Low Tow. This is how it happened.

We had a Schweizer T.G.3 two-seater sailplane, which weighed 1,200 lbs. all up, and all we had to tow it with was a Tiger Moth. We did not know if the Tiger Moth had enough power to launch the Schweizer, so we decided that the only way to find out was to try. On the first tow the boundary of the 'drome was cleared by about 100 feet after a run of about a mile and the subsequent climb was made at a rate of less than 100 feet per minute. Some would merely say that a Tiger Moth was underpowered for the job, and leave it at that, but we had nothing else to tow with, so we set about finding out how to make a Tiger Moth do the towing.

The first clue came when the tug pilot complained that he was unable to climb because the sailplane kept lifting the tail of the tug. The sailplane pilot was told not to get so high above the aeroplane, so gradually the Schweizer was positioned lower and lower until she was sitting on the slipstream. The rate of climb was improved to about 150 f.p.m.

The next instructions were, "Fly her under the slipstream," but there were objections that the tail of the tug would be pulled down.

"Well, isn't that the best way to get the nose up?"

So off she went again, with both tug and sailplane pilot ready to release if the tug looked like stalling. After the tow the tug pilot reported; "She climbs at 300 f.p.m., hands off!"

After this we experimented to find out just how far under the slipstream the sailplane could get without endangering the tug. Using a 200-feet towline the Schweizer was forced down to about 100 feet below the slipstream, and the tug pilot reported that, except for having to keep the stick slightly forward during the climb, there was nothing to complain about. It was found that the best rate of climb occurred when the sailplane was flying within 5 or 10 feet under the slipstream.

The next step was to tow a Grunau Baby and then an Olympia in the new position. The climbing rate of the Grunau was increased by about 50%, our best time so far being 2,000 feet in four minutes, from take off to release. The Olympia's climb was increased by about 100%.

To get down below the slipstream the pilot can use either of two methods. He can climb off the ground in the "high tow" position and go down through the slipstream after he has reached a safe height, e.g. 100 feet, or he can hug the ground during the take-off and allow the tug to climb up away from him. The writer favours the former method for safety reasons, but several pilots use the latter with no apparent danger.

Another method which has been advocated, but has not proved very popular, is for the pilot to climb off in the "high tow" position, then fly out a little to one side, go down, then fly back behind the tug again. This makes it unnecessary to go down through the rough slipstream. This roughness, incidentally, lasts for not more than two or three seconds but, at first, can

be disconcerting to a nervous or inexperienced pilot.

It is important that the sailplane should get through the slipstream as quickly as possible, as staying in it places additional strain on both of the aircraft and, if the buffetting is severe, it tends to roll the sailplane over onto its side. This is especially noticeable on sailplanes of short span or with slow ailerons like the Grunau.

One remarkable fact about the low tow position is the ease with which one can keep station behind the tug in rough conditions. Because it is flying much faster than its normal flying speed the sailplane is always trying to climb. If the tug flies into an area of lift, the sailplane pilot merely eases the stick back and shoots up after it. If the tug flies into sink it can drop a long way before the sailplane is far enough above it to be dangerous, and during this time the sailplane pilot has time to use his dive-brakes or to side-slip.

To date only one disadvantage has become apparent. If the towline becomes too slack it blows back all over the sailplane and there is a danger of it hooking onto the pitot, venturi or other protuberance near the nose.

Only on two occasions has there been a real danger. In both instances the towline became slack when the sailplane was out of position by being well over to one side. The towline curled back under the wing and hooked around behind the trailing edge. The line was immediately released from the sailplane and was carried away from the wing by the airstream.

A little investigation into the problem of slack in the towline brought forth a simple cure. By placing the sailplane into a gentle dive the slack is removed, then when the strain comes on again the nose of the sailplane is gently but firmly lifted by the tug without the pilot having to do anything. In fact, except in cases of rapid descent of the tug, we have found that a gentle dive is more effective than a sideslip or dive-brakes. The pilot never has to worry about diving too far or too fast, because as soon as the towline is tight the sailplane is gently pulled out by the upward lift from the tug.

