GLIDING

Vol. III. No. I. SPRING 1952

QUARTERLY
2/6

World Championships 1952

—Page 23

GLIDING

Edited by Alan E. Slater, M.A., F.R.Met.S.
Published by the SAILFLYING PRESS LTD.
Directors : Philip Wills, C.B.E., Ann Douglas, Jacques Cocheme, A.F.C.
OFFICIAL ORGAN OF THE BRITISH GLIDING ASSOCIATION

CONTENTS

Cover Photograph—A Spectacular Lenticular Cloud. Photographed by Leo L. White from an aircraft at 4,000 ft., about 20 miles inland from Dunedin, New Zealand. The left-hand edge of the cloud is immediately in lee of a 4,755-ft. peak, and an exceptionally strong wind is blowing from L. to R. Time : 13.30 hrs. on 18th May, 1951.

Courtesy of Whites Aviation, New Zealand.

High Soaring

THE intellectual feast provided for readers of our last issue, to help fill their long winter evenings, was admittedly rather heavy going, but it showed the extent to which this journal fulfils a need. Not only are those with technical and scientific ideas now provided with a suitable medium in which to express themselves, but the knowledge that such a medium exists has stimulated them to further thought. However, it would not do to fill our pages every time with such highbrow material, so in the present issue we cater again for a range of brows more in accordance with normal distribution law.

Of all the sciences and techniques which combine to promote the art of soaring flight, the one which receives most from it in return is meteorology. At a discussion on "Meteorology and the Operation of Jet Aircraft," held on 23rd February by the Royal Meteorological Society, pilots complained that meteorologists could not forecast for heights above 40,000 feet, and meteorologists complained that pilots had not passed on to them the information on which such forecasts could be based. Similarly there must be a two-way flow of information between meteorologists and sailplane pilots if they are to help each other.

In the present issue we publish two accounts of thunderstorm flights by M. René Comte, in each of which he soared to a greater height than any hitherto reached in cumulo-nimbus clouds. He found a remarkable difference in the conditions encountered in the two flights; in fact, it would obviously have been useless to carry a chart of a typical thunderstorm cloud in the hope that it would help him to find his way about. It is characteristic of all meteorological phenomena that they never conform exactly to a pattern but are of infinite diversity, so that there is always something new to learn.

At the aforesaid meeting everyone was surprised to hear how high the tops of cu-nims could rise. In the tropics 50,000 feet is common, and during the Thunderstorm Project in the U.S.A. a few were found at 60,000 feet and even 70,000 feet. Over England, one speaker reported, a cumulo-nimbus top was once observed at over 43,000 feet, which, as "Aesculapius" pointed out in our last issue, is a height at which the pilot needs either a pressure suit or a pressure cabin.

For fifteen years now the world's altitude record for soaring has been bandied about between standing waves and cumulo-nimbus clouds; but in spite of the figures given above, the waves are likely to have it in the end. The highest form of evidence for the existence of atmospheric waves is that of the rare "mother-of-pearl" clouds, with an average height of 75,000 feet and a maximum of 95,000 feet. They are typically lenticular in form and behaviour, and have been seen mostly over the Norwegian mountains, but occasionally over Scotland and once over Ross-on-Wye. So the waves may win, even in Britain.

B.G.A. News

Annual Awards for 1951

DE HAVILLAND CUP, for greatest height: Flight-Lieut. A. W. Bedford, A.F.C., for an absolute altitude of 18,100 ft. and gain of height of 15,900 ft. in an Olympia on 12th April.

MANIO CUP, for the best goal flight: Flight-Lieut. A. W. Bedford, A.F.C., for his goal flight from Farnborough to Usworth aerodrome (Newcastle) in an Olympia on 2nd May, 257 miles.

WAKEFIELD TROPHY, for longest distance: Flight-Lieut. Bedford, A.F.C., for the same flight.

VOLK CUP, for the best out-and-return flight: P. A. Wills, C.B.E., for his flight from Redhill to Little Rissington and return in a Weihe on 3rd June, 163 miles.

SEAGER CUP, for the best two-seater performance: Flight-Lieut. Charman Thomas, for his flight in a T-21B from Camphill to Derby Aerodrome and return, on 29th July, 64 miles.

The Council also recorded its congratulations to Flight-Lieut. Piggott for his gain of height of 9,200 feet in a T-21B from Detling on 18th June.

Technical Improvements Competition

The Council announces the award of prizes in this Competition as follows:

(1) Pitot Head Heater—£20 to P. Blanchard.

(2) Fore-and-aft level—£6 to G. H. Stephenson. (See description in GLIDING, Summer, 1951, p. 62).

(3) Artificial Horizon and Direction Gyro suitable for sailplanes—£3 to A. H. Yates.

Instructor's Badge

The Council has inaugurated a new type of badge, to be known as the Instructor's Badge. This badge is smaller but similar in design to a "C" Badge, with dark blue gulls on a pale blue background. Minimum qualifications for this badge are as follows:

(1) Should have held an A.T.C. or B.G.A. Instructors B1 or B2 category for at least 12 months.

(2) Should have carried out a minimum of 500 glider launches, or for B1 holders 20 hours, or B2 holders 50 hours (in each case as pilot in charge).

(3) Should have qualified and been awarded the "C" Gliding Certificate.

WORLD CHAMPIONSHIPS APPEAL

IN response to the appeal of Lord Kemsley, President of the British Gliding Association, for £4,000 to enable Britain to be adequately represented at this year's World Gliding Championships in Spain (see last issue of GLIDING, p. 183), the following donations have been received up to the time of going to Press.

£	s.	d.	
2	2	0	S. G. Stevens
1	0	0	J. J. Cresswell
2	2	0	R. Clough
1	1	0	G. Bacon
1	0	0	J. Moore
2	2	0	D. H. G. Ince
5	0	0	Royal Naval Gliding and Soaring Association
31	10	0	P. A. Wills
3	3	0	Docker Brothers
10	0	0	British Ropes Ltd.
100	0	0	De Havilland Aircraft Co. Ltd.
50	0	0	Fairey Aviation Co., Ltd.
15	15	0	R. B. Pullin & Co., Ltd.
5	5	0	Cellon Ltd.
10	10	0	British Aviation Insurance Co., Ltd.
50	0	0	Royal Aero Club
10	0	0	Sperry Gyroscope Co., Ltd.
50	0	0	Sir Francis McClean
1000	0	0	Society of British Aircraft Constructors
5	5	0	J. C. C. Taylor
26	5	0	Folland Aircraft
10	10	0	Flight Magazine
3	3	0	R.A.F. College, Cranwell
1	0	0	Flt/Cadet J. S. R. Salmond
10	10	0	Anonymous
50	0	0	Dunlop Rubber Co. Ltd.
3	3	0	Duke of Sutherland
1460	16	0	Total to 29th February

SECOND METEOROLOGICAL PRIZE COMPETITION

SINCE all the winning entries for the previous meteorological prize competition described wave phenomena, a second competition will be held. Prizes to the value of £10 will be given if sat sfactory entries are received.

Entries must describe thermal phenomena observed in the United Kingdom or coastal waters between 1st January and 30th August, 1952, and must be sent to R. S. Scorer, Imperial College, London, S.W.7 before 1st October, 1952. Authors must be glider pilots who have themselves observed at least part of the material described while soaring (or sinking).

Entries should aim at describing one or more of the following:—

(1) vertical velocity distribution in and around thermals,

(2) temperature distr bution,

(3) vertical and horizontal extent of individual thermals,

(4) relationship in space of thermals to their supposed sources.

Diagrams are to be encouraged, unsubstantiated hypotheses discouraged; times and places of the observation must be given.

INSTRUCTION COURSES, 1952

LONDON GLIDING CLUB will run four holiday courses, primarily for the benefit of non-members and beginners. The dates are: 15th—25th April, 9th—20th June, 14th—25th July, 1st—12th September.

The inclusive charge for accommodation with meals and gliding instruction is £21. Non-flying friends and relations can also be accommodated for the 12 days for £10.

MIDLAND GLIDING CLUB will run camps at the Long Mynd, Church Stretton, from 5th—13th July, 2nd—10th August, and 6th—14th September. A limited number of beginners can be taken on the first camp, otherwise the camps are for those with a B Certificate or power-flying experience.

Inclusive charge per course £15.

BRISTOL GLIDING CLUB is running a series of summer holiday gliding courses, for beginners and power pilots, continuously throughout the summer. The first begins on 2nd June and the last on 1st September and each lasts from Monday to Saturday.

Inclusive charge per course: June 11 gns. July and Sept. 12 gns.; August 13 gns.

SCOTTISH GLIDING UNION is holding courses for beginners at Balado aerodrome near Loch Leven. Dates: 5th-12th July; 19th-26th July; 9th-16th August; 23rd-30th August. Inclusive charge per course 12 gns.

Applications should be sent to the Course Secretaries at the following addresses: (1) London Gliding Club, Dunstable Downs, Beds. (2) 409 Hagley Road, Edgbaston, Birmingham 17. (3) 6 Longmead Avenue, Bristol 7. (4) 29 Barony Terrace, Edinburgh 12.

TROPER SSERGORP

Yes, we have been progressing smartly backwards since our report last issue, to a point where Something Must Be Done.

Inflation is doing its deadly work, and even *The Times* has gone up in price by one-third. We feel we can't do that, so the alternative course has been adopted—this issue is perforce printed on a lower-grade paper. This only goes some way to stop the rot, so we ask Clubs and readers to do their bit.

(1) We are reducing our Annual Subscription to a flat 10s., the theory being that more people are likely to find time to send along 10s. to the B.G.A. than to go to a Post Office and buy a P.O. for an odd amount. Please, dear casual reader, prove to us that this is sound reasoning.

(2) Home Clubs are being sent supplies of Annual Subscription forms, so that members who don't attend regularly in the winter months can send in an annual subscription instead.

(3) We are asking clubs to carry a small stock of back numbers and covers, so that members can easily complete their sets.

Incidentally, this issue fills the first binding cover, so all who wish to go on keeping their sets complete should now send 11s. to the B.G.A. and start in on their second volume. We just have enough stock of these covers left to supply all present holders with a second one. We haven't dared even to ask what the price will be for a repeat order. So get your second cover now!

If your present cover isn't full, then you haven't got a complete set—so send to the B.G.A. for the necessary back numbers (3s. 8d. No. 1, 2s. 8d. each for the other eight). We adore selling back numbers: it feels like money for jam, although in truth it's only paying for the dry bread.

Oh for the day when the green ball of the price variometer sinks to zero!

The Gliding Bug

by Squadron Leader E. J. Furlong, M.B.E., D.F.C.

THERE is something very unusual about any young person who has no desire to excel in some form of sport. The majority go in for the usual ball games of cricket, football, tennis, etc. and those who do well in these games have what is known as a "ball eye," which means that with a little practice they would be above average in almost any game in which a ball of some sort was used.

Now what of the many who do not possess this "ball eye"?—they are apt to be discouraged after their early attempts at school and take on a feeling of inferiority when ranged alongside the "ball eye" boys. There are, however, other activities with less publicity value such as running, jumping, swimming etc. to which is now being added Flying with a capital F.

To be a top-notch pilot you must start young—to be any sort of pilot it helps a great deal to begin early in life. In recent months the R.A.F. have recognised this truth by introducing elementary gliding to certain public schools in addition to the facilities already provided in the Air Training Corps. If the idea is a success there is little doubt that it will be extended.

Why did we say Flying with a capital F? Because, as any glider pilot will tell you, gliding is *real* flying—there is little comparison between it and power flying as a sport. Just about as much as between dinghy sailing and speed boating.

Gliding, which, of course, incorporates Soaring, is the finest sport of all because it has such infinite variety. It embraces the speed and thrill of skiing or bob-sleigh running, the grace and skill of ice figure-skating, the adventure and danger of climbing Mount Everest, the knowledge and patience of a game of chess, the endurance and determination of a marathon runner, the care and attention of an artist. All these and many other facets can be brought into play in greater or lesser degrees at will.

For instance, some glider pilots specialize in cross-country work, which calls for experience, knowledge of met. and elaborate preparation: others get most fun out of precision flying which demands few of the requirements of the former; and some just love to be up in the air with a view and a thrill. Seldom can a gliding man predict exactly what is going to happen or what he is going to do before a flight—he goes prepared to take what comes, knowing that once in the air it is entirely up to him. The more experience he has, the more he has prepared himself, the better chance he has of forecasting and using to the best advantage that which the gods present in the way of weather conditions.

There are occasions such as occurred at an Easter meeting in Derbyshire when five or six pilots of very varying skill and ability were soaring at Mam Tor some 2,500 ft. above the Hope valley in brilliant sunshine and visibility. There was steady lift extending over an area of many square miles and each pilot was enjoying a never-to-be-forgotten view of the magnificent Peak District extending for miles in every direction. No anxiety about staying up—just a glorious feeling of being on top of and at peace with the world—every workaday care forgotten in the splendour of Nature at its loveliest.

Within a matter of 5 or 10 minutes the scene completely changed when a small cold front came up the valley, blotting out the sun with massive snow clouds. What of the pilots? The cautious ones took the safe line and landed, one in the valley, and one dashed off to Camp Hill four miles away. The most experienced man recognised the signs and manoeuvred into a favourable position flying just in front of the storm, eventually landing after a grand flight some 30 or 40 miles away. Another found himself mixed up with the cloud and snow and landed on the hillside, turning over in the process, but without injury. Another clueless type, venturing forth to investigate, was sucked up into the whirling mass of snow, dived out in panic behind the hill, flew down a narrow gully around to the front of the hill and managed to stay soaring until all was quiet again. No two pilots did the same thing: each had to make up his own mind as to his action on the knowledge he had learned out of books or by experience—there was no one to consult and very little time to decide. No one was

hurt, all had a highly exciting time and would not have missed it for worlds.

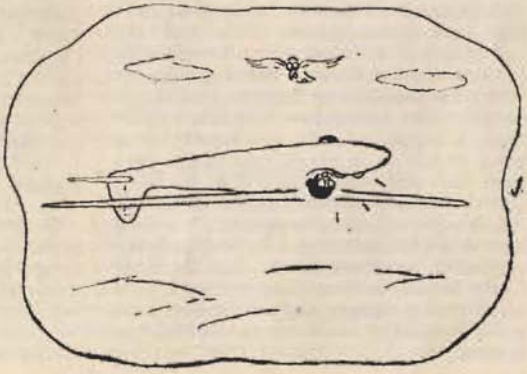
At other times pilots have been happily soaring in shirt and shorts because of a heat wave, when along comes a thermal taking them up to 6,000 or 8,000 ft. from whence they can start a very respectable cross-country flight if they are so minded—you can't go back for a warm suit once you've found your lift.

Yes! Gliding has everything to offer, and any young man or woman who gets the chance should take it and decide for themselves if it is *the* hobby they are looking for. Don't expect to get to the top rank quickly; there is no royal road, but the way, though hard, long and sometimes depressing, is a good road flanked with pleasant memories and used by a grand type of comrade. The very fact that the way is hard and sometimes depressing eliminates the poor types, leaving only the best whom you will be proud to know as time goes on.

Don't be put off if you are not quick to learn or if you are frightened at first—some of our best pilots were the despair of their instructors in their early training, and—let it only be whispered—some are still just a little bit scared every time they climb into a glider. Everybody with an imagination must have some slight qualms, but they make the safest pilots and therefore usually the best.

There is very little more to learn about most sports—which includes power flying—but nobody would dare to suggest we know half the possibilities of gliding. You can enjoy the best possible sport, learn something useful, be an explorer, satisfy your ego, and thrill yourself to bits: don't risk having to say later on, "I only wish I had taken it up sooner."

"As I said to him, 'Ponsonby,' I said, 'you'll be the death of me!'"



"I say, Ponsonby, some ass has fallen out of his kite!"

Drawn by W. TINKER.

The British Gliding Association Chairman's Report for 1951

THE scope of the work done by your Association during the past year was wider than ever, and we end the year in very good shape to tackle future problems.

Membership

Our paid-up Membership in 1951 was 13 Full Members, 18 Associate Members, 24 Private/Group Owner Members and 26 Individual Associate Members. New Associate Member Clubs during the year were the Leicestershire Gliding Club and the Aberdeen Gliding Club, whilst the Lüneburg Gliding Club dropped out.

Committees

The following Committees were set up during the year:—Flying Committee, Technical Committee, Accident Analysis Committee, Instructors' Panel, High Performance Two-Seater Committee, Meteorological Committee, Equipment Committee, Publications Committee, World Championships 1952 Master Committee.

Two newcomers in this list are the Equipment Committee and the Publications Committee.

Equipment Committee

The first-named Committee was created to assist clubs in the present inflationary situation by the purchase and storage in bulk of any type of supplies in constant club demand. It has so far only dealt in two such items: winch wire, and the "Gliding Tie" which was recommended by the last Annual General Meeting. So far both these transactions have been most successful. The Association was able to purchase a supply of wire and resell it at a price so low as to save Clubs much more than their affiliation fees, and at the same time to make a useful contribution to the Association's running expenses. We now have available sufficient wire to supply the estimated requirements of our Member Clubs for about two years, during a time when steel shortages might otherwise have made launching cable very difficult to acquire.

Publications Committee

The Publications Committee resulted from the successful conclusion of the purchase by the Association of control of the Sailflying Press Ltd., the publishers of GLIDING, which step was suggested at the last A.G.M. The Association therefore owns its official organ, but the Council has definitely laid down that the Editorial policy of GLIDING remains entirely independent.

Under Dr. Slater's capable Editorship our magazine has further consolidated its position as one of the world's best gliding magazines. Circulation and revenue of GLIDING continues to improve slowly but surely, but printing costs have recently risen even faster, and the future outlook on the financial side has become suddenly quite critical.

Operations

At the time of writing, twenty-one clubs have completed the Annual Questionnaire and report that from their club sites they have flown a total of 7,834 hours involving 42,613 launches. These figures compare with 7,560 hours involving 42,518 launches reported in 1950, showing a small increase. Over and above these figures the A.T.C. report 5,500 hours with 88,498 launches, and B.A.F.O. 4,000 hours, with 31,500 launches, in 1951.

