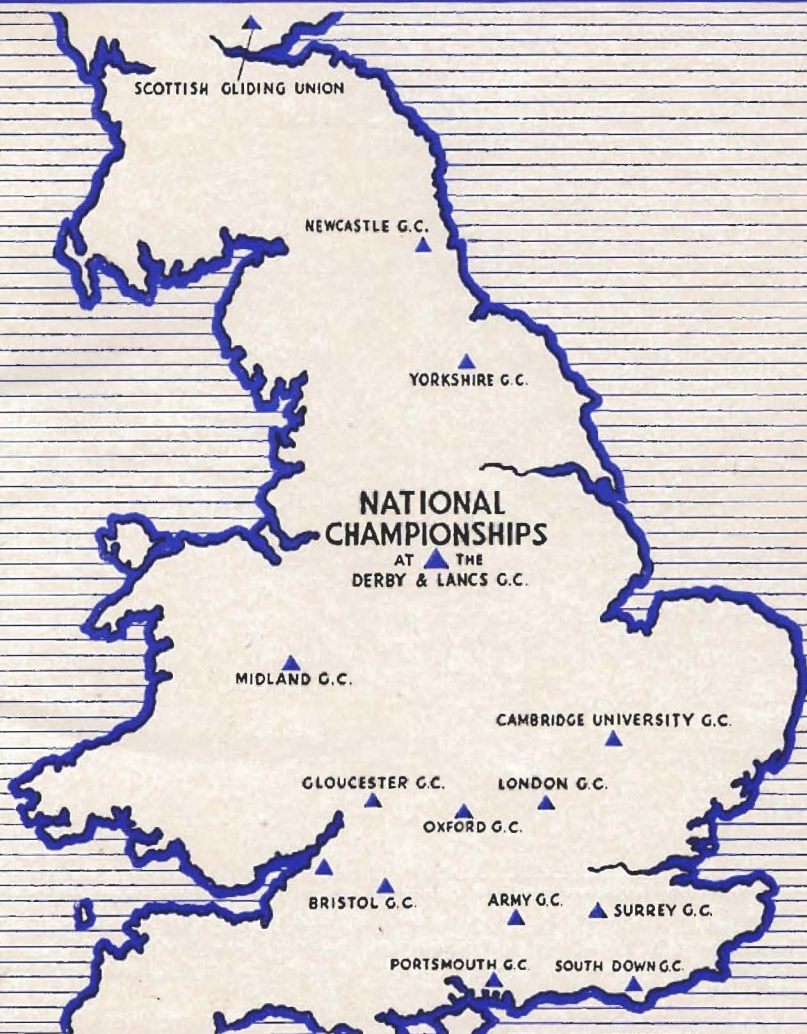


# GLIDING

JULY Vol. II. No. 2

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QUARTERLY



INCLUDING

1951 CHAMPIONSHIPS PROGRAMME

# GLIDING

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## OFFICIAL ORGAN OF THE BRITISH GLIDING ASSOCIATION

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## Yesterday and Today

When organised gliding began in Britain twenty-one years ago, the first meeting which could be called in any sense a National Contest took place on the South Downs during the week-end 18th-19th October, 1930. It was indeed a gliding match, for the contestants floated down a gentle slope and the winner managed to keep himself in the air for all of 4 minutes 47<sup>3</sup>/<sub>5</sub> seconds, while 1 minute 40<sup>2</sup>/<sub>5</sub> seconds was enough to earn a Silver Cup for another entrant.

By 1932 the competitors could be seen soaring up and down the Duddon estuary in Lakeland, occasionally as many as two at a time, and a great event was the setting up of a new British distance record of 13 miles—a twentieth of its present value. Then, in the prolonged summer drought of 1933, thermals rose up from the hot Wiltshire Downs at Huish during that year's National Contest, and pilots dared to turn tight circles within them in order to rise. Thus did serious cross-country soaring begin in Britain.

After that, longer and longer distances were flown in a down-wind direction, until at the last pre-war Contest, held in Derbyshire like the present one, the best flight was one of 160 miles to Southend. Yet the longest flight at last year's Contest was one of the same distance to the same place.

Then has progress come to an end? Certainly not. It is the shape of England that holds us up now, and only one direction, as Flight Lieutenant Bedford has shown, remains to be exploited. Hence the introduction of "tasks" in this and last year's Contests. It is not with the idea of developing a new transport vehicle that pilots are being encouraged to fly in any direction across the landscape, despite the wind, or to get to a given place as quickly as they can; it is because Nature is forcing new flying techniques upon us.

The present issue of GLIDING will show visitors to the National Championships what an immense range of knowledge the modern sailplane pilot must concern himself with; here it is in a series of articles by experts nearly all written exclusively for this journal.