One final point. While the sailplane is below the slipstream it is impossible for the tug pilot to see it. On several occasions the tug pilot has been unable to see if the sailplane has released until, after making a turn, he sees it happily circling about half a mile away. For the convenience of the tug pilot, therefore, we make a habit of coming up through the slipstream just before releasing. The tug pilot can then feel and see the release.

To sum up, we have found that the Low Tow makes aero-towing simpler, faster, cheaper and to a certain extent safer.

A Review of Gliding in Canada

by Frank Brame

FIGURES produced at the recent Annual General Meeting of the Soaring Association of Canada by Mr. Frank Woodward, Statistics Committee, indicate the long road ahead of Canadian soaring before any semblance of maturity is reached. At the present time there are approximately 12 active gliding clubs spread across a country of over 3,000 miles in width, 212 holders of F.A.I. gliding certificates and 170 active glider pilots. The certificates are made up of 68 "A", 74 "B", 60 "C,,' and 10 "Silver C", 7 of which were issued in Canada.

There are 23 gliders distributed among the 12 clubs, this number being made up of 1 Olympia, 5 Laister-Kaufman 10 A's, 2 Pratt-Reads, 2 Grunau Babies, 1 Loudon, 1 Mu-13, 2 Schweizer 2-22's, 2 Schweizer 1-19's, 2 Kadets, 1 Wren, 2 TG-3's, 1 Robin and 1 Sparrow. Of this number all but the TG-3's, the Robin and a G.B. are located in Eastern Canada.

The small but active gliding clubs are located from coast to coast, with the main activity being concentrated in Ontario. The clubs are at Vancouver, Calgary, Toronto, London, Hamilton, Trenton (R.C.A.F.), Rockliffe (R.C.A.F.), Buckingham, Montreal and Dartmouth. There are other clubs being organized at Edmonton, Winnipeg, Camp Borden and at Centralia, the latter two being R.C.A.F. establishments in Ontario, and it is hoped that they will all be active by this summer.

To date, most soaring in Canada has been confined to Ontario, where conditions are very much like those in England as far as thermals are concerned—ridge soaring is practically non-existent. In this vicinity, where most of Canada's soarable machines are located, the soaring conditions are mediocre and very unpredictable due to the stabilizing influence the many large lakes have on the atmosphere. The districts of very rough country often limit the directions in which distance flights may be attempted, and the prevailing wind directions relative to lake positions are very often not favourable for some of the gliding sites. With the absence of the terrific thermal conditions of Texas it appears that soaring inhabitants of this part of Canada will have to content themselves with "Silver C's" and possibly with the odd "Gold C" now and then—after more experience is gained.

The brightest spot in Canadian soaring is undoubtedly in Western Canada on the Prairie Provinces. The gliding club at Calgary, in the foothills of the Canadian Rockies, is expected to do much in raising the standard of Canadian soaring records, which at present are made up of 118 miles distance, 8 hours duration, and some 1,200 ft. altitude. Calgary enthusiasts are blessed with chances of standing wave soaring, as well as thermal conditions which can hardly be surpassed by even those of Texas. Winnipeg, too, has similar opportunities, less the advantage of the mountains, but with all the advantages of the flat prairie grain belt with cumulus clouds consistently taking up 5 or 6 tenths of the sky. Mr. Dick Groonan, of Winnipeg, is presently completing the construction of a new Schweizer 1-23 sailplane, so it shouldn't be long before Canadian records may be mentioned in tones slightly louder than a whisper amongst the select group of "Gold C" wearers.

For a word on training in Canada, it may be said that instruction, in the greater part, is based on dual aero-tow techniques. There are a few clubs who, by necessity only, train by solo and winch launching methods. These methods are usually employed because of the absence of either a towing aircraft or a two-seater machine. Practically all soaring is achieved after having been delivered to a thermal area by a tug plane, most of which are Tiger Moths.

As is the case in England, there is a great need in Canada of a two-seater training machine which has good soaring characteristics. Such a machine, the Shenstone-Czerwinski Harbinger, is presently being built in Toronto by Jack Ames and Henry Dow. This machine should be flying in 1952, but due to the poor financial state of most of the clubs, it is unlikely that sufficient numbers will be financed to really promote training across the country. With a dozen or more Harbingers, it is possible that gliding in Candaa could develop in leaps and bounds to a position where it could pay its own way as a national sport.