The Association has issued during the year (previous year's figures in brackets) 1,423 "A" Certificates (1,604), 826 "B" Certificates (644), 240 "C" Certificates (242), "Silver C" 63 (47), "Gold C" nil (2), Diamond Legs 2 (2). This is the second highest number of "Silver C's" gained in any one year.

Finance

Income from what is regarded as our bread-and-butter items was well maintained in 1951 and, in fact, substantially exceeded expectations, and as expenses did not quite come up to the budgeted amount we may well feel satisfied with the year's results, which show a surplus.

We benefited once again by a donation of £50 from the Derbyshire and Lancashire Gliding Club from the proceeds of the 1951 National Gliding Championships.

The Airworthiness and Safety account is now so stabilised that the guarantee of the Kemsley Flying Trust may be dispensed with, and because the expenses of operating these Committees cannot equitably be segregated from the general office work, it has been decided that fees received and expenses will be integrated into one Administrative account.

Proceeds of the re-sale of equipment to member clubs has provided a substantial source of income which it is hoped may continue.

Since the end of the year a final payment of £100 has been made in discharge of the Royal Aero Club loan of £400 generously made when the Association was in serious financial difficulties in 1948. Thanks are due to the Royal Aero Club Accountancy staff for the most efficient manner in which the records are kept.

The result of our subsidiary company, Sailflying Press, also show a small profit for the year, but owing to increased costs, our publication is currently running at a loss, and some definite steps are required to remedy this.

Although the financial position of your Association is at present stable, I cannot close this Section of my report without expressing some anxiety for the coming year. There is little doubt in my mind that many people are going to feel the pinch of retrenchment during 1952, and few gliding clubs to my knowledge have been able to accrue reserves sufficient to enable them to meet an adverse year, nor do I believe that they have been able to put up their charges to a sufficient extent to meet their constantly increasing running costs.

The Kemsley Flying Trust

A most happy relationship between the Kemsley Flying Trust and the Gliding Clubs continues to exist. A quite considerable amount of money has been made available to the Clubs for the purchase of equipment, improvements to flying grounds and building development, and the fact that the clubs have in turn and without exception honoured their commitments to the Trustees in their loan repayments is indicative of the integrity of our movement.

Distinct from its help directly afforded to the Clubs, the Trust has provided the capital outlay necessary for the purchase of the launching wire stock and gliding ties, and has undertaken to provide further money to "stockpile" such other equipment as may be useful to member clubs when opportunity presents a worth-while bargain which cannot be financed from the Association's own and immediate resources.

The Winter Cross-Country competition has been repeated this year, and we received donations for the Prize Fund of the 1951 National Gliding Championships, the expenses of which were underwritten against loss by the Trust.

Interest of the Trust has been enlisted in the International Championships 1952 in that provision has been made for three trailers to carry our competing machines to Spain.

Finally, the Trust continues in partnership with the Ministry of Supply and the Association in the M-76 two-seater sailplane.

The stability and security of our whole movement is greatly enhanced by the knowledge that we have behind us the support of the Trust, and of our President, to enable us to take on all worth-while projects which offer.

Work of the Council

A great deal of work fell on the Council in the early part of the year in connection with the preliminary organisation necessary to enable us to offer to hold the 1952 World Championships in England. This came to nothing, since the F.A.I. at their Brussels meeting in July eventually accepted the offer of Spain. However, we were second in the voting list, so I hope we will decide again to offer for the 1954 Championships. Our 1951 National Championships were so excellently run by the Derbyshire and Lancashire Gliding Club that I feel quite sure we could now cope with the World Championships with really valuable results to our movement.

Appeals for Government Aid

During the year two approaches were made to the Government for financial assistance; the first suggesting an extension to the Gliding Clubs of the A.T.C. Flying Scholarship scheme, the second after the recent General Election proposing a revival of subsidy along the general lines of the pre-war subsidy scheme which produced

such excellent results. The first approach was turned down, and at the time of writing we have not received a reply to the second.

After the imposition in the 1951 Budget of a further tax of 4½d. a gallon on petrol, the Association successfully achieved a rebate of this tax in respect of gliding clubs.

Safety

In the vital field of safety, although things are better than they were, we have still far to go. Whilst some clubs do so, other affiliated clubs do not seem to make sufficiently serious efforts to implement their undertaking, as members, to carry out the safety standards and operational requirements laid down in our regulations. During the past year we have stepped up our efforts to assist, cajole, and tactfully press such clubs to do so.

The time may come when, to live up to our undertakings to our Ministry, we may have to ask that a Club persistently failing to carry out this undertaking should cease membership. Otherwise the defects of one Club may produce official intervention which will react adversely on the whole movement.

In the meantime the Council has decided that before electing a new applicant club, they will first require evidence to show that it can achieve the required standards. There are still few Clubs that can honestly affirm that they permit no machine to fly on their site without a current Certificate of Airworthiness or its equivalent, that they have, or are well on the way to achieving a qualified Chief Instructor, and that they carry out all our Operational Regulations.

High-Performance Two-Seater

In the field of the M-76 high-performance two-seater, which is one of our most important interests, there have been developments both good and not so good. It is hardly surprising that in the general difficulty of supplies prevailing and with the technical complexities of the plastic wing construction, I have to report that the delivery dates hoped for cannot be achieved.

The favourable aspect is that the fuselage is nearly finished, we are now about halfway towards the production of an actual wing, and Messrs. Miles and our Technical advisers have between them successfully solved all the technical difficulties of the process to date.

The continued inflation has, however, meant that the price originally accepted by Messrs. Miles for the job is now quite insufficient, and further progress is being gravely slowed by the necessity of the firm giving first priority to other work of a more remunerative nature.

The probability has increased that the machine, when produced, will have a greatly better performance, and be saleable at a considerably lower price, than any comparable machine available to-day, but the obstacles to completion within a reasonable time are grave and increasing, as materials and labour are increasingly absorbed by rearmament and costs continue to rise. Every possible effort continues to be made to overcome these difficulties.

Instructor's Badge

The Council has now decided to create a new badge, to be called the "Instructor's Badge"; qualifications have been circulated, and details of application will shortly be issued.

Gifts to the Association

Miss Greig, sister of the late Donald Greig, has kindly made available to the Association her brother's collection of lantern slides, and when these have been catalogued they will form the foundation of a slide library to be made available to anyone wishing to borrow them for lecture purposes.

Mrs. G. Parry, widow of the late Mr. Jack Waring, has generously donated a Per Avia Barograph to the Association. This will be available to members on the same lines as are the "Kronfeld" barographs, which have proved so valuable to us over the past year in recording the several noteworthy altitude flights which have been carried out by Flight Lieutenant A. W. Bedford, Flight Lieutenant R. C. Forbes, and others.

Chairmanship

(Under this heading the Chairman gave reasons for wishing to resign, but he was afterwards re-elected to a 4th term of office.)

For several reasons, amongst which not the least is the unprecedented standard of efficiency of our secretariat in the hands of Lady Kinloch, I feel that your Association to-day stands on firmer ground and possesses more influence than ever before.

PHILLIP WILLS,
Chairman.

High Altitudes in South African Cumulus

by René Comte

Reproduced by courtesy of "Wingspan"

Two high altitude flights which I executed with my Moswey 4 during December, 1951, were done under different weather conditions and therefore, different experiences were encountered.

Flight on 1st December, 1951

This was the last day of the South African National Glider Rally and it was for me the second flight during this Rally. After 10 o'clock already the first cumuli started to form and we assembled the sailplanes as rapidly as possible. By the time I had filled in the oxygen, put the battery in its place and rigged the Moswey 4, all other competitors were already out on the 'drome and I was, therefore, the last one to take off.

Take-off took place at 12 noon. By this time all the cumulus clouds to S. and S.E. had developed two thunderstorms and the whole sky in that direction was covered. It looked like a front that was moving in, as, on the other side to N., the sky was still clear. I chose Bloemfontein for my goal, because this direction still looked promising and I hoped to get around front and thunderstorms.

After realeasing at 1,200 ft. above ground, I climbed almost to cloud-base in a thermal of medium strength, while Alec Farquharson flew with me in his Grunau Baby. I saw that also in my direction for Bloemfontein, the sky started to become darker, but nevertheless I hopped from one little cloud to another towards a cumulo-nimbus, which was about 10 miles S. of Baragwanath. It seemed to be the highest-reaching cloud in the neighbourhood, and while approaching, I could see that it was already raining underneath.

I flew as close as possible to the rainy spot, as I expected to find the best lift there. Indeed, the green ball went up and showed about 10 ft. per sec. climb. I switched on the artificial horizon and went into a wide circle while the lift carried me through cloud-base into the dark fog.

The air was relatively smooth at the beginning and there was nothing to worry about. After a few minutes I reached the icing zone and the rain changed to hail. It was very dense and caused an awful noise on the canopy. The climbing speed increased gradually and soon I passed 18,000 ft. and put on my oxygen mask. Before connecting the tube, I squeezed it together to check if the mask did not leak. To my surprise it did leak and, in spite of my efforts, I could not get it on to my face properly. Somebody had changed the strap-setting and I had forgotten to check that before take-off. So for the next 40 minutes I had to hold the oxygen mask in place with my left hand.

When I passed 24,000 ft. I felt very happy, as I knew I had just obtained my first diamond. The climbing speed was now 25 ft. per sec., the air was somewhat more turbulent, but it was still easy to keep the ship under control. The noise provoked by the hail became louder and louder—in fact it was so loud that I could not hear the whistling of the air any more. I also tried to listen to the electrical convertor (for the artificial horizon) which is built in directly behind my head, but it was impossible to hear it, as the thundering of the hail was so loud. The pitot tube for the air speed indicator was frozen and I realised that it would be rather awkward to have to fly the ship under these circumstances without the help of the artificial horizon. This horizon is very helpful indeed, especially in a small ship such as the Moswey and when the air speed can no longer be judged by the sound.

The hail scared me quite a bit—I remembered the story of the German pilots who had flown in a thunderstorm and whose canopies were smashed to pieces by hail. So I opened the little window and carefully put my hand outside and caught a few stones. They were the size of peas and I felt relieved. It was only their high density which created this awful noise.

After a short while, the altimeter read

30,000 ft. above sea-level. I was still holding the oxygen mask with my left hand, but let go occasionally, in order to check the colour of my finger nails. Both variometers stood at the upper end of the scale, which meant that I was climbing at 40-50 ft. per sec. The thermometer indicated an outside temperature of 30-40°C. below zero (thermometer scale very inaccurate for these values), but inside I felt comfortable, the temperature still being 8°C. above freezing point (46 deg. F.)

When the altimeter hand passed 32,000 ft., the hail decreased and the fog became lighter. I could already feel the sunlight shining through, but was still going up. Then suddenly I saw a flash and felt an electrical discharge go through my head, down to my body and through my hands into the stick. It was not very strong, this electrical shock, but it came so suddenly that it scared me. I remembered that Per Axel Persson in 1947 had to leave a cloud under similar circumstances, as the lightning strokes became a real nuisance. So I levelled out and directed my ship on to the course for Bloemfontein.

After 1½ minutes' straight flight, I came out into the sunlight. To my surprise I could not see very far, as in front of me there was a high foggy overcast directly on my course. I hoped it would not be too extended and that I would get through after a short while, so I flew straight into it. I held my course for Bloemfontein and kept the artificial horizon level. Hoping to come into the sunlight any moment, I flew and flew, but it was still foggy around me. I hit light up-draughts and very strong down-draughts, smooth air, rain and then turbulence again, but the fog around me did not clear.

The altimeter clock came slowly down turn by turn, and after 40 minutes' straight blind-flying (it seemed to me like eternity) I suddenly sighted ground about 6,000 feet below me. I had come out under the cloud-base and was right above the Railway Line Johannesburg-Kroonstad, 65 miles from where I had started my cloud flying. It was raining about 5 miles ahead of me and also to the left. The weather all round seemed very bad and for 1½ hours I struggled in very turbulent lifts, trying to get around rainy areas, but the weather became worse and worse and eventually I had to land 11 miles S. of Vredefort after a total flying time of about 3 hours.

Flight on 30th December, 1951

The weather on this day was quite exceptional. According to the Pretoria Weather Bureau, it was one of the hottest days in Johannesburg, and the air was unusually dry. Many of our glider pilots found thermals on this day particularly strong and the cloud-base was so high that Ken Newman reach "Gold C" altitude (unfortunately without barograph) without entering the clouds.

At 2 p.m. a nice cumulo-nimbus built up over Germiston and I took off in my Moswey 4 with oxygen, batteries and a sealed barograph all ready for an altitude attempt. The tow pilot, Fritz Johl, followed my instructions not to tow higher than 500 ft. above ground and I released at this altitude over the S.W. corner of the aerodrome. The up-current was a steady 4 ft. per sec., but increased slowly up to 12 ft. per sec. when I reached cloud-base. I climbed a few hundred feet in the little cloud above the airport, then headed immediately for the thunderstorm over Germiston. It was not easy to find the good lift area and several times I had to level out, as the air became too turbulent. But finally I got into an area that was wide enough to circle in without touching the down-draughts which surround the lift. I passed cloud-base very rapidly and climbed at a steady 15 ft. per sec. while circling with 45° bank. There was no rain and no hail, but the air was very much more turbulent than on the first flight I had done four weeks before. There was nothing extraordinary that happened all the way to the top—the oxygen mask fitted this time—and the climbing speed was so strong that I was at 36,000 ft. above sea-level before I knew what had happened. The average climbing speed on top was 50 ft. per sec. (as evaluated from the barogram), but at one place I was lifted about 700 ft. in 6 seconds.

Towards the top the turbulence became even worse and suddenly I was thrown around and fell in a bad down-draught, which made me lose 500 ft. in no time. I immediately levelled out and was shortly afterwards in bright sunlight. Unfortunately I could not see very much, as the whole canopy was frosted, but through the little window I could see that I had come out almost on top of the cumulus cloud.

Just beyond me I saw a wide sea of fog into which I sank very rapidly. It was a wide anvil that the cloud had formed. In-

side this anvil, it was snowing like back home in Switzerland, and for a short while my thoughts went back to the Swiss Alps and my friends who would very probably be there now enjoying a good day's skiing. Also the instrument panel was completely covered with frost and I had to wipe it regularly in order to read the instruments.

I flew straight and was soon out in the sunshine again, enjoying the view from this altitude through the little window. The inside temperature was just at about freezing point and I was surprised to find myself very comfortable only in shirt sleeves, but I think that this is due to the strong radiation of the sun, which keeps you warm even in very cold air, provided that there is no draught.

There was a medium amount of ice on the leading edge of the wings, but the ship was still manoeuvrable. I found that I had to keep up rather high speed to prevent her from stalling, especially in turns. After having taken about 20 photographs (which all did not come out due to a spoiled film), I began a quick descent on to the aerodrome, in order not to miss a good swim as long as it was still hot.

South African National Rally

This account of the last annual Rally in South Africa is condensed from a report written by PETER D. LEPPAN, *one of the competitors, and is reproduced by courtesy of "Wings". The map is by Peter Rivers.*

THIS event was held at Baragwanath, Johannesburg, from 19th November to 1st December, 1951. In respect of weather, it was the worst ever: no flying took place on five days out of the twelve, while on three of the remaining seven, thermic activity commenced only after mid-day. Nevertheless, with only two high-performance machines competing, in 36 cross-countries an average of just under 80 miles per flight was attained, and nine flights of over 100 miles were made, six of them being in intermediate machines.

High wind prevented flying on the first three days, but on Thursday, 22nd, clouds built up fast at about 11 o'clock, and Pat Beatty (in a Baby), the first away, found good conditions for 50 miles; thereafter, under a now completely overcast sky, he drifted along finding only weak lift, eventually landing north of Kinross (79 miles). Two others got away and reached a good height before being forced down by lack of activity under the high stratus.

Wind caused more unfavourable conditions on Friday 23rd, and it was only by the skilful location of hill-shadow thermals, combined with a certain amount of ridge-soaring, that Hans Würth (S-15) was able to cover 45 miles.

On the following day, 24th November, an overcast broke into streets after lunch. Alec Farquharson (Baby) reached his goal at Balfour (47 miles) in an hour, having flown straight-and-level under a cloud street for approximately 30 miles. Bill Teague (S-18) flew to Platrand, 109 miles, in 2½ hours in his first-ever cross-country, and Hans Würth made his goal at Standerton (89 miles) in less than two hours; both got troublesomely low at Heidelberg.

The Durban team's Bowlus Baby put up a performance in its first competitive flight which came as a surprise to many; Eric Tollis reached 9,000 feet above ground and covered 89 miles, landing near Trichardt. A farmer and his wife rushed to the scene with blanket and bottled reviver, as the propeller being lost, they said, they knew there was going to be a crash.

The Moswey, flown by René Comte, was last off at 15.30. Ten miles out, René went

into cloud with his variometer showing over 30 ft. per sec., but had to come out at 20,000 feet above sea-level, as he had no oxygen. With an indicated air-speed of 75 m.p.h. he covered 55-60 miles, picked up to cloud base again, and passed Standerton in a straight glide. Clouds were now decaying, so he turned back to the aerodrome.

Sunday, 25th, was windy and overcast. Fracto-cumulus started forming in the afternoon and Jackie Pullen (Baby) managed 26 miles, the last ten being at between 500 and 1,000 ft. The next two days brought high winds.

On Wednesday, 28th, a cloudless sky misled pilots into delaying take-off until the passenger-carrying Kranich found strong lift. Then there was a rush to become airborne, but Ken Newman's premature jubilation at the march stolen over others led to a dearth of thermals and a long straight glide to Devon (51 miles). Ted Pearson (Baby) released at 1,400 ft., climbed to 8,000, was brought low by strong downcurrents at Heidelberg and Greylingstadt, and then found fairly regular thermals between 5,000 and 8,000 feet till they gave out at Standerton. Nigel Arbuthnot (Schweizer 1-19), on his first cross-country, was carried up while circling over his goal at Nigel in a vain attempt to identify it, so went beyond it to Leslie (59 miles). Ernie Jacoby (Bowlus Baby) covered 36 miles with only three thermals.