The absence of high-performance machines in Canada is felt by all concerned. The Schweizer 1-23 machine being built from kit form in Winnipeg may be the forerunner of schemes to alleviate this shortage. It is one way of reducing the high duties imposed on such imported items. Another bright spot is that Mr. Czerwinski, under the sponsorship of Professor T. R. Loudon of the University of Toronto, is leading aeronautical engineering students in the design of a very high performance machine with a glide angle of the order of 35 to 1. This project is something to look forward to in the future, and it indicates the healthy foundation upon which the soaring movement is presently being built, and which should be quite strong in 20 years' time.

Gliding in Canada is controlled by the Soaring Association of Canada, with licenses and Instructors' Ratings being issued by the Department of Transport, on the recommendation of the S.A.C. Publicity, club assistance, and technique employed are all part of the responsibilities of this body, whose main purpose is to supervise the sport so that as rapid a growth as possible, consistent with safe practices, is always achieved. The S.A.C. also organizes such annual events as the National Meet, where competitive flying and instructors' courses are conducted. Its Contest Committee selects the annual winner of the British Aviation Insurance Trophy, an individual award for the best flight of the year; the Loden Trophy, a club award for best annual utilization of equipment; and the Canadian National Champion, based on any individual's best three flights of the year. Other committees of the S.A.C. are responsible for statistics, regulations, insurance, technical considerations, membership, etc., etc. Needless to say, such a body is not subsidised, but depends entirely on its membership for its funds!

Correspondence

NEWS FROM ZOMBA

Dear Sir,

You mention me in your Editorial of the winter quarter—Zomba, Nyasaland. Strictly, I live a steady eighty miles E.S.E. of Zomba, in the furthest corner of the Protectorate, and in the tea belt which is the economic reason for the existence of a station here.

Mt. Mlanje is a hefty block of limestone, with a fifteen-mile face, nearly straight, across the prevailing wind. It is much broken by ravines, and careful study of mist and cloud movement from a distance, that is during the rains, convince one that soaring this scarp will not be so easy as, say, any U.K. or German ridge. Even with the wind dead on to the line of the scarp, there are visibly vicious downdraughts at certain places.

At the time of writing, the rains being nearly at an end, the cross-country conditions are on first inspection wonderful. Cu. begins to form about 08.00 hrs., and by 09.30 there is 4/8 small and medium cu., to any distance. Some time after mid-day, large cu-nimbs occur, which from their appearance would be better left alone, but they dissipate fairly rapidly as the sun declines, and there is the usual "couple of hours' calm for the Primary" before sun-downer time.

All this, of course, is so much ground observation—gliding has not so far been attempted out here. It is thought that the attempt might shortly be made, though. I haven't been here long enough to be sure, but from what I've heard from charter pilots and similar types, there are dry thermals long after the rains are over. When I arrived, at the end of October last, there was a "built-in" inversion, which they told me started in August and lasted till the rains came. So that soaring is possible to one extent and another for some eight to ten months of the year, on the face of it. We shall have to see.

There is a good deal of support in the Protectorate for the idea of a gliding club. Our chief drawback is our awful road system and the comparatively long distances involved. One other factor among many is the question of emergency landings: the country is either thengo—low scrub punctuated with elephant grass—or under tea, which grows in horrid hard bushes about three feet high. Ideal for whipping tail-planes off.

However, I've no doubt we'll get round all that. Other people have started with as much and worse. When we do eventually get off the ground, we shall let all you folk in Blighty know.

I. H. MANSFIELD,
Mlanje, Nyasaland.

LIFT, SINK AND AIRSPEED

Dear Doc,

My job up here testing Dakotas and Rapides enables me to visit the most interesting parts of the local sky in search of wave lift, which seems to be available surprisingly often—about 80 per cent of the time in July, for instance.