Peter Leppan (H-17) twice got low in strong downcurrents at Germiston and Brakpan, but then found strong thermals coming off ploughed fields every 10-15 miles. These generally took him to the top of the inversion at 12,000 ft. a.s.l., and he maintained a ground-speed of over 40 m.p.h. from Devon onwards. From 11,500 ft. at Davel he made a 20-mile glide to his goal at Ermelo (123 miles) in almost negligible thermic activity. At the same time Sparky Davidson (S-18), who had started 20 minutes later, was progressing from Davel to Ermelo in occasional weak lift at only 1,500-2,000 ft. above the ground. Pat Beatty finished a 104-mile flight with a straight glide down from Bethal to Davel.

Thursday, 29th November, gave the best conditions of the rally. High cumulus started forming before mid-day. Winds were light, and Helli Lasch (Moswey) nominated Potchefstroom and return. Until 15 miles from goal he cloud-hopped at 14,000 ft. a.s.l. Over the town there was clear sky, but a good thermal gave him height, and after taking photographs he contacted cloud again 10 miles out. Cloud-hopping gave him a fast journey, and the Moswey sounded like a jet as it came over Baragwanath. In 3½ hours 128 miles had been covered to establish a new South African out-and-return record.

Other competitors set course along the Durban road, and all were helped by cloud streets. Roy Lilienfeld (H-17) made 70 miles to near Val. Jackie Pullen entered cloud at 9,200 ft. above ground; later he climbed back to cloud base at 20 ft. per sec. and from there reached his goal at Standerton easily. Pat Beatty (Baby) had given Volksrust (140 miles) as his goal, but on arriving over Paardekop (120 miles) with 5,000 feet in hand, mistook it for the goal and used dive-brakes to get down. Ken Newman (S-15) climbed 7,000 feet in 7 minutes; later he was flying at 60 m.p.h. under a good street to Standerton, but after that he met only one more thermal and cloud and landed at Sandspruit (132 miles), 8 miles short of his goal.

Eric Tollis (Bowlus) achieved 140 miles to Volksrust in a flight which won him the Pilot's Award, which is decided by vote of the competitors. Bill Teague (S-18) made a flight which won him the Lasch Trophy for the longest goal flight, the Kelvin Bottomley and Baird Trophy for the longest flight of the Rally, also his "Silver C." He used a good cloud street to Standerton, then twice got very low, picked up to 11,500 ft. a.s.l. at Charlestown and 12,000 at Volksrust, and from there in zero-zero he flew at 40-45 m.p.h. to Newcastle, his goal, reaching it with 8,000 feet in hand. Not realising how close he was to "Gold 'C" distance, he circled the town until his 5 hours had elapsed and landed at 18.35.

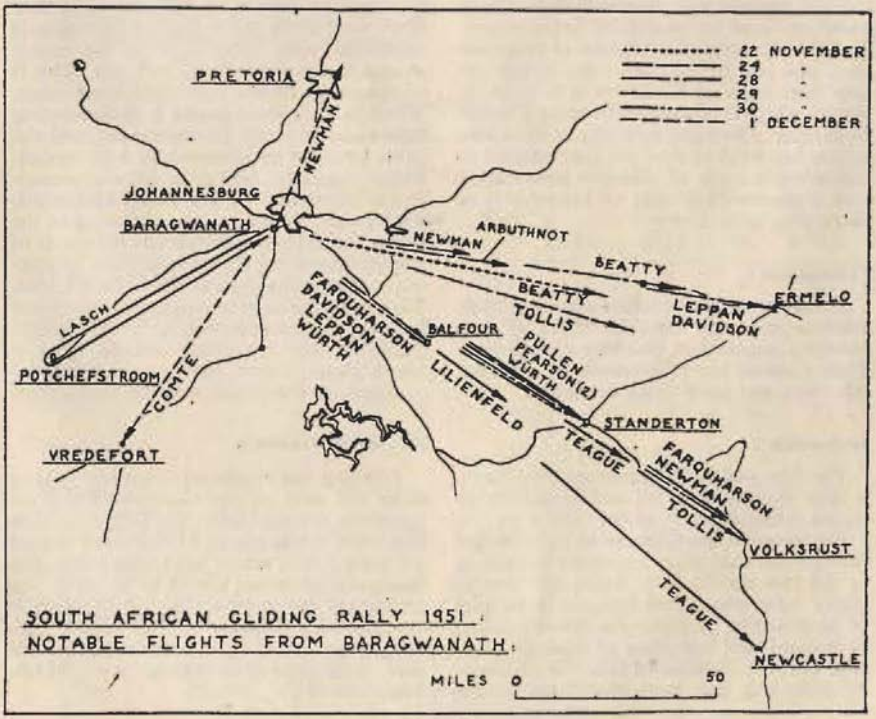
On Friday, 30th, clouds began popping just before mid-day and rapidly covered almost the entire sky, giving an easy get-away but difficulties thereafter. Climbs of up to 20 ft. per sec. were recorded, but subsequent down was even more violent. Farquharson used two streets to Amersfort and then had to glide down from 12,400 ft. a.s.l. to Sandspruit (132 miles). Ted Pearson was down to 500 feet at Balfour, spotted a bonfire, circled at first in zero-zero and, 1½ hours later, reached 5,000 feet, still over Balfour. From there he jumped from one sunlit patch to another to reach Standerton. Helli Lasch hit a big hole at Heidelberg;

Davidson and Leppan both staved off disaster there but, with Würth, found such a down near Balfour that their descent resembled dive-bombing. Vic Knott (Bowlus), in his first cross-country, flew along the edge of cloud from Heidelberg and nearly reached Standerton.

The last day, 1st December, produced very stormy conditions that spread rapidly. Teague flew under a long black street until he met lightning and violence, and used dive-brakes to get down from 11,500 feet a.s.l. Lew Kayne (Baby) got mixed up with a thunderstorm from which he emerged at 14,500 ft. above ground, photographed his turning point at Heidelberg but was brought down by heavy rain and bad visibility. Ken Newman dodged several storms on a devious route to Wonderboom. René Comte was last off and headed for a blackening sky and Bloemfontein; his subsequent adventures, during which he reached 32,000 feet, are described in a separate article.

This brought to a close a Rally, ill-fated by weather, but during which some exceptionally good flights had been made. Points were awarded for distance only, with 25 per cent bonus for a goal flight and 50 per cent for a completed out-and-return. The National Championship was decided on the best three flights, and the Junior Championship (for those flying intermediate machines) on the best two.

Bill Teague, a power pilot who took up gliding less than a year ago, became National Champion with 346 points, with Pat Beatty second with 305. The Junior Championship was won by Eric Tollis (229 points), Pat Beatty coming second with 226. The Argus Trophy was won by Beatty and Farquharson, with Hans Würth and Ken Newman second. Other markings were: Leppan 235, Newman 227, Davidson 224, Lasch 222, Würth 207, Farquharson 181, Pearson 178, Comte 163, Pullen 137, followed by Knott, Kayne, Lilienfeld, Arbuthnot and Jacoby.



Accidents Analysis for 1951

by The Chairman of the Accidents Analysis Committee

DURING 1951 a total of 66 accidents and incidents have been reported; the cost in damage of the 55 so far examined amounts to £2,860, and the cost for all 66 is likely to exceed £3,000 by a good margin. The main features, and a comparison with previous years, are shown in an appendix attached to this report.

Analysis Methods and Work

The main feature of this analysis is that there is now a sufficient background to permit conclusions to be drawn from facts, as opposed to opinion. The total number of accidents and incidents now examined is 189, and whereas the Committee began its work nearly three years ago with nothing but its own limited experience to guide it, the 189 reports now received from Clubs have provided a wealth of information. This is in process of continual re-examination, and one of the main tasks in the last year had been to build up a card-index system which it is hoped will make it easier to handle. The main difficulty of the Committee has been to find the time needed to convert this mass of valuable information into a usable form and to transmit it to those who need it.

Conclusions

There are certain conclusions, which, because you may consider them of outstanding importance, you may wish to hear. They concern the importance of good instruction, and good flying discipline.

Instruction

The first and most important conclusion is that the majority of accidents can be traced, often directly, to the instructor.

For example, the Committee have formed the opinion that many accidents in landing or on the approach to land, are due to pilots' ignorance of elementary principles of airmanship, in particular those relating to control and handling of aircraft at or near the stall. Measured either in numbers, or cost, this has been the cause of the greatest proportion of accidents, and the opinion is strengthened by the fact that two further aircraft were written off through unintentional spins, or inability to recover from a stall. This is a direct reflection upon the instruction and training of the pilots concerned, and suggests that insufficient attention had been paid, in instruction both in theory and in flight, to the stall, and conditions of flight related to it.

There seems an almost complete absence of continuation training once a pilot is qualified, and the criticism made above applies equally both to those Clubs who give dual, and those who train by solo methods.

Repetition of Accidents

It will be seen from the summary that there is no particular reduction in accidents compared with 1950, and no particular change in the proportions by types. This is symptomatic of our next main conclusion, which is that there seems a disappointing reluctance to learn by experience, and the same kinds of accidents recur with monotonous regularity, and draw from us monotonous repetition of the same comments. Discipline comes into this, and some of the worst examples have arisen as the result of pupils disobeying the orders of the instructor, or the flying regulations of their Clubs. The whole question of passing on experience is linked with instruction, and it seems most desirable that the future should bring a much closer liaison between accidents investigation, discipline, and the instructors.

Avoidable Accidents

Nothing has happened in the last year to alter the view of the Committee that *all accidents are avoidable*. In fact, this view has been strengthened by the good record of those Clubs where both instructors and flying discipline are known to be good. An important factor in accident prevention is undoubtedly whether or not Clubs concerned have had their instructors trained and categorised in accordance with B.D.A. requirements.

Recommendations for the Future

The 1951 Accidents Analysis Committee wish to make the following recommendations for the future:

1. That the Committee should report annually, at the time of the A.G.M. and not quarterly, as at present, and that this annual report should be supplemented, not only as at present by comments returned to Clubs of each individual report, but in addition, by a comprehensive report annually to each Club on that Club's total accidents to date. The amount of material now contributed by most Clubs is such that they are likely to benefit from it, especially as the Committee will be fortified by a far greater mass of information on accidents generally than any individual Club can be.

2. That the B.G.A. Council, when it considers the work and constitution of the Accidents Analysis Committee for 1952, should:

i. So constitute the Committee as to simplify the growing volume of work involved in filing, indexing, examining, commenting upon and distributing the results of reports.

ii. Consider the best means of assuring the closest possible association of accidents analysis, and the work of the Instructors' Panel; if necessary by some form of integration of the two Committees.

3. That the Clubs should be asked to ensure that, not only do they compile their accident/incident reports correctly, filling in such frequently omitted details as the experience of the pilot, date, cost of damage, but that the form should also be completed legibly.

4. That the Instructors' Panel, and Clubs should give renewed attention to instruction both in theory and in practice, in stalled flight, spins, recovery from spins, and that such instruction should be continued, accompanied by instructors' periodical checks, well after the trainee has qualified as pilot.

Group Captain G. J. C. PAUL, D.F.C., R.A.F., *Chairman.*

Summary

	1951			1950		1949	
Type of Accident	*No.*	*Percent of 55*	*Cost £*	*No.*	*Percent of 61*	*No,*	*Percent of 61†*
Hops and Slides ..	6	11	330	5	8	15	25
Pilot not in Charge ..	5	9	5	8	13	4	6
Take-Off	7	12	105	7	12	3	5
In Flight	*6	11	1,000	5	8	8	12
Approach	10	17	230	11	18	7	12
Landing	22	40	1,200	25	41	24	40
Total Analysed	55	100	2,860	61	100	61	100
Not included above ..	11			2			
Total for Year	66			63		61	

Notes: * Two aircraft involved in one accident.
† Last eight months only of 1949.

Camphill to Barton-on-Humber

by G. O. Smith.

This is the longest flight made in the fourth Winter Cross-country Competition organized by the Kemsley Flying Trust. Prizes will be awarded in April.

SUNDAY, 16th December, was the morning after our Christmas Pantomime and Party, and although I had no actual "hang-over" it was with a slight feeling of resentment that I awoke to find that it was a good flying day. Wind was W.S.W., about 15 m.p.h. at Camphill, and obvious lenticular clouds were visible all over the place. Orographic cloud was forming on the hill at only 300 to 400 ft., but not in sufficient quantity to be a nuisance.

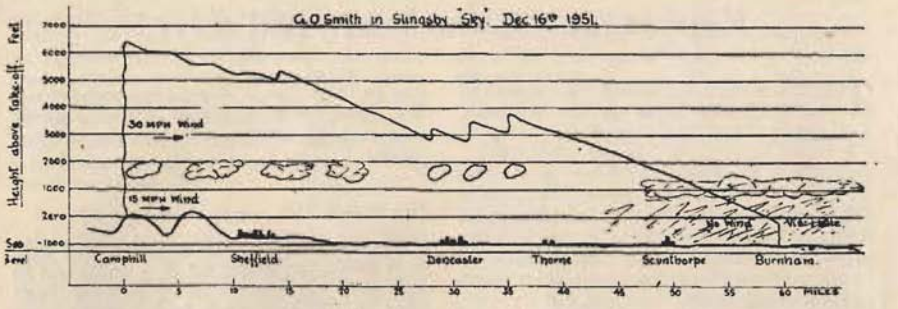
Prompted possibly by my general frame of mind, I decided immediately after breakfast (09.30 hrs. G.M.T.) that the wind was not strong enough for any real excitement, and I therefore "wasted" (from the point of view of my own flight) a valuable hour in getting club machines out and into the air.

I eventually took off myself (by winch, to 500 ft.) at 11.50 hrs., by which time a number of other machines were flying at what seemed to be a considerable height above the club. The rate of climb was not phenomenal, 6 ft/sec. never being exceeded, but I managed to keep in the right place and went up steadily. At first, say at mid-day, there were no stationary clouds over Camphill by which to locate the position of the wave, and the first part of the climb was made by careful reference to variometer and ground position. At about 12.30 hrs. a stationary cloud began to form over Camphill, and although I was by this time well above it, its position agreed very well with the extent of my area of lift.

By 12.50 hrs. I was at 6,350 ft. above Camphill, using a beat of about one mile, approximately over Bradwell village. Rate of climb was by now negligible, and I decided it was almost time to leave. As always at such a moment, the prospects up-wind looked much more hopeful than those down-wind, judged by the cloud formations. There was a nice-looking lenticular over Kinder Scout which I should have liked to investigate, but I was interested in distance, and therefore turned my attention to the Sheffield direction. Looking down-wind, there appeared to be no real pattern in the cloud formation, and the impression was that of looking down on about 4/8 of ordinary small cumulus.

At 13.00 hrs. I set off from Camphill (6,400 ft. by altimeter above take-off) in a direction some 20° north of a line straight down-wind. This was for two reasons; first, there appeared to be a vague gap in the clouds to the N. of Sheffield, and second (the eternal optimist) I realised that I should only need one real lift on the way to run out of land going straight down-wind. I immediately encountered 6 ft/sec. sink, interspersed with short periods of no sink or even slight lift, but I did not consider these sufficient to bother with. My gap to the N. of Sheffield no longer appeared as such now that I was there, but at 13.12 hrs., about 5 miles N.N.E. of Sheffield, I found 3 ft/sec. lift and turned into wind to try and take advantage of it. However, after gaining only 200 ft., I lost the lift, and as there was no positive means of locating it, I pressed on again on my original course.

I was approaching Doncaster, and feeling pretty miserable about the flight being nothing but a plain glide, when I saw a more promising formation of three lines of cloud lying across wind, each about 8 miles long and about 4 miles apart. Approaching the first of these at 13.25 hrs., still well above cloud level, I again found 3 ft./sec. lift and turned into wind and flew along parallel with the cloud maintaining 3 ft/sec. lift. This was much better, but when I turned to beat back the other way I found that the cloud was rapidly dispersing, and sure enough after another minute or two the lift began to fall off. From the appearance of the cloud I was satisfied that the lift really had gone, so I nipped across quickly to the second line, where I was able to repeat the performance. This, however, was also dying and gave me only 650 ft., before I had to make a dash for No. 3, where I gained another 500 ft. before the whole system seemed to die out.



I was with these three clouds for 25 minutes, and between them they gave me about 8 miles distance with a *gain* of over 1,000 ft., and it was this incident alone that lifted the flight out of the rut, so to speak, of the "plain glide" variety.

It was now 13.50 hrs., and I was almost over Thorne, still some 4,800 ft. above the ground, but it was obvious that the rest of the flight was to be plain glide only. Downwind all clouds seemed to merge into one another to form a layer of sort of broken stratus, with increasingly bad visibility to the N. and E. My previous course would have taken me across the Humber, but I now decided that I could run off what distance I had available without crossing the river; and as this would considerable assist the retrieve, I altered the course to 100°, with the general idea of landing somewhere in the Goxhill district.

I was just able to distinguish Scunthorpe before being cut off from the ground by the above-mentioned stratus, and at 14.07 hrs. I took a deep breath and entered cloud, with 1,200 ft. on my altimeter—i.e. approximately 2,300 ft., above the ground. At 14.10 hrs.—anticlimax—I was out of cloud again, although I certainly would not describe it as being "in the clear." Visibility was about one mile, and I changed back onto an 80° course for maximum distance on the last few miles, expecting the Humber to appear at any moment, although it never did. When I was showing —200 ft. on my altimeter, i.e. about 900 ft. above ground, a really enormous field came up, and although in good visibility I should probably have continued for another 4 miles or so, the temptation was too great and at 14.20 hrs. I settled in my large field, which turned out to be at Burnham Grange, about 4 miles S.S.E. of Barton-on-Humber.