I have noticed that when a heavy aircraft is flown, from whatever direction, into the ascending side of a wave, and its attitude kept constant, it experiences an increase in airspeed, and similarly in the down side of a wave it experiences a loss of airspeed. Being simple-minded I don't understand why. Can any scientifically minded reader of GLIDING please explain in simple language? I have experienced variations of as much as 20 knots. Has this also been noticed by those lucky enough to do their wave flying in gliders (with barographs, oxygen, etc.)?

This effect is even more noticeable to an airline pilot trying to keep level at a particular height, as he puts the nose down on experiencing climb, and gains even more speed, and vice versa. In fact, one such pilot scragged his aeroplane for instability, complaining that it would not trim to a steady speed. As I had spent most of that day watching lenticular alto-cumulus clouds the answer came straight to me, and saved the taxpayer the cost of another test flight.

JOHN NEILAN,
B.E.A., Renfrew.

B.G.A. TEST GROUP PILOTS

Each Test Group must have one pilot whose minimum qualifications must normally be as follows, but the Technical Committee will be prepared to consider small variations to these requirements. (Compliance with requirements does not in itself ensure approval).

Minimum hours : total of 200, of which at least 50 must be on gliders of a.u.w. less than 1.250 lb. Not more than 1/5 of the applicant's power hours will count towards the total.

Minimum Number of Types of Gliders flown : eight.

Types of Launches : Bungey, winch, aero-tow, auto-tow.

Minimum blind flying : must have done a number of different flights involving cloud flying.

The applicant will be required to perform one specific test to B.C.A.R. Section E on a standard glider, and will then submit a report on this test for the consideration of the Technical Committee.

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Clubs & Associations

Midland Gliding Club

THE high spot of the Spring period was the ab-initio camp we held during Whitsun Week, 4 A and 4 B Certificates being gained during the eight flying days of the camp. Three of these were gained by people with no previous air experience after 17 or 18 launches and 2¾ hours flying. Hours for May:—45 hrs. 20 mins.

June.—Sunday 3rd dawned with light and variable winds. During the thermulatory hours on that memorable day every launch, including Tutors, contacted good lift. D. G. Wilson and Bobby Neill, Jnr. both took their C badges with flights in which the gain was more than 3,000 ft. John Horrell in T-21b reached cloudbase at 6,700 ft. A.S.L. Total hours for June were 64, nearly all of which were in thermals, the west wind being conspicuous by its absence.

July.—During the first week we held our second summer camp. The first two days were thermulatory and good fun was had by all. On Tuesday the wave waved at Alan Yates and John Horrell; Alan got his "Gold C." height with an absolute altitude of 11,400 ft. A.S.L., John in the club Olympia reached 7,700 ft. A.S.L. and, converting his height into distance by pressing off down wind, he landed at Wolverhampton aerodrome, thus completing his "Silver C" badge. Ramsden in the Cranfield Olympia nearly reached Staverton with a flight of 52 miles. We also held the first task flying match to be held at the Mynd; Alan Yates and David Ince declared Lulsgate Bottom out-and-return, but neither pilot made the turning point, David reaching Chipping Sodbury (70 miles) while Alan landed near Monmouth (50 miles).

On Friday, 5th there was a strong west wind accompanied by thick mist in the valley, but apart from this the sky was 8/8ths blue. The wave was there, however, and John Horrell, with a representative of the Birmingham Gazette on board the T-21b, climbed to 6,900 ft. A.S.L. in it. During the camp 266 hours were flown: 9 five-hour legs, one "Gold C" height and two completed "Silver C" badges were obtained. The Southdown Gliding Club also visited us during July, bringing an Olympia and a Tutor.

Total hours for July were 414, which is a record for this Club.

August.—During the first week we held our third camp, which included 10 members of the R.A.E. Gliding Flight, led by Flt. Lt. Bill Bedford, with their own Grunau. The week provided some good hill-soaring, and on the Friday 5 C Badges were obtained. On Sunday, 12th the wind was west, 25 m.p.h., later increasing to 35 m.p.h. John Holder in Club Olympia put the newly installed artificial horizon to the test by climbing to 5,000 ft. A.S.L. in cloud, emerging over Wenlock Edge; all escape being cut off, he turned down wind, completing his "Silver C" with a flight of 51¼ km. to near Worcester. Sqn. Ldr. A. A. J. Sanders also flew his Olympia to near Stratford-on-Avon, 60 miles, on the same day.