From the barograph, map, notes made at the time, and in fact all available sources of information, I have drawn the attached diagrammatic flight path, which I think is fairly accurate; while the following weather observations may also be of interest:—

Most people agreed in estimating 15 m.p.h. as the wind strength on the ground at Camphill, and this remained reasonably constant throughout the day. At about 13.00 hrs., however, Louis Slater was at 3,000 ft. above Camphill in the T-21, and reports moving very slowly backwards at 30 m.p.h. I failed to observe this increase in wind strength myself, probably because I was flying a machine in which one never wishes to travel at less than 45 m.p.h.; and I think it is worthy of note that the faster your machine the more difficult it is to estimate wind strength while flying.

In my landing field one could hold a match up and it would burn steadily, and it had been like that all day. The locals said there had been no change of weather all day, and stole glances at one another when I spoke of wind and sunshine. Later on, the wind died everywhere, and after dark our retrieve was hampered by that annoying sort of fog that is quite thick but only 10 ft. deep.

Replies to "Can You Tell Us?"

THE following summarises the answers to the questions asked in the Autumn, 1951, issue of GLIDING.

General

The replies were extremely interesting and useful to meteorologists. If you wish to, do not hesitate to send in more information, or to tell us if your experience contradicts these general conclusions.

Although 8 of the 10 entries for the prize competition described wave flights, the questionnaire replies gave far more information about thermals.

Waves

No-one believed that soaring was impossible above wave clouds, but some thought it was much easier above the strato-cumulus roll type than over the genuine lenticular. The reason for the existence of these two types is not understood.

No-one claims to have wave-soared in conditions which make waves theoretically impossible—which is consoling; very few people have seen cumulus among wave clouds—which we find surprising because we thought it was a commonplace.

"Cobblestone" turbulence of short duration, particularly on the down-wind side of waves (though not always) is quite a common experience, and is probably due to wind shear induced by wave motion at discontinuities of lapse-rate. In one case violent turbulence in a wave cloud was reported.

Hill Soaring

Hill lift is said to reach from 2 to 5½ times the hill height above the hill. One suspects that when it gets higher it is simply called "wave lift."

Hill lift is improved by sunshine on the hillside, and is best when thermals are good: in fact, the hill is then a good thermal source. On the other hand, thermal activity can make hill lift unreliable between thermals.

Hill lift often increases in late evening, particularly after a good thermal day (hence the name: evening "thermal"), but the general opinion is that the increase is due to the onset of good wave conditions. We think the competition entries showed that evening "thermals" are really evening "waves."

Sea Breeze Lift

Very few people have experienced this. It is found anywhere up to 4 miles out to sea when the main wind is blowing from land to sea, and a sea breeze blows from sea to land underneath. The Dorset coast seems to be the best place, in a northerly wind. More or less stationary clouds can be seen in a line parallel to the coast; sometimes, however, they are like a row of "sausages" perpendicular to the coast with their landward ends all about the same distance from the coast.

Thermals

1. *How does the updraught strength vary with height below cloud base? and*

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?*

The answers show a general agreement that usually updraughts increase with height up to 1,500-2,000 ft. and then remain very nearly constant, but often begin to decrease about 1,000 ft. below the bases of shallow fair-weather cumulus so that eventually the pilot just fails to enter the clouds. If the clouds can be reached the lift inside may improve, but not much. This information has never been described or used in any meteorological treatment of thermals.

2. *How does the updraught strength vary with time of day? and*

3. *Is there a representative updraught strength at any time or can a great variety of strengths be found simultaneously?*

With reference to the last question, one sage said that never having flown in more than one thermal at once he was not qualified to give an opinion. Most other people agreed that although they found updraughts of variable strength, at any time there is a representative *maximum* updraught, many

variations being due to encountering decaying thermals or failing to find their cores. During the first hour or two of thermal activity the updraughts are said to be weak and narrow, perhaps stronger in cores which are too small to be useful. An increase in thermal strengths is noticeable until 13.00-14.00 local time; thereafter there is little change until 15.00-17.00, after which the thermals weaken.

4. *Do thermals rotate*?

Although some pilots thought that thermals do or should rotate, all agreed that if so the speed of rotation is too small to have any effect upon the performance of the glider.

6. *Do cumulus have flat bases*?

In general cumulus do have flat bases, but many pilots agree that, where strong updraughts enter large clouds, the cloud base is often 100 ft. and may be as much as 400 ft. above the main base, so that there appears to be a dome-shaped indentation in the cloud. As the glider rises the horizon is obscured earlier than the ground beneath, but of course this effect might be due to the different extents of the cloud lying in the lines of sight. Nevertheless many pilots are certain that the effect is real, so that here is another phenomenon unknown to meteorologists, and an interesting and perhaps important one for which no good explanation has yet been offered.

Often there are ragged fringes and more or less ephemeral wisps as much as 300 ft. below the main base.

7. *What happens to your airspeed on entering and leaving a thermal*?

One or two pilots thought that nothing would happen if they flew their gliders "correctly," but practically all agree that on entering a fairly sharp-edged updraught the airspeed increases by about 5 knots. On leaving a thermal a decrease of about the same magnitude occurs, but there is less certainty about this because few pilots habitually leave well-defined thermals.

8. *Have you ever measured temperature excesses inside thermals*?

No one seems to have tried.

9. *Are thermals usually sharp-edged (a) below cloud base, (b) above cloud base*?

There was conflict of opinion here, chiefly we think because "sharp-edged" does not mean the same thing to everyone.

10. *Have you ever found rain in an updraught, and if so at what level*?

Evidently rain, hail and snow can be found in updraughts, both in and beneath shower clouds.

11. *Have you ever found lift or downdraughts outside clouds above cloud base*?

Sometimes lift or sink in clear air above cloud base can be attributed to orographic effects, but extensive regions of lift and sink are reported to occur beside lines of shower clouds and thunder-clouds. Pieces of decaying cloud may be associated with strong sink, and sink or lift may be found within a few hundred feet of the edge of a cumulus cloud. It is difficult to understand why lift should be found in the clear air near the cloud edge. Perhaps sometimes it occurs above a newly-rising cloud tower, as occasionally indicated by *pileus* ("cap" or "scarf" clouds). Recently the Meteorological Research Flight have noticed that the air just above a growing cumulus tower is a little colder than that around it, which also shows that it must have been pushed up a little. It is hard to imagine clear air near the cloud edge being dragged up by the updraught, because the evaporation of cloud at its edges necessitates a considerable chilling which seems more likely to produc sink.

12. *Have you ever found updraught in cloud very smooth*?

Inside big clouds the updraught is usually smooth, sometimes "extraordinarily so." This conclusion is supported by the evidence of German glider pilots, who have found very smooth but powerful (30 to 90 ft/sec.) updraughts inside thunderclouds. We think it an important fact, for it suggests that there cannot be much mixing of outside air into the middle of a large cloud, whose behaviour therefore conforms fairly well to the well-known "parcel" theories.

13. *What are good thermal sources*?

Practically everyone believes that thermals arise preferentially from certain ground features, more particularly on days of light winds. When the air is very unstable or the wind is strong these favoured regions are not so important. Places likely to be warmer than their surroundings, for a variety of reasons, are good sources; and thermals are perhaps more often found when the source is near woods, lakes, or rivers (providing a temperature contrast).

No one suggested that thermals ever have their origin other than near the ground, although some clouds are recognized to be self-feeding, or "self-stoking."

General Remarks

The structure of thermals and cumulus is widely acknowledged to be complicated, and the variability of weather conditions so great that, in the words of one of our most respected pilots, "anything *can* happen, almost any time." However, it is possible to construct a fairly coherent picture of what thermals really are, and most of the answers summarized above are consistent and can be accommodated in this picture. They have provided valuable help in the planning of a field-investigation mentioned on page 35.

We would like to thank all those who sent written answers to the questions, and to invite comments or criticisms from other pilots.

R. S. SCORER and F. H. LUDLAM,
Imperial College of Science,
London, S.W.7.

Up-Wind Through Waves

by J. H. Hickling

RIDING to the Mynd on the morning of 6th January, it was fairly obvious to me that conditions were favourable for standing waves It may surprise some people, but Elmdon Met. had actually forecast waves for this day about 24 hours previously. By the time the aircraft had been lifted out of the hangar there was little doubt left in my mind. Viewed from the ground the sky looked completely overcast, but out over the valley the sun shone through the clouds in patches. I gave the blue Olympia an extra rub over on the strength of it.

We winched Bob Neill in the club Olympia at 12.00 hrs. into a W.S.W. wind of about 12 knots, and as he was able to soar, I was bungied off at 12.15.

At first we were both touching cloud base at 600 ft. above the top of the Mynd and it seemed all too much like another hill-soaring flight. Fifteen minutes later found my companion and me heading towards the south end of the Mynd, where to our delight the sun was now shining through to the ground. We reached the area of clear sky with about 500 ft. altitude and were soon rewarded with periodic lifting of the green ball. This surging and at times turbulent lift gradually produced results and soon the altimeter was showing 1,000 ft. At about this height the lift improved and characteristic smoothness with it.

We were now above cloud base and found ourselves climbing up the front of a wall of cloud. My variometer was showing 8 ft. per sec. up at this time. To the west a similar cloud wall obstructed the view.

The climb continued up to 4,400 ft. a.s.l., where the red and green ball kept company at the bottom of their tubes. At this point the club machine left me, having taken some air-to-air photographs.

From my grandstand position it was now possible to see the set-up. A carpet of brilliant white strato-cumulus stretched from horizon to horizon and near me appeared to be in rolls. To westward the rolls were most defined and in the troughs between them several good-sized holes were to be seen.

I first made a sortie northwards along the trough through which I had climbed, but only succeeded in losing height. Down wind, although the hills were pushing up their own private lumps of strato-cu, I was not impressed (I found out later that evidence of wave formation finished about 20 miles down-wind). It was then that I decided to have a crack at going up-wind.

Back at my original hole over the south end of the Mynd I squeezed 4,900 ft. a.s.l. I then set course 250 deg. and increased my air speed to 60 knots indicated. Two minutes elapsed and 1,000 ft. were lost before

I reached the next hole. Here I equalled my previous altitude and pressed on again to reach 5,500 ft. a.s.l. in front of the next roll. I estimate the wave length was 2½ miles from crest to crest.

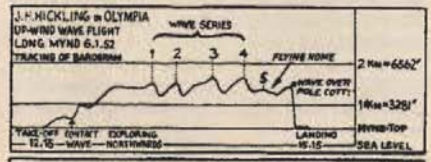
This was indeed encouraging and spurred me on. I could see enough of Mother Earth not to worry unduly about navigation. My next jump up-wind was slightly more exciting, as the roll ahead seemed higher than its predecessors, whose tops were 3,500 ft. a.s.l. As I approached this crest I realized I was not going to clear it, so immediately altered course so as to cross by a lower part further north. Having accomplished this I turned south and climbed like a power plane, rising up and over the highest part—very exhilarating.

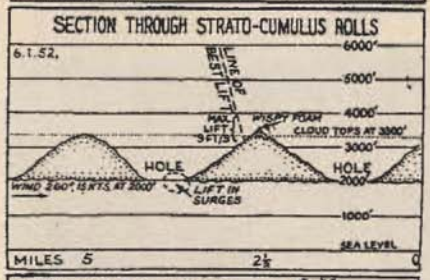
My position was now roughly 2 miles west of Bishops Castle and Lindley Hill was visible at times to the north-east. I spent a long time here trying to improve my altitude but 5,600 ft. a.s.l. was the most I could obtain. Best lift in front of this roll was 8-10 ft/sec., below the highest part of the crest. Lift gradually fell off to 3 ft/sec. for most of the climb. At this point I began to wonder whether or not one of my partners had arrived for their turn to fly, and so pressed on to the next hole. Here, to my disappointment, I discovered poor lift, and the hole beneath was rapidly filling in.

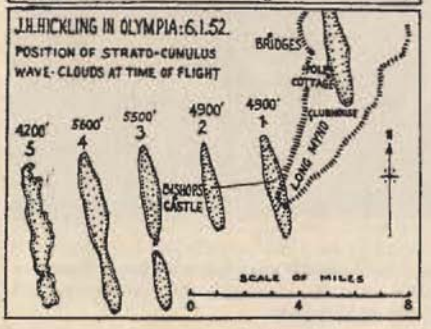
In theory I was now about 10 miles out, but I am certain that the strato-cumulus rolls were slowly moving down-wind. To check my position was not possible owing to the now almost complete cloud cover in this area.

Having now been airborne for nearly three hours and out of sight of my base for 2½ (my friends thought I had gone away), coupled with the fact that up-wind conditions were doubtful, I turned onto a course of 060 deg. and did an air surf-ride down wind. Strangely the barograph chart does not show any up and very little down on this part of the flight, although areas of lift and sink were in the expected places. (This shows how easy it would be to miss lift altogether if one was in a hurry).

Arriving back over the site with 4,000 ft. a.s.l., I formed company with the club's T-21, which was then about 500 feet below. He seemed intent on investigating the rear of a roll cloud lying about over Pole Cottage, and dog-like I followed him. I soon found the roll cloud crest climbing at quite a rate, and had no alternative but to get quickly on to a 250 deg. course and plunge into it. It was too late to turn on the artificial horizon so I put out the air brakes and sat tight. When the ground did become visible again I found myself over Bridges, about two miles from the nearest bit of Mynd, but thanks to a large area of no sink I got back to a safe landing without further loss of height.







Conclusions

I consider flights of this sort are quite possible on most wave days at the Long Mynd, provided the headwind does not exceed about 25 knots (we find fairly light winds often produce our best conditions). The later portion of this flight should make one cautious; remember cloud base is usually low and leaves little spare altitude should things go wrong.

New Zealand Altitude Record

By climbing to 10,600 feet above sea level in a Slingsby Prefect, Mr. S. H. Georgeson, formerly of the London Gliding Club and now of Christchurch, N.Z., will have set up a new altitude record for New Zealand if the flight is officially recognised. It was made during the Christmas holidays over the Mackenzie country. The climb above take-off was 7,380 feet.

On the previous day Mr. Georgeson had made a reconnaissance flight with Mr. R. B. Allison in the latter's Auster.

The record flight started about 3 p.m. with an aero-tow from Irishman Creek, provided by Canterbury Aero Club. "In spite of a 35 to 40 mile an hour north-westerly wind," says the account which has reached us, the 'plane "managed to get the sailplane into the air."

Mr. Georgeson released from tow over Edwards Creek, 8 miles on the Fairlie side of Lake Tekapo, at about 600 feet above the foot of a ridge leading up to the summit of Mount Edwards, which is about 6,000 feet high. After some anxious moments the Prefect began to rise through turbulent air until it was level with the mountain top; then the pilot ran into cloud which forced him out into the Mackenzie basin away from the slope lift, but he continued to climb in perfectly smooth air until, at 10,600 ft., he encountered a very extensive cloud formation and decided to break off the climb, although there was still good lift.

He then came out into a clear space and observed a hole in the cloud leading down into the Fairlie basin, so he headed for it. After crossing the Two Thumb range he got into a downdraught, so selected a field close to the home of some friends and sank almost vertically down to it, losing the last 1,000 feet in about half a minute. Only in the last 20 feet did the downcurrent ease off. Mr. Hamilton, an official observer of the New Zealand Gliding Association, watched the flight.

There seems little doubt, from the above description, that Mr. Georgeson made the top 4,000 feet of his climb in a standing wave.

Mr. S. H. Georgeson's Slingsby Prefect, rigged for take-off near Lake Tekapo, South Island. In the background is the mountain over which he climbed to his New Zealand altitude record, described on this page.

World Gliding Championships, 1952

by Ann Douglas

THE third World Gliding Championships since the war will be held this year in Spain, at Carabanchal Airfield, 7 miles outside Madrid. The previous contests were held at Samaden, Switzerland (1948) and Oerebro, Sweden (1950), both being won by the Swedes. In the past there have been approximately ten nations competing from as far apart as South Africa and the United States. We do not yet know who is entering this year.

The Championships will start on 3rd July and continue until the 12th. The three days before the commencement will be counted as practice days, and prize-giving will be on the 13th. As July near Madrid may well be extremely hot, and the prospects of getting an evening meal served much before 11 p.m. seem remote, it would appear that all ranks are in for an endurance test.

During the total of 10 days there will be, weather permitting, eight contest days. These will include:—

1. Free distance flight.
2. Flight to a goal fixed by the pilot.
3. Race to a goal fixed by the organisers.

In the event of large-scale standing waves appearing, opportunity will be given for these to be explored provided the minimum amount of flying for holding the championships can also be carried out.

All launches will be by aero-tow, and gliders flying distances of more than 350 km. can be retrieved by air, provided that they land in suitable places.

The Royal Spanish Aero Club are being extremely generous, in that they are offering to lend gliders, towing cars and trailers if necessary, provide free retrieving petrol, and crew accommodation free or at a reduced rate. They naturally ask that these facilities should not be taken up by nations who can manage without them, but they do not want any nation to be precluded from entering on economic grounds. It is hoped that this sporting gesture will pay the dividends it should, and that this will be a more internationally representative Championship than ever before.

The preparations of the British team are going ahead slowly. The pilots, as everyone knows by now, are:—

R. C. Forbes	G. H. Stephenson
L. Welch	P. A. Wills
F. Foster	D. H. G. Ince (*Reserve*)

Unless any unforeseen hitch occurs, our equipment will be entirely British in design and manufacture, and should be a first-class advertisement for our national products.

Slingsby Sailplanes are lending the team three Skys, the remaining two being lent, complete with trailers, by E. J. Furlong and by G. O. Smith and his partners.

The Standard Motor Company is similarly providing five new Vanguard Estate cars and one Saloon car, all finished in light electric blue. Pye Radio are lending new lightweight radios, with a range of 70 miles, for all gliders and cars. These are also light blue in colour, so with the flame and cream Skys and silver trailers we shall have a brilliant array.

This year the British Gliding Association decided to launch a public appeal as was done in 1948. The 1950 Championships entry was paid for by the pilots and crews who composed the team, and as many of the same people will be going again this year, a further similar financial outgoing is just not possible for most of them.

Owing to the most generous equipment loans and to the sporting offer of the Spaniards, we have been able to reduce the amount we need to enter. The cost, however, is still very heavy. Insurance absorbs over £500 before we start, and transporting the team to and from Madrid leaves little change from a further £1,000. Then there are Carnets and cost of practising in Spain before the Contests, quite apart from about £300 worth of ferrying of equipment in England before we go, and after we come back.

We have been greatly assisted in our appeal for funds by the most generous gift of the Society of British Aircraft Constructors especially, and by the Royal Aero Club

and various aircraft firms, as well as private individuals. But still we have not got enough. If we cannot make up the balance it may be necessary to reduce our five pilots to four. This would be a most unfortunate economy, as this year's team promises to be the best we have ever sent abroad.

As regards our further preparations, there will be a flying meeting at Lasham over the Easter holidays, in which tasks will be arranged and flights marked according to the Spanish rules. Three or four private owners are prepared to fly against the British Team, and give them a good run for their money. Weather forecasting will be in the good hands of Dr. Scorer, and Ken Machin will demonstrate the Pye Radios.

Finally, the Team hopes to leave England either on the 17th or 23rd June, and return on 18th July. If anyone wishes to travel out and back with, or at the same time as, the Team, it would be possible to include them in a cross-channel party ticket at reduced fares.

Argentine Goal Flight Record

by José Ortner

It was over three years since the Argentine Goal Flight Record had been established by Miguel A. Conde with a flight from Merlo to Maipú, a distance of 260 Kms., in a Rhönbussard. A magnificent flight with a Bussard, but too much time had elapsed without it being surpassed and this in our sport means lack of progress, especially as we have better sailplanes.

For a long time, like many of my companions at the "Albatros" Gliding Club, I had been waiting for a good day to beat this record. I had as alternative goals for my flight Mar del Plata, Pehuajó and Trenque Lauquen: Mar del Plata was my most anxious objective, but it is always difficult to reach the "Pearl of the Atlantic" as we call this beautiful seaside resort, due to the fact that if one does not get there early in the day, the wind, which normally changes in the evening, does not allow one to reach it.

Thus, on the 11th February, 1951, the ideal day turned up for my flight, there being a N.E. wind with an intensity of 2 to 3 Beaufort, and knowing that as we get away from the influence of the River Plate the cloud base rises considerably, after considerable thought I decided to give Pehuajó as my goal.

I was flying the Eon Olympia (red) LV-DBL, and I took off on double tow with Manuel Fentanes, another pilot who had given the same goal, in the other Eon Olympia (white) LV-DBM. It was 11.56 hrs. and at 300 metres I released in a thermal. Fentanes carried on tow a little higher so that we would not molest each other at the beginning of the day when the thermals were weak. In the first thermal I only reached 504 metres—Fentane was already 100 metres below me and finding the thermal too weak, left it in search for a better one. Unfortunately with the little height on hand, he did not find what he was looking for, and with great pity I saw him land in the airfield ten minutes later.

Seeing this, I realized that I had to go easy if I did not wish to spoil this flight, because I know from past experience that getting away from Merlo (site of our field), is always a tough job. At 320 metres, a new thermal was encountered immediately over our field and with a lift of 1 m/sec. I climbed up to 450 metres. At this point, after 17 minutes' flight, I saw about two miles away a small cumulus beginning to form, and I was away at 120 km/h. towards it. I arrived under this cloud in 1¼ minutes with 300 metres, but found a new thermal of 1m/sec. and climbed up to cloud base, 800 m., where I switched on the turn and bank and went up to 1,090 m., flying 5 minutes blind. The flight was now ensured, and the following is the detail of the lifts found during the flight, and time of blind flying in clouds.

Before doing this, however, I would like

to mention that all the details are sufficiently exact as to be taken as true, since they have been taken from my Swiss Peravia Barograph—a superlative instrument which marks with excellent clarity the heights and minute by minute.

Lift No.	*From metres*	*to metres*	*Blind flying in minutes*
3	800	1,300	9
4	700	1,500	8
5	850	1,130	6
6	680	960	—
7	700	2,060	10
8	720	1,650	6
9	1,260	1,680	5
10	1,000	1,450	5
11	1,260	2,150	9
12	1.200	1,500	6
13	900	1,800	9
14	1,500	3,150	12
15	1,050	1,580	11
16	1,250	1,650	3
17	1,580	1,900	4
18	1,510	1,710	3
19	1,420	1,900	—
20	1,760	2,040	—
21	1,850	2,080	1
22	1,500	1,950	—
23	900	1,430	—

Conclusions

Adding the times of the blind flights, a total of 1 hr. 51 mins. is obtained, and taking the duration of the flight of 5 hrs. 7 mins., I find that I flew a little under one-third of the flight by instruments, and it is for this reason that I consider this flight the one that has taught me most in this very important method of flying. With the practice of the first clouds, it was relatively easy to make the best of conditions found in the best cloud entered, having left it only 50-60 m. from its top, when the turbulence encountered at that stage made it impossible to climb any more. There were moments when the variometer jumped from 4 m/s. up to 4 m/s. down, and the Olympia was showered in water. According to the barogram, the strongest lift encountered was just above 2½ m/sec., although the variometer at times showed a lift of 5 m/sec.

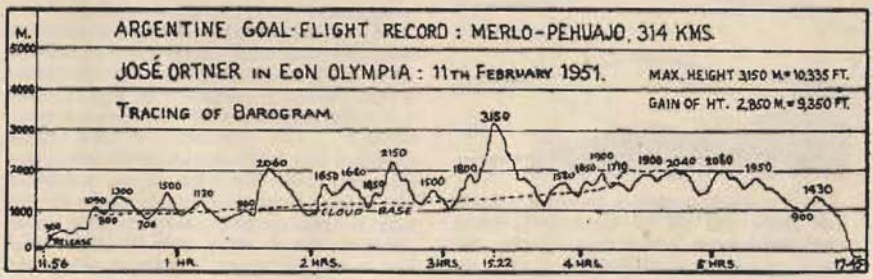
Other interesting points are:

Average glide after climb .. 13½ kms.
Average speed of flight .. 54½ kms.
Total distance covered .. 314½ kms.

I landed in the flying field of the Pehuajó Gliding Club, and shortly after a number of the members of this club, which was inactive that day, turned up and a grand reception was prepared for me, because not only had I beaten the Argentine goal flight record, but I had also obtained the first diamond to my "Gold C"—the first diamond to be obtained in the country.

Now there are the 500 kms. and the 5,000 metres still to go, and I think there will be no difficulty in obtaining these with the Eon Olympia. It's just a question of time and luck—luck in having a good day on a week-end. We usually find the best days from Mondays to Fridays, and when the week-end comes along, the weather does not seem to want us flying.

With regard to my out-and-return record, it was beaten last December by José Cuadrado, on the Meise Olympia, built by us at the "Albatros." My flight was 172 kms. from Merlo to La Plata and back, in 5 hrs. 47 mins., and Cuadrada flew 210 kms. from Merlo to Carmen de Areco and back in 5 hrs. 55 mins., so that I think that as my flight is out-dated, it is not worth writing about it.



Barocadabra

by R. S. Scorer

Imperial College of Science

WHEN the lapse-rate is adiabatic, that is when the air has no static stability, the flow of air over a hill is almost the same as the potential flow over an obstacle in a wind tunnel, the similarity being closest when the height of the wind tunnel is large compared with the height of the model hill. The streamlines for the flow of a uniform airstream over a two-dimensional ridge when there is no static stability are shown in Fig. 1. They are the same for all air speeds. Their slope decreases with height, and from the soaring point of view the best place to be is over the steepest part of the slope or a little upwind of it. This kind of flow is called *aerodynamic* because the forces determining the pressure are principally the inertia forces of the air as in any other aerodynamic problem.

More often the atmosphere is stably stratified, at least throughout the greater part of the troposphere. If a streamline is not horizontal, then *barostromatic* forces are called into play. These forces (the name is derived from baros = weight and stroma = layer, and implies a stratification of density) tend to make all streamlines horizontal and are therefore important in determining the airflow over hills. The calculation of the streamlines is more complicated; however, we plod on, turning the handle of perturbation theory and—barocadabra!—figures 2 and 3 emerge. These show barostromatic flow over the same two-dimensional ridge as in Fig. 1, with two different values of the relevant parameter l^2. The conclusion is that almost anything can happen at a given level, and when we take the case of an airstream whose speed and static stability both vary with height, further complications arise. These diagrams show only the "hill lift," and if the airstream is suitable there will

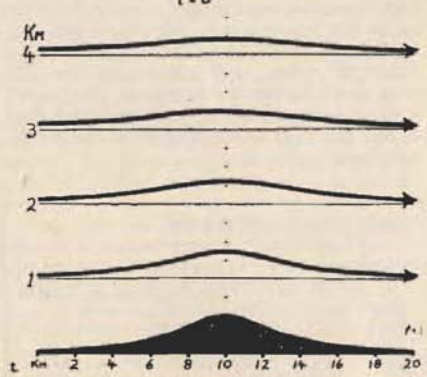


Fig. 1. Airflow over a two-dimensional hill when the air is statically neutral (adiabatic lapse rate), aud velocity the same at all heights.

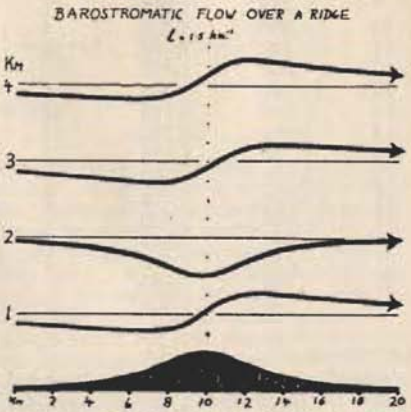


Fig. 2. Airflow over the same hill when $l^2 = g\beta/U^2 = 2{\cdot}25\ km^{-1}$. β = (adiabatic lapse rate — actual lapse rate) ÷ absolute temperature, U = velocity of the air (assumed uniform), *e.g.* with a normal (wet-adiabatic) lapse rate $U = 8$ metres/sec., or with an isothermal (zero) lapse rate $U = 13$ metres/sec.

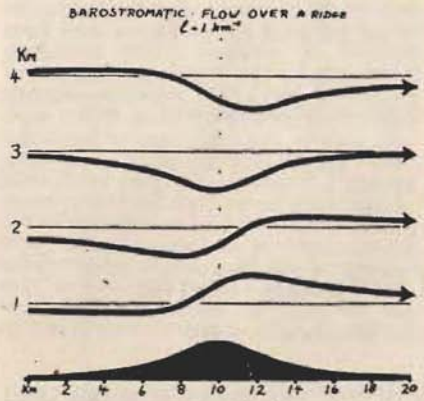


Fig. 3. Same as Fig. 2 but $l^2 = 1\ km^{-2}$ so that with the same lapse-rates as in Fig. 2 the wind is 1½ times as strong.

also be a train of lee waves on the downwind side, but that is another story.

The most significant thing is that there can be hill-sized disturbances of the streamlines at almost any height. This is not a failing of perturbation theory because sometimes the disturbances do reach observable proportions at 20 or 30 times hill height; but we do know that it does not always happen. One possibility is that the flow is aerodynamic in the convection layer, and by the time we get to the stable layers the disturbance is negligible. Another possibility is that the flow separates from the surface and forms a lee eddy, or a "bolster" on the windward side, and so changes the effective shape of the mountain to one which does not produce a disturbance at great height. But the chief reason why disturbances do not reach indefinitely upwards is because the hills are not two-dimensional. Perturbation theory can cope with the problem of a solitary hill; the formulae are far more complicated but can be evaluated—though not in time for this issue.

Let it not be thought that perturbation theory is omnipotent; for if we calculate the flow up on to a plateau, unless we choose a special case (and a uniform airstream is not such a case) we obtain the not very helpful answer displayed in Fig. 4.

To understand why barostromatic flow is so different from aerodynamic flow we may contemplate the difference between the wake of an aeroplane and the wash of a ship. The aeroplane produces vortex motion in its wake, and so does the ship, but the ship also produces a wash which travels along with the ship, and always looks the same from the ship. This is because the small region of air that the aeroplane disturbs is not held in equilibrium by barostromatic forces, whereas a water surface is. Waves on the sea can travel with a speed equal to that of the ship, whereas there is no such disturbance in air that can exactly keep pace with an aeroplane at normal speeds. When the air is stably stratified, gravity waves can travel up wind with a speed equal and opposite to that of the wind, and the mountain disturbance is composed of these waves, and so remains stationary relative to the mountain. (The aeroplane is too small to produce gravity waves). The wash of a ship spreads out and becomes dispersed to nothing a long way behind the ship; this is because it has two dimensions to spread out in. The mountain wash is all above it, and unless the mountain is a solitary (i.e. 3-dimensional) one it can only spread in one dimension, that is upwards, and so it does not become dispersed.

The wash of a ship lies all on the downstream side of the ship and is only an exact analogy to the train of lee waves that occurs behind a mountain sometimes, but the physical forces controlling it are nevertheless barostromatic. In Figs. 2 and 3 we see that the mountain disturbance is not symmetrical even though the mountain is, and this is very important because over a

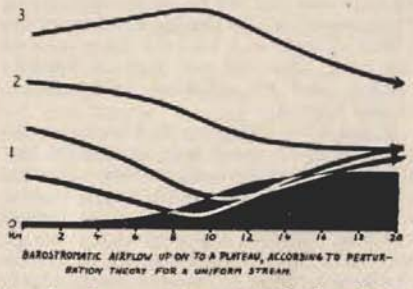


Fig. 4. A case where perturbation theory will not work — a uniform airstream flowing up on to a plateau.

hill the lift may not be found in vertical columns.

We conclude that the more two-dimensional a mountain, the higher its hill lift will extend. According to the values of the stability and air velocity the disturbance will assume its own peculiar form which, at one level over a given hill, will vary from occasion to occasion. The conditions favourable for the formation of a train of lee waves have been described already (GLIDING, Winter, 1950-51, p. 196).

12,000 ft. in the Camphill Wave

by Christopher Hughes.

THIS flight, as is so often the case, came very unexpectedly. The cloud was down to about 400 feet above Camphill, and occasional snow showers had rather damped, or frozen, our enthusiasm. I was bungied off in the club Olympia, however, at about 12.00 hrs., into a westerly wind of about 20 m.p.h., and quite quickly gained height over the slope between the bungy slope and the bowl. The air was fairly smooth, lift varying from zero to about 5 feet per second.

At 600 feet I started running into low puffs of cloud, and when flying forward to avoid them I could see the characteristic wave "hole" extending from Bradwell to Mam Tor, though there was a complete lack of the usual smooth wave-type clouds —just massive banks of fluffy cumulus.

At 1,000 feet I worked more to the north and flew alongside some smaller cumulus, the lift being best close in to them. Between 1,000 and about 3,000 feet we sat approximately over the top of the cement works, flying round or over the top of odd cumulus which drifted back into the main mass to the east. The lift was smooth but not regular, and the optimum position constantly shifted.

From 4,000 feet upwards I kept over the east half of the cloud hole, finding the best lift by slowly shifting my position. The best rate of ascent was about 10 feet per second, and the lift became dead smooth, though the best positions still seemed to keep on varying. Sometimes it would be in the north-east corner of the hole, sometimes in the south-east. At times it was best in front of the leading edge of the cloud: at other times well behind.

Only a small amount of smooth cloud was visible, lying to the north-east of Camphill, covering low cumulus. This and the constant position of the hole gave the only indication of a wave. There were no lenticulars and the cloud in the distance consisted of vast walls of cumulus: in fact, for the whole flight, I remained within a saucer of cloud, the edges reaching 15,000 feet or more.

As 8,000 ticked by, things began to lose their pleasantness. The inside of the canopy kept on frosting up, and by this time the frost refused to be rubbed off. I had, as is usual, failed to clothe myself properly for the flight, and had on little more than the usual indoor clothes. My shoes, which had started off damp, decided to freeze solid, like clogs.

The wind became more northerly with height and an airspeed of about 45 m.p.h. was required to maintain position, and having caught a last glimpse of Camphill through the ventilating holes, I settled down on a compass course of about north-west and waited. By 10,000 feet I was requiring about 50 m.p.h. to remain in the lift. At 11,000 I maintained a bit of 8 feet per second lift for a short while, but it required hard work to reach the 12,000 mark, probably due to drifting back too far and getting badly out of position.

A glance at the vast walls of cloud and almost complete cloud cover, together with the thought of landing in an unknown field in snow, convinced me against going across country. After a quick glance at the thermometer, which read an unpleasant 9 deg. F., I pulled out the brakes and set course for Camphill. I was rather slow in realising

that Camphill was not to be found, and I did a series of tight S-turns with the windows open in an effort to recognise something.

At about 5,000 feet I saw a railway line and station which I took to be Miller's Dale, and at about 4,000 I started running into cloud. From 3,000 I saw nothing after spending about ten minutes teaching myself blind-flying by trial and error. I popped out at around 800 feet above a small village, did several tight circles over a likely-looking field (my only view was still through the windows,) whistled in with the brakes out over a wall, just missed a horse which kindly galloped across my path, hit the middle of the field with an unpleasant crack and ended up in a ground loop to avoid another wall, amidst a cloud of snow.

At the Club, one machine had been launched after mine, but had only gained a few hundred feet. After that the wind had dropped and the cloud clamped.

The more I contemplated the flight, the wilder I got with myself. Having landed away, and having had to fly through cloud, I might just as well have done the odd seventy miles that 12,000 feet would have got me. On inspecting the barograph, I found that I had had an 8,000-footer aboard, and on inspecting the nose, I found a cracked bulkhead and keel. Rather a futile flight, really.

The Total Energy Variometer

by Hugh Kendall

THE variometer, or sensitive rate-of-climb and descent meter, is the sailplane pilot's key instrument for most methods of soaring. Its primary purpose is to enable the pilot to deduce the vertical speed from moment to moment. The normal variometer, however, indicates the true vertical speed of the sailplane, so the pilot must make allowance for the vertical speed of the sailplane in relation to the air before he can tell what the air is really doing.

The variometer reading can be reduced to three components.

(1) Climb or descent due to vertical speed of the air.