On Saturday, 18th John Hickling in Blue Olympia soared on the east face over Church Stretton for 35 minutes, which indicates that there is scope for further investigation of this slope. On the 19th the wind was west, 20 m.p.h., and cumulus were building up all round. John Hickling and A. A. J. Sanders, both seeking Gold C, left for the east coast. John fell by the wayside at Bridgnorth (20 miles) and Sanders carried on to Bourne, Lincs. (109 miles), reaching 10,000 ft. A.S.L. on the way. Total for August, 290 hours.

At the time of writing the fourth club camp is getting under way and has among its members the Director of Civil Aviation for Trinidad, Mr. Carl Agostini, who is in this country for the S.B.A.C. Show at Farnborough. Our total hours up to the end of August, are 1,158, far exceeding the corresponding total for the end of August last year.

2×J.H.H.

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Royal Naval Gliding & Soaring Association



National Championships

THE Association entered two teams for the National Championships to compete in the Team Event. Owing to a dearth of pilots coming up to the minimum qualifications required by the organisers, it was necessary to use the same two pilots (the Lieutenant Commanders Goodhart) for each team, flying each sailplane alternately.

The two sailplanes entered were both ex-German, a Meise and a Mu-13a, which finished first and second respectively, out of a total of 24 entries in the Team Championship.

For ground crew the team were able to obtain the services of four volunteer Wrens, who, although none of them had ever seen a sailplane at close quarters before, carried out their duties of rigging and retrieving with full efficiency and undoubtedly helped considerably towards the success of their teams.

Portsmouth Naval Gliding Club

The Club's new assistant instructor this year, Lieutenant (E) Coulshaw, has pressed on steadily with dual and solo instruction throughout the summer, and the year's target of 3,000 flights is well in sight, the 2,000 mark having been passed in early August.

During the summer leave period a camp for the more experienced members was organised at the Bristol Club's site at Roundway. The weather wasn't very helpful and one of the members found the site so strange after a flat airfield that he bent a Grunau rather severely. Another Grunau was quickly obtained and a certain amount of hill soaring was achieved.

Condor Gliding Club

Steady progress has been made at Arbroath Naval Air Station with Lieutenant Commander (E) Fison as C.F.I., using one of the two-seater Tutors bought with the money granted to the Association by the Nuffield Trust.

Fulmar Gliding Club

The other two-seater Tutor has been in use with this Club at Lossiemouth, which suffers from the difficulty that it has to fly at an air station some 15 miles from where all the members are quartered. Leading Airman Merrills has been doing a good job as C.F.I.

Gannet Gliding Club

Under Lieutenants Stubbins and Cochrane the Club at Eglinton in Northern Ireland has been progressing with instruction on an Eon Primary. A liaison has been struck up with the Ulster Club and some of the more experienced members have done some hill soaring in that Club's Tutor.

Heron Gliding Club

This new Club has just been formed at Yeovilton. So far it is still in process of making its equipment serviceable, but it hopes to start activities in the near future.

★

Derbyshire & Lancashire Gliding Club

OUR energies during the early summer were, of course, directed chiefly towards organising the National Championships. Through all this, and the Championships period, the normal club life has managed to survive, our training figures for the year to the end of August being just over 1,000 launches in the T-31 trainer, with 11 each of A, B and C certificates.

Our last Cadet has been converted into a Tutor, so our training fleet now consists of one T-31 two-seater, two Tutors and two Eon Babies, with the Sedbergh as "overflow" training two-seater. A general reshuffle of private owners has resulted in a privately owned Slingsby Sky appearing at Camphill, and—more important—in the club acquiring an Eon Olympia Mk. II. This, in turn, means that the good old,

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little understood Gull I (with wheel and improved canopy) is now for sale.