(2) The sailplane's rate of descent due to its drag.

(3) Climb or descent due to changing speed.

(1) is what we want to know.

(2) is known with sufficient accuracy for the type and can be memorised readily.

(3) may be large and is difficult to estimate

The total energy variometer cuts out component 3.

Consider a dragless sailplane. In still air at constant speed it would have zero sink. Its total energy would be made up of two components, that due to its height above an arbitrary datum (say, sea level) and that due to its forward speed. We can say that

$$Mh + \frac{\frac{1}{2}MV^2}{g} = C$$

If the machine is dived, height will be lost (less potential energy) but speed will be gained (more kinetic energy), and the total energy remains constant. If the machine is looped, there will be an interchange of potential and kinetic energy all the way round, but the total will remain the same.

Considering practical sailplanes, the total energy is no longer constant, but is being lost at a rate of MV_z ft. lb/sec., where V_z is the sinking speed appropriate to the forward speed.

Subject to the fact that V_z will vary with forward speed and applied "g," the potential and kinetic energies are still interchangeable. Thus, considering a relatively slow deceleration, say from 50 to 49 m.p.h. in one second, the rate of sink appropriate to that speed will be reduced by about 3 ft/sec., but the rate of loss of total energy remains nearly constant. Using the conventional system, it follows that the rate of vertical air movement can only be deduced correctly when the speed is constant. This is highly inconvenient in practice, as in the

process of finding and centring in thermals, traversing areas of sink, etc., speed is seldom held constant. It is clearly difficult or impossible to adjust speed to varying rates of sink where the process of changing speed radically affects the rate of sink itself.

The total energy variometer cuts out the indicated vertical speed component due to changing forward speed.

The means of providing this feature are simple. The variometer is a rate-of-change-of-pressure instrument. Reverting to our dragless sailplane, it has been shown that increasing its speed by diving does not change the total energy. To obtain an unchanged variometer reading it is necessary to vent the instrument at a point of suction, the coefficient of which is such that the increased suction due to increase of airspeed exactly balances the increase of static atmospheric pressure due to loss of height. The requirement is precisely the same for a practical sailplane.

The vent pressure coefficient can be arrived at as follows:—

In the absence of air drag, a freely falling body will gain speed in proportion to the square root of the height loss. The dynamic pressure (q) will increase as V^2, therefore q is proportional to height loss.

The relation is:—$q = \frac{1}{2}\sigma V^2$ and $V^2 = 2aS$

where σ = air density in slugs/cu. ft. = .00238 in the standard atmosphere.

V = acceleration due to gravity = 32.2 ft/sec/sec.

S = height loss — ft.

From the above, $q = \sigma a S$

Thus for $S = 100$ ft., $q = .00238 \times 32.2 \times 100 = 7.7$ p.s.f.

The variations of atmospheric pressure per 100 ft. at various heights are:—

Height	*p.s.i.*	*p.s.f.*
0 ft.	0.053	7.6
5,000 ft.	0.045	6.5
10,000 ft.	0.039	5.6
15,000 ft.	0.033	4.8

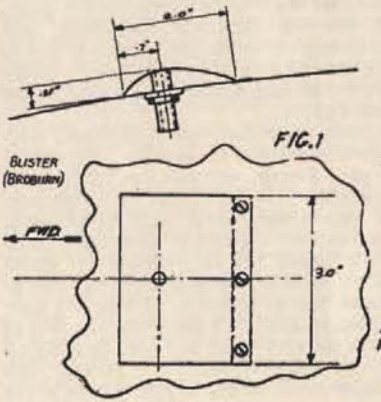
It will be seen that a different pressure coefficient is required at each height, being $\frac{7.6}{7.7} = 0.985$ at sea level, and $\frac{4.8}{7.7} = 0.625$ at 15,000 ft.

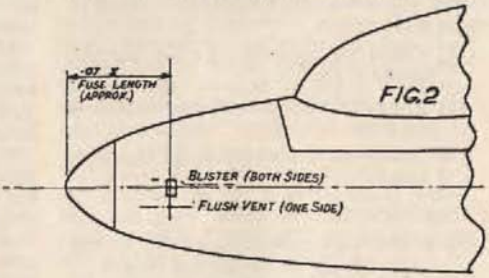
One could select, say, 2,500 ft. as a mean fumbling height, and set the pressure coefficient to suit that height, but as the pressure coefficient at sea level is nearly 1.0, if that height is selected, an A.S.I. can be used to calibrate the suction device and to provide air speed indication at all times, dispensing with the pitot static head.

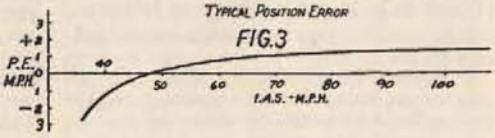
In the experiments to be described, the latter alternative was chosen.

The suction was obtained from a pair of blisters (see Fig. 1) fitted on each side of the nose at the assumed zero pressure point (see Fig. 2). A tube soldered to the highest point of the blister formed the vent, and by threading it externally and putting it through a hole in the fuselage skin, adjustment of the height of the blister could be made in flight (with difficulty!).

The two vents were connected together, thence to the outlet of the Cobb-Slater variometer, and to the suction side of the A.S.I. The pressure side of the A.S.I. was connected to a single static vent, also loca-







ted on the assumed fuselage zero pressure point.

This system was first tried on the Surrey G.C. Weihe in 1947 and on an Eon Olympia and the Broburn Wanderlust in 1948. The setting up procedure was to adjust the height of the blisters (in flight) for minimum A.S.I. position error, using a trailing static, if possible, and also to balance them against each other to give lowest side-slip error. Various sizes and shapes of blisters all gave the form of position error curve shown in Fig. 3, showing that the pressure coefficient became more negative with increasing speed. However, the position errors were of the same order as those obtained with other A.S.I. systems.

The variometer behaved generally as expected. When soaring the variometer readings appeared to be little affected by quite violent speed variations, while a loop produced "red ball" all the way round.

The main snags were:—

1. The variometer became extremely sensitive to small rapid changes of air speed due to turbulence, and under ordinary soaring conditions the red and green balls were apt to be in a perpetual state of agitation. A leak type variometer was found to be only slightly better in this respect. On the Wanderlust, this defect was largely overcome by connecting 30 ft. of ¼-inch bore rubber tube between the vents and the variometer outlet. The effect of this was analagous to that of an electrical choke, making the variometer insensitive to short-duration fluctuations of air speed. This development was ground-tested by adjusting the length of "choke" tube until there was no variometer response when the door of the room containing the instrument panel was slammed. Following this modification, the variometer was little if any more "jumpy" than the normal type.

2. On a rough aero-tow, if tow surging occurs, a large apparent climb will be indicated at each surge due to momentarily increasing airspeed. This could, and did, lead to premature release, as the "green ball" could be mistaken for that due to a thermal. When on aero-tow, it is clear that the considerations on which the total energy variometer are based are no longer valid. On this, and possibly other occasions, it would appear best to have a cock on which "static" could be selected, thus reverting to standard.

It became apparent quite early that the holes in the blisters and static vent should not be less than $\frac{3}{16}$ in. diameter, otherwise the holes can be bridged and effectively sealed by water drops.

Nothing is known so far about the effect of icing conditions. The system would appear to lend itself to fluid de-icing.

These experiments have shown that the ordinary variometer installation can be modified to make it respond to variations of total energy instead of static pressure. One is led to hope that, with a little more development work, the system could be made to operate perfectly.

(Since this article was written, it has been pointed out to me, by abstruse mathematics, that the correct pressure coefficient is 1.0 at all heights. Consequently, whether or not one chooses to use the suction from the blisters to work the A.S.I., no compromise with accuracy is necessary).

British National Gliding Records

From a Correspondent

In 1952 we hope to see continued efforts to improve our standards of flying. As a spur to this, following is a list of past and present British National records, and at the end of each class the present World record in that class.

What can we learn from this? The single-seater distance record is clearly up against the limited size of our island. Since British records can be made by British pilots flying anywhere, we may see this record "leave the country," at any rate until the arrival of the laminar-flow generation of aircraft with gliding angles which will make the Channel crossing a relatively easy matter.

The multi-seater distance record, and indeed all British multi-seater records, have lagged notably behind, and should be fairly easily bettered, particularly when more high-performance two-seater aircraft are available.

The existing single-seater altitude records have all so far been made without oxygen.

A full list of duration records is not given; nor is a list of feminine records, partly

because we are sufficiently feminist not to see why the ladies should not fly as well as the other sex—indeed, by holding the World single-seater Distance Record from 1939 to 1951 Miss Olga Klepikova has shown this to be the case.

Looking at these lists brings to mind many nostalgic memories of fine men and fine flights. But our movement looks more forward than back. By the end of this year we hope to see many new flights added to these records.

Single-seater Distance

Date	*Pilot*	*Sailplane*	*Miles*	*Route*
4- 9-32	Buxton	Falcon I	13	Askam-in-Furness—Coniston
22- 8-33	Collins	Professor	19	Dunstable—South Mimms
18- 3-34	Wills	Professor	56	Dunstable—Latchingdon
5- 8-34	Collins	Rhönadler	95	Dunstable—Holkham Bay
5- 7-36	Wills	Hjordis	104	Dunstable—Pakefield
17- 4-38	Nicholson ..	Rhönsperber	120	Huish—Bigbury-on-Sea
18- 4-38	Fox	Rhönadler	145	Huish—Fowey
30- 4-38	Wills	Minimoa	209	Heston—St. Austell
13- 7-47	Wingfield	Olympia	216	Wichita Falls—Buffalo Lake
1- 5-49	Wills	Weihe	233	Hatfield—Gerrans
2- 5-51	Bedford	Olympia	257	Farnborough—Newcastle
PRESENT WORLD RECORD				
5- 8-51	Johnson (U.S.A.)		545	Odessa—Salina (Kansas)

Single-seater Goal Flight

27- 7-46	Wills	Weihe	113	White Waltham—Leiston
17- 6-47	Wills	Weihe	140	Yeovilton—Ratcliffe
19- 5-48	Forbes	Weihe	192	Fassberg—Cologne
19- 5-48	Archbold	Weihe	192	Fassberg—Cologne
2- 5-51	Bedford	Olympia	257	Farnborough—Newcastle
PRESENT WORLD RECORD				
31- 7-39	Savtzov (U.S.S.R.)		374	Tovla-Mikhailovka

Multi-seater Distance

18- 3-34	Collins/Exner ..	Kassel	46	Dunstable—Little Waltham
6- 7-46	Sproule/Suthers ..	Kranich	103	Peplow—Owlswick
17- 6-47	Nicholson/Blake ..	Kranich	118	Yeovilton—Bramcote
28- 5-49	Hirst/Simpson ..	Kranich	139	Gutersloh—Hamburg
PRESENT WORLD RECORD				
17- 7-38	Ilchenko/Savtzov (U.S.S.R.)		385	Moscow-Ismailovo—Ouchnia

Multi-seater Goal Flight

17- 6-47	Nicholson/Blake ..	Kranich	118	Yeovilton—Bramcote
PRESENT WORLD RECORD				
19- 6-40	Kartachev (U.S.S.R.)		308	Toula—Kharkov

Single-seater Goal and Return

7- 4-39	Murray	Rhönbussard	68	Ratcliffe—Castle Bromwich/rtn.
16- 7-47	Wingfield	Olympia	147	Wichita Falls—Quanah/rtn.
3- 6-51	Wills	Weihe	163	Redhill—Little Rissington/rtn.
PRESENT WORLD RECORD				
7- 7-50	Laroy-Mansson (Sweden) ..		234	Ljungbyhed—Jonköping/rtn.

Multi-seater Goal and Return

12- 8-49	Pringle/Grantham	Kranich	77	Cambridge—Dunstable/rtn.
PRESENT WORLD RECORD				
12- 6-40	Kartachev/Petrochenkova (U.S.S.R.)		309	Toula—Ouklevo/rtn.

Single-Seater Gain of Height

Date	*Pilot*	*Sailplane*	*Feet*	*Starting Point*
19- 8-33	Collins	Professor	1,750	Dunstable
18- 3-34	Wills	Professor	3,800	Dunstable
5- 8-34	Wills	Scud II	4,514	Sutton Bank
4- 9-34	Buxton	Scud II	8,323	Sutton Bank
3- 6-38	Wills	Minimoa	10,180	Dunstable
22- 6-39	McClean	Grunau Baby	10,350	Hartside
1- 7-39	Wills	Minimoa..	14,170	Dunstable
23- 6-46	Wills	Weihe	15,247	Long Mynd
24- 7-50	Bedford	Olympia	19,120	Odiham
PRESENT WORLD RECORD				
30-12-51	Ivans (U.S.A.)		30,100	Bishop, Calif.

Multi-seater Gain of Height

4- 7-46	Furlong/Johnson	Kranich	3,601	Peplow (Salop.)
2- 8-47	Williams/Kahn ..	Kranich	8,399	Oerlinghausen
24- 7-49	Grantham/Bell ..	Kranich	10,080	Cambridge
PRESENT WORLD RECORD				
1-12-50	Brzuska/Parrczewski (Poland) ..		26,771	Jelenia-Gori

Single-seater Absolute Altitude

24- 7-50	Bedford	Olympia	21,340	Odiham
PRESENT WORLD RECORD				
30-12-50	Ivans (U.S.A.)		42,220	Bishop, Calif.

Multi-seater Absolute Altitude

No British Record

PRESENT WORLD RECORD				
5- 3-51	Symons/Kuettner (U.S.A.) ..		38,295	Bishop, Calif.

Single-seater Speed over 100-km. triangle

Date	*Pilot*	*Sailplane*	*Speed m.p.h.*	*Course*
22- 7-48	Wills	Gull IV	29.2	Muottas Murail—Weissflühjoch —Piz Curver
PRESENT WORLD RECORD				
24- 6-51	Mednikov (U.S.S.R.)		48.2	Grabtsevo

Multi-seater Speed over 100-km. triangle

No British Record

PRESENT WORLD RECORD				
5- 5-51	Fonteilles/Lamblin (France) ..		41.0	Le Bourget du Lec (Savoie)

Single-seater Duration (present)

Date	*Pilot*	*Sailplane*	*Hrs.*	*Mins.*	*Site*
18- 8-38	Young	Falcon II	15	47	Long Mynd
PRESENT WORLD RECORD					
16-18- 3-49	Marchand (France)		40	51	Romanin-les-Alpes

Multi-seater Duration (present)

9-10- 7-38	Murray/Sproule	Falcon III	22	14	Dunstable
PRESENT WORLD RECORD					
9-11-12-38	Bödecker/Zander (Germany)		50	26	Rossitten

The Investigation of Convection in the Atmosphere

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

THE study of atmospheric convection processes is important not only in relation to the general problems of heat transfer, but also because they are associated with many of the more spectacular and dangerous of meteorological phenomena, such as squalls, hail showers and thunderstorms. Vigorous convection clouds present to aircraft the additional hazard of severe icing. The intensity and extent of these phenomena cannot yet be predicted satisfactorily because our understanding of them is far from complete. For the same reason the development of techniques for artificially stimulating or modifying convective showers is greatly retarded.

The study of *convection-clouds* has been divided into two parts. The first concerns the large-scale physics of the processes which lead to their formation and control their growth; the second concerns the small-scale physics of the cloud particles. In recent years much attention has been paid to the micro-physics of the clouds, and new insight has been obtained into such important features as the size-distribution and supercooling of cloud droplets, the properties and natural concentrations of the nuclei which lead to the formation of ice crystals, and the ways in which the cloud particles can become aggregated into raindrops, snowflakes and hailstones.

However, in Nature the large-scale and the small-scale physics are but different aspects of a whole, and our new ideas about the cloud particles have quickly led to the desire for more knowledge of the large-scale processes which control the conditions in their environment. The scale of the clouds is such that they cannot be faithfully imitated in laboratory experiments, and the urgent need is for more detailed observations made in the atmosphere itself. Observations are required of the temperature, water-content (in all three phases), and motion of the air both inside and outside typical clouds, throughout their life-history. These observations have to be related to the conditions in the layer beneath the cloud bases and at the ground, which is usually where the heat causing the convection is supplied.

Because of the rapidity of the growth of individual cumulus (convection) clouds and their brief existence, the required observations are not easily made, even from aircraft. At any moment only a few of the cumulus clouds in the sky are actively growing. Even large clouds which can be identified for an hour or more are really assemblies of smaller cloud masses which are continually forming and evaporating over periods of perhaps 20 minutes. A massive cumulus or cumulonimbus (i.e., a cumulus whose particles have become aggregated into a shower) may consist almost entirely of decaying residues with just a few cores of active growth in its interior or around its edges. When the clouds are explored in aircraft these facts must be remembered, and an effort must be made to relate the observations to position in the cloud and to its stage of growth. The high speed of the powered aircraft now used makes this very difficult (the traverse of an entire cloud is made in only 10 seconds or so), and also leads to instrumental troubles, as for example in measuring air temperature. While the effect of the rapid motion of the thermometer on the indicated temperature is readily allowed for in clear air, the necessary correction to its reading in cloudy air is not known.

A number of these troubles can be overcome by using the slow-flying and structurally strong glider, in which it should be possible to make to the required degree of accuracy observations of temperature, pressure and updraught speed, and moreover to note other features such as the nature of the cloud particles. For flights into vigorous clouds it will of course be necessary to equip the aircraft with all the instruments required for safe blind-flying, and to employ a skilled pilot in radio contact with a ground controller. As far as

possible the instruments must be self-recording, so that the pilot can concentrate on the handling of his aircraft.

A Proposed Investigation

As a first step, however, it is proposed to use gliders in examining the structure of small cumulus, which present no particular hazards, and the updraughts in the clear air beneath their bases.

It is intended to use three gliders (and crews) at Cranfield in August next. Each glider is to be equipped, in addition to the usual instruments, with "walkie-talkie" radio, a sensitive recording thermometer (of lag coefficient less than 1 sec.), a recording variometer, and a sensitive altimeter (reading pressure to ± 0.2 mb).

A glider will be towed into a suitable position for release into a particular isolated cloud visible to a ground controller, and will make a series of nearly horizontal traverses through the cloud, and through the updraught below its base. While in clear air the glider will be observed through theodolites in order to determine exactly its height and path.

The primary purpose of the investigation will be to relate the observations made by the glider during these traverses through the convection updraught to conditions observed outside the updraught by the gliders and the towing aircraft, and to conditions in the ground-layer (as measured by thermometers attached to a captive balloon and thermometers and pyrheliometers exposed at the ground). It is hoped that from these observations it will be possible to construct a satisfactory theory of the release of convection-currents from the ground-layer, and of their structure below and above the bases of the convection clouds they produce.

Advantage will be taken of the opportunity of making some other kinds of observations. For example, the clouds will be explored for rare large droplets, believed to be of great importance in the development of showers, by exposing slides on which only such large droplets could impinge. More representative samples of the cloud droplets will also be taken, and the concentrations of ice crystal nuclei in the atmosphere will be observed. Centimetric radar will provide information on the distribution of showers in the neighbourhood, and if suitable clouds are discovered an attempt will be made to stimulate shower production by "seeding" them with a water-spray. Apart from problems of rain control such experiments are expected to give valuable information on the internal structure of the clouds.

The Camphill-Dunstable Goal Race

by Nicholas Goodhart

On 14th July, 1951, the task for the day at the National Competitions was a goal race from Camphill to Dunstable. This course was completed by seven pilots, all of whom were probably within half an hour of each other throughout the race, and could thus be expected to be operating under similar conditions. It was this fact which made a comparative analysis of the barograph charts worth while.

Unfortunately, barograph traces for two of the aircraft do not exist. The remaining five charts were of varied types and scales, so these have been re-plotted to uniform and linear scales. They are shown with an estimation of cloud base marked on each.

QUALITATIVE ANALYSIS OF CHARTS

A general examination of the charts reveals a wide difference of technique employed by the various pilots, and I propose to examine this under various headings.

Cloud flying

The amount of cloud flying done by each pilot varies enormously, but whether from choice or not, is not easily decided. Clearly Stephenson considered that there was a best height bracket roughly between cloud base and 1,000 ft. below it. Ince and A. Goodhart, on the other hand, may well have stayed out of cloud simply because they

could not get back again after their low dives at Derby. Wills and N. Goodhart appear to have gone into cloud at every opportunity.

Bad moments

Every pilot had a bad moment about 30 minutes to 1 hour after starting, and these all occurred in a bracket of 15 minutes of actual time. But whether this bad air was in fact over one place on the ground or one belt of air is not obvious. That it existed seems additionally proved by the fact that Frank Foster was brought down after 15 miles.

Apart from this bad moment the remainder of the flight appears to have been reasonably secure for all pilots except Ince, who apparently had a permanent bad moment for the following 1½ hours.

Number of thermals

One of the most outstanding differences between the charts lies in the number of thermals employed. Stephenson used 16 and N. Goodhart used 6. The large number used by Stephenson appears to be caused by two factors:

(a) The narrow height band in which he chose to operate.

(b) A process of inspection and selection.

In my own case the small number is due to thankfulness for what I have got and a desire to be as far from the ground as possible.

Maximum height

Three of the charts show a very clearly defined maximum height of about 5,500 ft. Ince's final climb is most interesting as it went to a greater height than achieved by any other pilot and this occurred at about 17.10. Ludlam no doubt has several theories to cover this.

Last glide

All the charts show a last glide at a markedly higher rate of descent than that used earlier in the flights. The inevitable conclusion is that all pilots played excessively safe or else are over-pessimistic about the qualities of their sailplanes and the intervening downdraughts. In this particular case it may be that this apparent error in judgment was partly caused by a large area of lift which existed during the last 10 miles.

QUANTITATIVE ANALYSIS

In order to carry out an analysis of the charts, two assumptions (of very doubtful validity) were made; these were:—

(a) That all climbs were made in circling flight and that all descents were made in straight flight in the required direction.

(b) That the mean wind was 15 m.p.h.

The results were then analysed as follows:—

(a) Determination of the distance covered in drifting with the wind.

(b) By subtracting (a) from the length of the course (110 miles) the air distance glided was obtained.

(c) The duration and height gain of each individual climb was measured, neglecting small interruptions of climb of the order of 1-2 minutes.

(d) From (c) the total height climbed and the mean rate of climb was obtained.

(e) By adding the height (above Dunstable) of crossing the start line to the total height climbed, the total descent was obtained.

(f) From (e) and (b) the mean gliding ratio was determined.

(g) By subtracting the time spent in thermals from the total time, the time spent in gliding flight was found.

(h) From (g) and (b) the mean gliding speed was found.

The results of this quantitative analysis are shown in the table.

EXAMINATION OF QUANTITATIVE RESULTS

Time of start

It is apparent that the pilots who completed the course each started in one of 3 thermals, and it is logical to assume, since launches were continuously in progress, that these were the only thermals from which a successful start could easily be made.

Wind drift

While the assumed wind speed is almost certainly wrong, it is clear that a large part of the course—almost half in the case of the slowest flight—was achieved by drifting down-wind.

Total height climbed

This result comes out right, in that the Mü 13 with its poor penetration had to climb higher than any other machine, while the Sky had to climb least. The climbs of

the Weihe, Olympia and Meise also fall into the right place. The result is dependent, apart from the performance of the aircraft, on whether the pilot is in fact using best cross-country flying speeds or not. It appears that in this case they were, though Wills has said that he used maximum gliding ratio speed between thermals. Does this show that it does not make much difference?

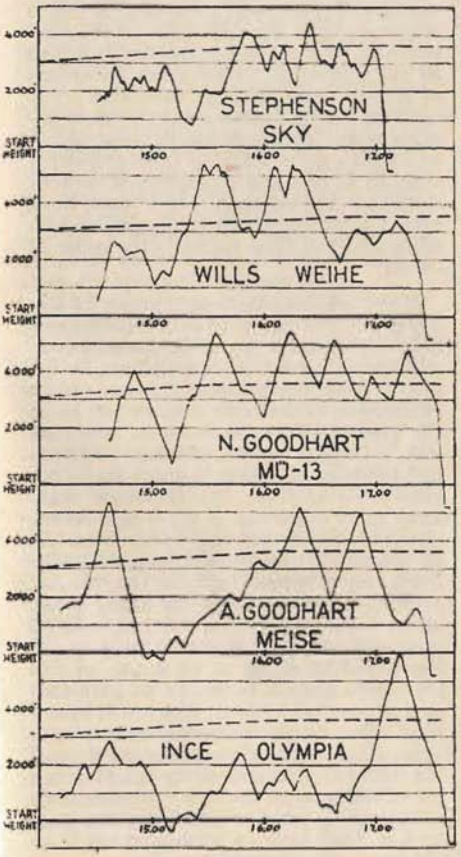
Average rate of climb

In thermalling the actual sinking speed of a sailplane relative to the air is sure to be higher than its minimum sink. It is my opinion that it is higher by 50 per cent. If we assume that the Sky, Weihe and Mü 13 have equal minimum sink performance we get the following achieved values in thermals:—

Sky, Weihe, Mü 13 } 3 ft/sec. Meise, Olympia } 4 ft/sec.

Examination of the actual achieved values of rate of climb show that the Sky, Meise, Olympia and Mu 13 are directly comparative and indicate a mean absolute thermal strength of about 6.3 ft/sec.

The value obtained for Wills's Weihe is about ½ ft/sec. lower and this may be ascribable to the minimum sink value being about 0.3 ft/sec. higher for this machine.



Mean gliding ratio and gliding air speed

The validity of the figures obtained depends on the basic assumption that all descending flight is in a straight line and along the track. This assumption is wrong in at least one case—Ince—who reports that at one stage he had to return up-wind to a thermal source. However, the figures have come out to be of the right order. Wills's gliding speed of 42 m.p.h. is exactly the best gliding-angle speed, and he states he was using this speed. Stephenson's 47 m.p.h. is just that much higher than Wills's because he was using best cross-country speeds. That it is no good flying the Mü 13 fast is well known. The Meise should be flown fast but not so fast as an Olympia (it is lighter). Therefore there is a paradox between the Meise and Olympia, and this cannot be attributed to Ince having had to fly up-wind at one stage as this would seriously reduce the mean gliding ratio. The only conclusion therefore is that Ince was in fact flying much slower than A. Goodhart, and this one can well believe from the fact that he was dangerously low for most of the flight.

Achieved cross-country air-speed

This is simply another method of indicating the result; it does however highlight the difference between the various achievements rather more sharply than when no allowance is made for wind. The most interesting point is that if we take an absolute thermal strength of 6.3 ft/sec. the following table shows the theoretical cross-country speeds:—

Sky/Weihe	27 m.p.h.
Mü 13..	23 m.p.h.
Olympia/Meise ..	19-20 m.p.h.

Pilot	Aircraft	Start Time	Finish Time	Wind Drift Miles	A/c Dist. Glided Miles	Total Height Climb ft.	Climb Time Min.	Average R/C f.p.m.	Mean Glide Ratio 1 :	Mean Glide Speed m.p.h.	Achieved X-Country air speed m.p.h.	No. of Thermals
Stephenson	Sky	1431	1706	39	71	12,900	65	200	24.5	47	27.5	16
Forbes	Sky	1437	1713	39	71						27.0	
Wills	Weihe	1431	1727	44	66	13,400	81	166	24	42	22.5	12
N. Goodhart	Mü 13	1437	1736	45	65	14,900	74	200	20	37	22.0	6
Welch	Weihe	1437	1750	48	62						19.0	
A. Goodhart	Meise	1411	1725	48	62	14,500	115	126	19	46	18.5	9
Ince	Olympia	1411	1737	51	59	14,200	103	138	19.7	34	17.0	11

These figures are startlingly close to those actually achieved except in the case of the Weihes.

DISCUSSION

The whole of this analysis has been based on very doubtful grounds, and is consequently of a very tentative nature. In fact, it seems quite probable that, by adjusting the assumptions, more or less any answer can be achieved, so all that can be said is that it is my own opinion with the facts made to support it.

To my mind the most outstanding fact brought to light is the achievement of near theoretical cross-country speeds. If this is really so, then the difference of skill between pilots must be largely overshadowed by the theoretical performance differences of aircraft types, and our somewhat crude marking system cannot make the necessary allowances. This must not be construed as an attack on the marking system, which I consider to be a good compromise between simplicity and accuracy. In Utopia, however, I hope everybody has a similar sailplane and real class racing is the order of the day.

If the absolute thermal strength of this day was representative of British conditions, then it is apparent that minimum sink is an all-important attribute of sailplanes for use under these conditions, and that while penetration is desirable it must not be at the expense of any increase in minimum sink. Oxygen bottles, artificial horizons and batteries may help in other ways, but they must increase the minimum sink. Even more important is the weight of the pilot, which may well vary by 50-60 lbs. As an example, a pilot weighing 130 lbs., flying an Olympia without oxygen or artificial horizon, would be flying at an all-up weight of perhaps 570 lbs., while a pilot with full equipment who weighed 190 lbs. would be flying at an a.u.w. of 670 lbs. This gives a difference of minimum sink of about 0.3 ft/sec., which will have a large effect on the cross-country performance. This only applies under conditions of low thermal strength; when the thermals are of the order of 10 ft/sec. or better, then a measure of adipose tissue, oxygen, gyro devices, lead, sand or what-have-you is an aid to greater cross-country speed.

Correspondence

TWO COMMENTS

Dear Sir,

May I be permitted some mild criticism of two of the technical articles in the Winter issue of GLIDING.

(1) Lt. Cmdr. Nicholas Goodhart goes into some detail concerning "best" flying speeds without at any stage defining what he means by "best." In fact there are different sorts of "best" depending upon what one is trying to do. The "best" derived by the graphical construction given in the article is "that speed at which the glider should fly between thermals in order to achieve the highest average cross-country speed" under the conditions given. I think it should be pointed out that this construction assumes that thermals are plentiful. In order to cover the maximum amount of ground from a certain height, as when hunting for thermals or trying to reach the aerodrome, one should fly at the "speed for best gliding angle," which is dependent on the wind velocity and the downdraughts. For example, when getting uncomfortably low on a down-wind cross-country one should fly (when not in a downdraught) at about the speed of minimum sink.

(2) In his letter on Airspeed Fluctuations Mr. A. H. Yates states: "Having entered the upcurrent, if the airspeed is to be held to the original value, the aircraft attitude to the horizon will be more nose-up." I do not think that he can really mean this. After all, the glider is coming down in a perfectly ordinary way in a piece of air which happens to be going up. There is no reason for the attitude of the glider to be unusual.

I am not qualified to argue concerning the bulk of Mr. Yates' letter, but it seems to me that the paragraph from which I have quoted would make better sense if it began: "While entering . . . "

P. H. BLANCHARD,
Surrey Gliding Club,
Lasham, Hants.

Lt. Comdr. Goodhart comments: "Mr. Blanchard's point is well made. On the subject of hunting for thermals, however, I am not too sure that the requirement is to cover the maximum amount of ground; would it not be preferable to cover the maximum amount of air? If this is so, then the speed to fly is independent of the wind strength or direction, and is (when not in a downdraught) always the best gliding ratio speed."

Mr. Yates comments: "Mr. Blanchard is quite right. The argument in the last sentence of my paragraph is fallacious and I am grateful to him and to Frank Foster and Walter Neumark who have also called my attention to it. My error here does not invalidate any of the rest of the argument, which I believe to be the explanation of the increase in the speed of the glider when it encounters an upgust."

(Mr. J. M. Hahn, of Bristol and South-down Gliding Clubs, writes making similar comments on Mr. Yates's letter.—ED.).

"GOLD C" DISTANCE

Sir,

Instead of putting this suggestion direct to the British Gliding Association, I offer it first for discussion.

There are not many places in this country from which Gold C distance can be flown without the expense of private aero-towing arrangements. But there are now dozens of pilots at or near the standard of skill needed. If continental pilots had to fly in Great Britain, and vice versa, we might not stand so low on the lists.

Suppose the B.G.A. were to invite the F.A.I. to amend the rules, to allow Gold C distance to be flown over a dog-legged course, with an observer at the declared turning point? The angle could be what you will. The landing point need not of course be declared.

Such a flight is more difficult than a straight flight downwind, and so need not be regarded as a concession. It is by no means as difficult as the triangular flight already permitted, which I shall be surprised to see achieved in the next ten years. Observing need not be a serious snag, especially during meetings or competitions.

A map and a pair of compasses reveal some interesting possibilities from most of the regular gliding sites.

LAWRENCE WRIGHT.

CLUB NEWS

Derbyshire & Lancashire Gliding Club.

OUR flying statistics for 1951 show an increase over 1950 in almost every department, the one notable exception being private owner flying. Club aircraft did 2,950 launches for 532 hours, while private owners did 480 launches for 455 hours. Altogether, including A.T.C. and National Competitions, 4,744 launches took place at Camphill for a total of 2,001 hours' flying, both these figures being our highest yet.

In the most important department of all —training—over 1,400 instructional two-seater launches were given (1,200 in the T-31), resulting in 14 A, 15 B and 13 C certificates. The average number of launches before an ab-initio goes solo has gone up this year to 64, probably because we call for a higher standard than previously. One has to beware of calling for an ever-increasing standard for first solos, although within reason a high standard reaps its own reward in later training. For instance, in 1951, new B pilots averaged only 8 further launches before getting their C.

Future projects include a "weight" launching machine, à la Wright Brothers, and a twin-drum Diesel winch, permanently fixed in its own little house on the edge, with provision for launching 45 degrees either side of the neutral direction. Like most labour-saving devices, these both require a hell of a lot of labour themselves in the first place, and whether either of them will be in operation in 1952 is not yet certain.

Cross-country mileage totalled 657, although club flights contributed little to this figure. Three of these flights are worthy of mention: A. A. J. Sanders made the best distance in a flight of 109 miles to Bourne, Lincs., reaching 10,000 ft. a.s.l. on the way; for this he gets the cup presented by Prince Bira. David Ince, our C.F.I., a flight of 100 miles to win the extended Kemsley winter prize, when he remained airborne almost till sundown. The fastest trip was a flight of 75 miles in 1½ hours by John Hickling in an attempted goal flight to Dunstable.

We held four camps during the year and all, with the exception of the last, resulted in plenty of gliding for campers.

In the Competitions at Camphill our C.F.I., David Ince, finished 6th.in the Individual Championship and succeeded in winning a daily prize.

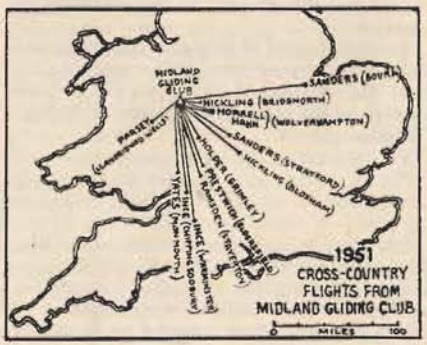
So far this year the weather has been extremely kind, and several explorations of the standing wave have been made.

On the training side we seem to be advancing slowly but nevertheless surely. Training ab-initios from winch circuits in the T-21 has proved to be a far quicker method than hill-soaring training, and tends to produce a better pilot.

At our Annual General Meeting on 28th February, the following committee were elected: C. E. Hardwick (president), R. N. Thwaite (chairman), S. H. Jones (secretary), F. H. Batty (treasurer), D. H. G. Ince (C.F.I.), J. W. Horrell, F. Wright, A. Sheffield, J. H. Hickling.

Midland Gliding Club.

DURING the months of September to December we experienced few days when conditions were even suitable for hill-soaring, and so our number of hours, which had looked like being a record, actually amounted to just over 1,300 for the 1951 season. As last year, two club members completed their "Silver C" during the year. Several visitors completed "Silver C's" and many more obtained legs for this certificate. One "Gold C" height was obtained in a standing wave, and two pilots attempted the distance leg.