Throughout the whole of August a successful series of instruction courses for the Air Training Corps has been run at Camphill, using A.T.C. aircraft and winches, while dormitory, messing and other general facilities have been supplied by the club. Most of those who attended were already trained to B Standard. For a total of approximately five weeks' activity, there were 700 launches and 180 hours' flying, with 3 A, 6 B and 21 C certificates.

★

Scottish Gliding Union

GLIDING in Scotland has had a most frustrating summer season. As is so often the case, this is not the result of any particular thing but a combination of small incidents. The re-adjustment following the loss of our ground engineer to the R.A.F. took some time, especially as one of the Cadets was in the midst of repair. Our launching facilities, too, have not been so good as last year, and for a long spell we relied solely on the Wild winch, which has never failed us yet despite its five years' service. Our Ford truck, after many exasperating breakdowns, was sold as scrap. So far this has not been replaced, but the second winch has been in use since August. The weather, too, has been unkind, especially regarding direction of wind.

On the credit side we have had some interesting local flying in the T-21 and Tutor, the best being Peter Pearce with 1 hour 20 minutes thermal soaring in the Tutor. A syndicate of four members have purchased a Slingsby Kite II with modified wing tips. This machine appears to fly very well and they are expecting some interesting results.

The R.A.F. Gliding & Soaring Association (Lodger Unit) have now taken delivery of a Slingsby T-31, which they fly at week-ends and on Wednesdays.

During the months of June to September, five holiday gliding Courses were held for non-members. These were well attended and most successful. For the first time a course was held specially to obtain B Certificates and was open only to those with some previous gliding or power flying experience.

Royal Air Force Gliding & Soaring Association

National Championships

THIS year's Nationals brought the biggest number of R.A.F.G.S.A. entries so far: there were nine in all where the pilots could fairly be said to be members of the Association. Flight Lieut. Forbes won the individual championship, although not in a R.A.F.G.S.A. aircraft. Of the team entries, the Association's aircraft were spread between the 4th and 22nd places. That we produced the winning pilot and also more entries than any other gliding organisation was, we feel, appropriate to the Royal Air Force. We have every expectation that from now onwards we will not only produce a growing number of entries, but those entries will be nearer to the top of the list of final placings.

In the meantime, the Association continues to expand rapidly in a most heartening manner, and is receiving an ever-increasing amount of official support.

New Aircraft

In accordance with a decision made at the last Committee Meeting, the Association acquired a Gull IV in time for it to take part in the Nationals. The idea behind this particular purchase was that the aircraft, its trailer and a towing vehicle will become a single unit which can be hired from the Association by its R.A.F. Clubs in rotation, when the Clubs have trained pilots up to the necessary standard.

Negotiations are at present in progress for buying a King Kite and a Falcon III. The allocation of these two aircraft is at present under consideration, but they will probably be re-sold to R.A.F. Clubs.

Annual General Meeting

The next Annual General Meeting has been fixed for the afternoon of 26th October. There will be a General Committee Meeting during the preceding morning. We would like to take this opportunity to inform all R.A.F. personnel that they will be very welcome to attend this or any future General Meeting, whether they are members of Clubs belonging to the R.A.F.G.S.A. or not, and, of course, regardless of their rank. Details of all meetings are published well in advance in Air Ministry Orders.

W.H.I.



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Bristol Gliding Club

In spite of chronic vehicle unserviceability, we have managed to do some worthwhile soaring during the last few months. The first cross-country was A. F. Gotch's 60 miles from Lulsgate to Newbury on 16th June. The following day Philip Wills visited us and flew 196 miles to Coltishall. Shorter flights by Tony Goodhart and our own pilots brought the day's cross-country mileage to over 300.

At the National Contests, C. Staffurth made a wave cross-country of 50 miles, and J. D. Jones, A. F. Gotch and D. A. Colvin completed their "Silver C."

An unusual cross-country was made on 4th August by A. O. Sutcliffe, who ferried the Grunau from Lulsgate to Roundway. Running out of lift half way, he had to land at Colerne airfield; however, after lunch the A.T.C. winched him into a thermal and he completed the journey.