Courtesy of "The Aeroplane"

First owned by Philip Wills, and lately by a London Club group, this Minimoa now belongs to Mr. O. K. Magnusson and is here seen at its new home at Reykjavik.

London Gliding Club

WINTER thermals fell off after Foster's try for a cross-country prize on 3rd November, when they took him as far as Hitchin. Mostly they have lifted pilots to no more than 1,500 or 2,000 ft., and have been present for at most two or 1½ hours around mid-day. However, we have had a taste of other forms of lift besides thermal and hill.

For the first time in club history, an undoubted wave was contacted from hill lift on 15th December. Ramsden climbed through low strato-cumulus in wave lift and soared along the valley to Hemel Hempstead, above the windward edge of a long roll of obvious wave cloud. He returned along the same belt of lift and was then joined by Hands and Rivers. All three were in Olympias and reached 3,000, 3,200 and 2,700 ft. respectively. The wind was S.W. Previously the only well-established wave was a lee-wave in an east wind on 22nd September last year.

Cold-front lift was used on 30th December. Rivers contacted it first and soared upwind to Ivinghoe radio station at 1,900 ft.; then Russell in T-21, with Court as passenger, used it to make a 10-mile out-and-return to Gaddesden.

Kiting on the cable was possible on 10th November, when Doughty cast off at 1,400 ft. in the Grunau, drifted backwards and landed without ever turning out of wind. He claimed it was a 1s. 6d. high hop, not a 2s. 6d. circuit.

Entertainments have included a Brains Trust on 17th November, with Ivanoff as Chairman and Bedford, Lee, Slingsby, Stephenson, Wills and Yates as Trustees; and two dances on 1st December and 2nd February, to which our new member from Geraldo's Band, Derek Abbott, brought along some of his colleagues to provide the music. The Annual Dinner was also held on 2nd February.

George Scarborough has been appointed full-time member of the staff; his main duties are instructing and keeping the transport in order. This year, therefore, we are again holding instruction courses for non-members; particulars are given on another page.

Southdown Gliding Club

DURING 1951 a total of 438 hours were flown from 2,412 launches. The Olympia has done 90 hours (13 hours in one day at Long Mynd), and the T-21B 120 hours. We have obtianed 20 gliding certificates including one "Silver C" completed and three C Certificates. Our hill site at Firle Beacon was used on nine occasions during the year. There has not been a great deal of soaring over the cliffs, and although Beachy Head was soared on several occasions by the Olympia, the Tutors and T-21B were only able to get there on one week-end, 25th-26th August. We were pleased to welcome members of the Portsmouth Naval Gliding Club to Friston and on 23rd September, when one of them got his C.

On 21st October John Murray climbed to 2,500 feet in the Olympia under a cumulus cloud. Only in April and October does the occasional cumulus come with cold unstable air along the coast, and unfortunately we have not been really ready for it when it has.

There were north-east winds on September 8th, 9th and 30th and 7th October, so on these days the Tutors were taken to Firle. Peter Healey, after many previous attempts, stayed in the air for five hours on 9th September, and on the 30th there was a car hill climb in progress, of this pilots had a grandstand view. Soaring was not spectacular, 300 to 500 feet being maintained above the hill; on 7th October, however, both Tutors landed at the bottom.

Flying ceased during January to allow work on C's. of A. Then on Sunday, 3rd February, we started again with the T-21B.

The Annual General Meeting was held in Eastbourne on 2nd February. The most important change in Club Officers was the appointment of Ken Fripp and Len Blaber as joint ground engineers. This will take a

great burden from the shoulders of Ray Brigden and will allow him to devote all his attention to the duties of C.F.I. Chairman is still Don Snodgrass; treasurer is Dr. Jameson, who took over the job in the middle of last year; and the secretary is again E. R. Jarvis of 45, Havelock Road, Hastings, Sussex. After a dinner which followed, our President, Marshal of the R.A.F., Sir John Salmond, presented the Cups. The Leaney Cup went again to Jo Hahn, this time for his "Silver C" distance flight from Long Mynd to Wolverhampton; the York Cup to Chris Hughes for gaining a height of 3,100 feet (we have since learned that the day after the cup was presented in his absence, he reached 12,000 feet at Camphill); David Parsey was again the winner of the John Lawford Cup for the most outstanding flight of the year, from Long Mynd to Dolau in Wales. Games then passed the time, the highlight being the catapulting of "pilots" along the floor by bungy.

The best flight to date this year was on 17th February by the T-21B flown by David Parsey; he was kited by the winch to 1,800 feet and remained over the Cuckmere Valley slope for 27 mins. He had to fly at over 40 knots to maintain position.

We are hoping that this year groups of pilots will take the Olympia to other sites.

A.R.S.

Scottish Gliding Union

THE winter season has been marked by the frequent appearance of our resident wave. The outstanding flight in the wave to date was made by A. J. Fyfe in the syndicate Kite IIa. On 9th December he climbed to 10,000 ft. above sea level, an unofficial height record for Scotland. The flight lasted 1½ hrs. Another very praiseworthy effort was a 32-minute flight in a lee wave from the Ochils by Bill Adamson in a variometerless Cadet.

Development of the Club's soaring site on Bishop Hill received a great boost as a result of the loan of a bulldozer. In a single week-end it filled in a ditch at which we had been toiling patiently for months and, in addition, levelled 100 yards of landing strip. On its way down the hill, as a sort of afterthought, it cut the foundations of the road we have been dreaming about for years.

A good deal of maintenance was done when the airfield was snow-bound and unusable. Both winches were overhauled and fitted with new cable and the Wild winch treated to a new roller box and improved feed-on apparatus.

On 8th December, the Club held its Christmas Party in the Kirklands Hotel, Kinross. Entertainment included a pantomime.

The lodger unit of the R.A.F. Gliding and Soaring Association have recently acquired a Slingsby Sky. Delivery is expected shortly.

Andrew Thorburn has formed an 8-member syndicate to purchase a high-performance sailplane. Choice of machine seems to be causing them some difficulty. Andrew, who is noted for his enthusiasm, is in favour of a Sky, but the other members coldly point out, in their dour Scotch way, that a Sky costs a lot of money.

Tentative plans for a week's camp on the Bishop Hill during the summer are being laid. Sassenachs who feel inclined to pit their puny wits against the wiles of our Scotch weather will be very welcome and should contact the secretary.

The Club has decided to abandon solo instruction and all training will in future be carried out in the T-21b. As a result, it has been found necessary to reduce this year's summer courses to four, with a maximum limit of 8 pupils per course. The two S.G.-38's and the Dagling are to be sold.

Bristol Gliding Club

NINETEEN-FIFTY-ONE seems to have been one of our best years yet: totals for launches, flying hours, and certificates are all well up on last year's figures. In 1951 we made 5,615 launches and flew for 466 hours, collecting 166 certificates for club and course members. The happiest man in the Club at the moment is the Treasurer, Dave Mitchell, who tells us that we prospered mightily.

During the winter months we have pressed steadily on with training flights at Lulsgate and with maintenance work on the aircraft. Our fleet of motor transport, too, provided us with plenty to do in winter evenings.

The only winter soaring flight of any length was made in November by Jimmy Allen, who was aero-towed down to the Mendips in the Grunau. After three hours a storm cloud temporarily killed the lift and put an end to his hopes of a 5-hour duration. At the end of February, Ken Brown set us all brushing the cobwebs off the barographs when he got the first "C" of the year by keeping the Grunau aloft for 13 minutes at Lulsgate.

At Roundway, our theme song at the moment is "Don't Fence Me In." There is talk of barbed wire being put round the present rather small club field, but a bigger field next door should be available soon and will yield much more worth-while winch launches. Duff weather and lack of room have caused a temporary state of suspended animation at Roundway, but we have taken advantage of this to take most of the equipment to Lulsgate for servicing. Plans are afoot for a soaring camp at Easter, by which time we should have the new field. Why not drop in and see us? (Bring your own bed!)

The summer holiday gliding courses are being repeated this year with even better facilities. We think we do a really first-class job on these courses, which have been a roaring success in previous years. Beginners to the art get an excellent introduction to gliding by being given a sound and rapid basic training, at the same time spending a pleasant and inexpensive summer holiday.

J.M.H.

R.A.F. Bridgnorth Gliding Club

THE Club was formed in the latter part of 1950, when three non-standard, repairable Kirby Cadet Mark 1 gliders were purchased from the R.A.F.

By March, 1951, one machine had been completely overhauled and re-covered by a qualified N.C.O. airframe fitter and was ready to fly. In addition, Headquarters Technical Training Command had purchased a Sedbergh and a Prefect and delivered them to the club. The Sedbergh was positioned at the Long Mynd and the Prefect at R.A.F. Cosford, and on 14th April the first launches were made at R.A.F. Cosford in the Kirby Cadet.

Throughout the year the club had a total membership of 25, made up of one qualified pilot, 4 power pilots and 20 ab-initios. Unfortunately we have now lost 11 members through postings and releases from the Service. These members had reached the B stage and were forming the backbone of the club.

The first soaring flight took place on Saturday, 2nd June, with Flying Officer T. J. Page flying the Prefect, which had an unserviceable variometer and A.S.I. In cloudless weather a thermal was contacted at about 1,000 ft.; this took the aircraft to the inversion level at 2,600 ft.

On Sunday, 1st July, a party went to the Long Mynd, where, with the goodwill and tremendous help of the Midland Gliding Club, the Sedbergh was flown for 3½ hours. On 26th November, the Sedbergh was aerotowed by Auster tug from the Long Mynd to R.A.F. Cosford, where more flying and training is now being carried out.

Flying hours were 34 and launches 400, up to 31st December, 1951

Umvukwe Gliding Club

THIS club held its inaugural meeting on 18th November, 1951. The club officials are: President and Chairman, E. Evans; Vice-President, H. Darby; Treasurer, E. F. S. Chance; Ground Engineer, H. Close; Secretary and C.F.I., F. J. Harrison, c/o Mandindindi, Msomeddi, S. Rhodesia.

Members are beginning to roll in, and we have some 14 paid up at the moment. A T-31 two-seater trainer has been ordered from Messr. Slingsby, in kit form. We are right at the beginning of a long road, and without much experience but much enthusiasm.

Oxford Gliding Club

THE Club burst into life late in November after a long period of apparent dormancy. The pre-war site at Aston Rowant was no longer available, but after various places had been investigated, permission to fly at Oxford Airport, Kidlington, was obtained early in 1951. Three would-be instructors (Stafford Allen, Goodall and Varley) got places on the B.G.A. Instructors' Course at Redhill at Easter, and, with Pressland, formed a syndicate and bought a second-hand Olympia, which was first flown at Whitsuntide. There were soon enough members to warrant the purchase of a Rice winch, which arrived in September.

The first club machine, which reached Oxford in November, was an Eon Primary. By the end of the year the club had given it 88 launches, and it had logged 48 minutes in free flight, and with power experience, Eric Stow had qualified for his A and B, and John Herbert his A. The first *ab initio* pupil to get his A and B was Squadron-Leader Jamieson.

In January, training was possible on every Saturday and Sunday, and 134 launches were given, including 19 to the Olympia. This machine has been launched once to 1,300 ft., and commonly to 1,000 ft.

The membership is still very small, but it is growing. The club was very glad to have a visit from Lorne Welch, who inspected the Primary for C. of A. Air arrivals will be eagerly awaited. Pilots with cross-country ambitions will be glad to know that the Tiger Moth owned by the Goodhew Aviation Company is fitted for aerotowing, and that tows, or retrieves, can be arranged by 'phoning Kidlington 2291.

Royal Engineers Flying Club, Gliding Flight

A SMALL club such as this tends to talk of launches rather than hours. However, any club, and particularly a service club with a floating population, must build a foundation of sound *ab initio* instruction in its early years before it can expect major soaring achievements.

The Gliding Flight of the R.E.F.C. likes to feel that this foundation is now laid. The club has been operating for four years, of which two have been at Detling. The last of these was a record one both for the number of launches (1,200) and certificates (38). It was also noted for the club's first gliding camp and the purchase of a T-31 in October. A change from solo to two-seater instruction is no longer news, but the club can confirm the remarkable effect that it has on all aspects of club activity—membership, finance, flying time, and standard of flying.

The R.A.F. Gliding School, whose guests we are, no longer raise their eyebrows quite so often at the gyrations of our pilots. An advantage which is rarely mentioned is the improvement in winter flying time. The two-seater can be flown on days when solo instruction would be out of the question, and as a consequence the club has already had three times the normal number of winter launches. A lot of the credit for the progress of the club must go to the resident ground engineer—we have been able to appreciate for the first time the advantages of a reliable ground and repair organisation.

Plans for the soaring weather are well advanced. The Tutor has been fitted with a semi C. of G. hook and we hope to get approval for a similar modification to the Gull I. The latter has been laid up for the winter, but it is now in excellent condition, with an improved cockpit layout. A number of pilots will be converting to the Gull in March, and the Midland Gliding Club are allowing us to fly it at the Mynd over Easter. Another gliding camp is planned for late April when the group of impatient B pilots, which has been accumulating over the winter, will be trying its hand at soaring.

The R.E. Flying Club is holding its annual Air Day at Rochester on 26th July.

Old Sarum Gliding and Soaring Club

THIS is a comparatively young club just outside Salisbury on the Amesbury road. It was formed from the nucleus of The Combined Services Gliding Club previously located at Abingdon. Our primary object is to bring gliding facilities within the reach of Navy, Army and Royal Air Force service personnel in the area; recently we have opened membership to a percentage of civilian personnel as well.

Instruction is given by dual in a Slingsby T-21B up to B category by our C.F.I., Major Evans, who has always favoured this method. One of our craft is a French Avia and we would be interested to hear from anyone who has had experience of this type.

We are still growing and have room for further members, especially service personnel, from the Salisbury Plain area. We extend a welcome to all, whether for regular or daily membership, and hope visits from other clubs may be arranged.

Deeside Gliding Club

DUE to wintry weather and the withdrawal of aircraft for overhauls, flying had to be suspended at a few winter weekends, though some members were always present and, as a result, club amenities have been considerably improved.

Training has now been resumed with the S.G., which will be joined by the Cadet early in March after C. of A. overhaul. Several A's and a couple of B's were obtained during these winter months, but hopes of possible C's have had to be postponed owing to the write-off of the Chairman's Olympia, one of its owners having landed it short of the airfield. There is, however, every intention of acquiring another sailplane, although perhaps not up to Olympia standard.

Improved team-work has shown results in an increased number of launches, and a total of 31 on a Saturday afternoon in February, the majority requiring retrieves over the full length of the airfield, is felt to be a promising forecast of what will be possible in the longer days ahead.

V.B.

THE DERBYSHIRE AND LANCASHIRE GLIDING CLUB

Camphill
Great Hucklow
Derbyshire

Initial training and soaring instruction in two-seaters by experienced qualified Instructors.

Intermediate and High Performance Flying

Link Trainer

Private Owners Accommodated.
Dormitory and Canteen Facilities and comfortable Club House accommodation.
Resident Steward and Stewardess.

Well equipped Workshop and full-time Ground Engineer.

Write for particulars of membership to The Secretary.

SCOTTISH GLIDING UNION LTD.

Balado Airfield, Milnathort, Kinross-shire

Ab-initio training at Balado Airfield
Hill Soaring at Bishophill, Kinross

Fleet of 7 Aircraft including Two-seater

Excellent catering and Dormitory Facilities

Summer Holiday Courses of seven days duration are held each year. Beginners and others are welcome

Subscription £3-3-0 Entry Fee £1-1-0
Launches 3/- Soaring 15/- per hour

Write to the Secretary for further details

SURREY GLIDING CLUB

Lasham Aerodrome
Nr. Alton, Hants.
HERRIARD 270

Ab-initio training on T21b two seater with experienced qualified instructors. Five sailplanes for cross-country soaring. Winch Launches.

Subscription £6.6.0. p.a. Entrance £4.4.0

Training Flights 2/6 each
Sailplanes 15/0 per hour.

Associate Members (No entrance) £1.1.0. p.a.

Details from Secretary

LONDON GLIDING CLUB

Dunstable Downs, Bedfordshire

Telephone Dunstable 419 & 1055

Offers site of 140 acres with soaring ridge and permanent hangar, club house, workshops, dormy houses and restaurant.

Club fleet includes 2 dual 2 seaters, 2 Olympias, Gull IV, Prefect, Grunau II, Tutors, Cadets and Primaries.

Launching by two drum winch Link Trainer

Resident Instructor and Engineers
Flying every day except Tuesday

Entrance Fee £5-5-0, Annual subscription £6-6-0

MIDLAND GLIDING CLUB LTD.

The Long Mynd, Shropshire
Telephone No. Linley 206

Ab initio training to high-performance soaring

Club fleet of Seven Sailplanes including two Dual-Control Two-Seaters. Resident Ground Engineer

Catering and dormitory accommodation

New members are welcome, particulars from the Hon. Sec.:— **S. H. Jones, 409 Hagley Road, Edgbaston, Birmingham, 17**

OXFORD GLIDING CLUB

is training pupils ab initio at OXFORD AIRPORT, KIDLINGTON

Subscription £5 p.a. No entrance fee.

Training flights by winch launch 2/6 each on Eon Primary and Kirby Cadet.

Aerotowing can be arranged (except Mondays) by phone with the Goodhew Aviation Co., KIDLINGTON 2291.

For details of membership, write to:
R. M. H. Goodall, Oriel College, Oxford

BRISTOL GLIDING CLUB

Ab initio training at Luisgate, Bristol.
Hill-Soaring at Roundway Hill, Devizes.
Fleet of 8 aircraft, including Olympia, Grunau, Tutor, Cadet & Sedbergh 2-Str.

MINIMUM Subscriptions MAXIMUM Facilities

A series of Summer Holiday Gliding Courses for beginners will be conducted weekly during the Summer of 1952 Write for details and available dates.

We cordially invite membership

Write **BRISTOL GLIDING CLUB** Tel.: 81790
102 Coombe Lane, Bristol, 9

Printed for Sailflying Press Limited by Young Myers & Co., Ltd. and F. A. Clements (Chatham) Ltd. of Harrow and Chatham