Activity at Roundway has been mainly confined to camps, though in early June, G. E. Miller completed his "Silver C" with a climb to 5,000 feet. During August Bank Holiday camp we were joined by a party of the R.N.G.S.A. from Portsmouth, who spent a week on the site and made themselves at home in true naval style. On 7th August J. R. Allen flew the Olympia 60 miles to Windsor to collect his height and distance.

About a dozen members attended a camp held from 18th to 25th August, when Sutcliffe succeeded in doing his 5 hours in the Tutor before a visiting pilot landed it upside-down in the hedge.

J.N.C.

★

Southdown Gliding Club

We have not done so well as last summer, mainly because there have been fewer south-westerly winds strong enough for soaring over our cliffs. Nevertheless we have had one or two really good snorters, and the last one at the end of August enabled us to lay on our "round-the-lighthouse-back-for-tea" trips. The T-21B on one of these, with John Murray and Barry Smith, went up into cloud to 1,700 feet.

The last week of July saw the opening of our summer camp with the arrival of the Portsmouth Club with their Grunau, with Bert Parslow as "Gaffer." It also saw our mobile section depart for the Mynd with the Olympia and Tutor I. Portsmouth got in a fair amount of training, using our Cadet until an unlucky prang by an "ab." This left them only their Grunau and our T-21B.

At the Mynd we managed to complete the "Silver C" for Joe Hahn, who went cross-country to Wolverhampton, and Dave Parsey did 22 miles into Wales, landing near Dolau. The best thermals were on the day the party arrived after an all-night journey, and the Olympia obtained 3,500 feet with Joe Hahn up. Altogether 130 launches were made for 84 hours flying. Dr. Jameson and George Constable each got their 5 hours in the Tutor.

Don Snodgrass and Jack Godley again went to France this year, with Peter Healey added to the team. They made Pont St. Vincent their headquarters, but did not do so well as last year further south. Healey obtained 4,600 feet, but from a 600-metre tow, and Godley did a miniature cross-country of 10 miles. A total of 20 hours flying was done.

SQUEEGE.

★

Gloucestershire Gliding Club

Throughout the summer, flying at Staverton has continued with ab-initios and general flying. Our best cross-country attempt was 12 miles to Toddington by Geoff. Brian on 2nd August in the Kite, which had no blind flying instruments, so he was unable to enter cloud. We have also had aero-tow launches provided by the Cheltenham Aero Club. Recently Donald Campbell visited us with his H-17 and had a couple of aero-tows. Any other pilots or clubs interested?

We are still handicapped by the lack of a reasonably accessible hill site. The Leckhampton site, though otherwise excellent, involves manhandling over a barbed wire fence and 50 yards of "tumuli," all in a gale which has to be howling enough to justify shoulder-launches.

The Prefect and four members went to the Long Mynd on a soaring day in July and Eric Hett got his C. Five members took the Kite to Camphill during the National

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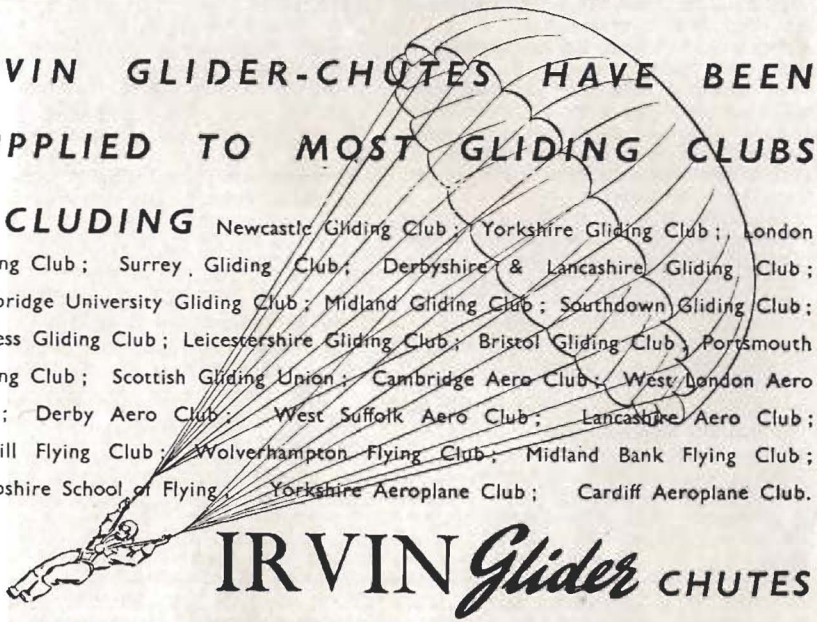
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Championship week and were able to fly it on several afternoons and evenings.

Thoby Fisher's private Olympia has been sold to Oxford Club, so we lost the use of his trailer. Worley came to the rescue with a home-made "toast rack" made of bits and pieces of derelict cars, which has done our retrieving and the above-mentioned visits.

When we rigged our Kite on the terrace in front of the Royal William Hotel, Painswick, during our summer dance, many passers-by stopped to investigate, but most lost interest as soon as they found that it had not "crashed" there.

D.H.T.

★

London Gliding Club

May brought few soaring winds but provided a small cold front on the 13th which carried Rivers to Princes Risborough. On the 21st, Yates flew 35 miles round a triangle Dunstable-Henlow-Cranfield-Dunstable, to show "Silver C" aspirants that it could be done that way.

June was much better for cross-countries, and several "tasks" were set. On the 10th the task was Cambridge and back; Dan Smith got all the way there and back as far as Luton, 75 miles in 6½ hours. Bishops Stortford and back was the task on the 16th; Latto got nearly there and Ramsden overshot to Newmarket.

The great day was the 17th, with a race to Boston, 80 miles. D. Smith, Hiscox and Rivers all got there, and Wright was a few miles short, while J. Lang made Cambridge. That day's flying added up to 75 hours 10 minutes.

Foster on the 19th, in his Rhönbussard, climbed 7,000 ft. in a cu-nim, and Stephenson 9,000 ft. in a Sky on the 24th. Wright made Cambridge next day. Total flying for June was 276 hours 24 minutes, with 711 miles in 12 cross-countries.

July weather was poorer, but Ellis, declaring West Hartlepool on the 9th, got as far as Boston. Flying for the month was 158 hours 19 minutes, with 5 cross-countries.

We have to record with great sorrow, the loss of our resident Instructor, Jack Hanks, due to a collision while flying the Camel on 19th August.

New Zealand Gliding Association

THE last year has been one of progress in a quiet sort of way. Firstly, the Olympia and Prefect have been flying in Auckland and Christchurch and have aroused wide public interest. Secondly, our Civil Aviation Department has officially recognised the N.Z. Gliding Association and has conferred upon that body a large measure of self-control of the movement with power and responsibility. Thirdly, our two main centres of interest gathered funds and imported prefab. kits of T-31's which are now here and about to be assembled. A few months should see them commencing operations.

Hockings and the undersigned had to do a lot of spade work: build our trailer, pioneer a ridge-soaring site, organize aero and auto-towing facilities and prospect the local air for best conditions.

Auckland is on a narrow isthmus with oceans ten miles apart on each side. Huge inland harbours reduce the actual land area to a minimum—we get fine thermals during midsummer but there is a long off-season during winter.

"Gold C" height in summer looks a certain attainment—we need about 8,000 feet to break away over unfavourable ground surrounding the local area. Hockings did a flight of 65 miles after getting to this height.

RALPH COURT.

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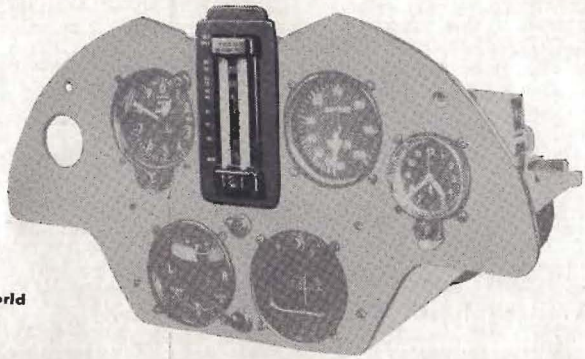
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