There is not only the actual flying, though that is fascinating enough. Flt. Lt. Bedford, in the middle of a record flight, suddenly learns a new lesson and nearly doubles his over-all speed average in consequence. Mr. Wills, another record-breaker, shows that there are days when a sailplane can be made to go practically anywhere you want it to. Mr. Ince advises on finding thermals in the cold half of the year; and so on. As to the importance of plunging into the biggest clouds to get the best results, Mr. Rivers and Mr. Stephenson discuss the necessary cockpit instruments, and "Aesculapius" deals with the bodily consequences. Dr. Scorer demonstrates how meteorologists can settle problems for us, and Dr. Raspet pursues perfection in sailplane design and shows how much more it needs to be pursued. Finally there is a survey of what the British gliding clubs are doing.

And now to the Championships!

# The 1951 National Championships

21st to 29th July

**T**HE Championships are organised and conducted by the British Gliding Association in conjunction with the Derbyshire and Lancashire Gliding Club. They are open to pilots of British nationality, or normally resident in Great Britain or Northern Ireland, or who are serving members of H.M. Forces. Visiting foreign pilots will be welcomed and allowed to fly, though not as official entrants.

The contests, which are being held at Camphill, Great Hucklow, begin at 09.00 hrs. on 22nd July and end at 18.00 hrs. on the 29th. On the 21st there will be practice flying and a Daily Prize.

Competitors must either have the Silver Badge (popularly known as the "Silver C"—qualifications are a 50 kms. distance flight, 1,000 metres climb, and 5 hours duration) or, alternatively, must have done the 50 kms. and have had at least 20 hours solo flying, including 5 hours over a hill. Among other qualifications they must also have done 10 winch launches.

An innovation this year is that the Championships are divided into two classes: Teams and Individuals, and among the trophies is one for competition by the Individual class. In the Team class two or more pilots must be nominated for each glider, and the same pilot may not fly all the time. In the individual class, only one pilot may be nominated for each glider.

## Marking System

There are four different kinds of "tasks," one of which will be set for each day's flying.

(1) A race to a goal pre-determined by the organisers. Each pilot is timed, not from his launch, but from the time he carries out a predetermined manoeuvre; he can therefore wait around for what he considers the most favourable moment for starting. He is also timed at touch-down at his destination, which will be an aerodrome.

Gliders receive 5 marks per mile-an-hour of their speed relative to the ground, if the

destination is reached. If it is not reached, the glider receives one-half the speed marks of the slowest aircraft completing the course, reduced to that proportion represented by the actual distance in the direction of the course. If no glider reaches the destination, the task will be regarded as a distance flight and marks given at the rate of 2 per mile in the direction of the course.

(2) A race round a course predetermined by the organisers. This is marked on the same system as Task No. 1.

(3) Out-and-return flight with turning-point predetermined by the organisers. One mark is given for each mile of distance projected upon the direct route, with a 20 per cent bonus for reaching the turning point and a further 20 per cent on the return mileage if completed. Height marks also are given for each 100 feet of climb, provided it is of at least 1,500 feet. Distance marks can only be earned for distances of at least 15 miles.

(4) Distance flight to a goal pre-determined by the pilot. One mark per mile along the straight line to the landing point, wherever it is, and 20 per cent bonus if the goal is reached. Minimum distance 15 miles. Height marks as for Task No. 3.

It may be remarked that, whereas distance and speed marks can be worked out from ground observations, height marks cannot, except by such means as theodolites, which involve long calculations and poor accuracy. Barographs are therefore carried to record the height; but even they are not too accurate, and the competition rules demand that they shall have been calibrated within the last two months.

## Handicapping

The accurate handicapping of gliders according to their efficiency, to ensure that the contests shall be decided as far as possible on piloting skill alone, is a tricky business, and even if a perfect system could be devised, it would involve many tedious calculations when applied. There have been



discussions on the subject in the last two issues of GLIDING, but without leading to any changes in last year's system.

Handicapping is done on Aspect Ratio—that is, the relation between the span of the wings and their fore-and-aft breadth. Sailplanes with an aspect ratio of 17 or more will be "scratch"; this class will include the Weihe and the Sky. Those with aspect ratio between 14 and 17, such as the Olympia, will receive a bonus of 10 per cent on all marks earned, and those

with aspect ratios of 14 or less will get 25 per cent bonus. In this last class are the T-21 two-seaters.

Handicapping according to weather conditions has been tried abroad; the method was to take the average of the three best flights of the day as a standard against which to measure the competitors. But it has fallen into disuse. We are, however, still open for discussion on further ingenious ideas.

## R.A.F. visits St. Auban



A PARTY from the Royal Air Force Gliding and Soaring Association, led by Group Captain G. J. C. Paul and including Wing Commdr. W. H. Ingle and Sqn. Ldr. A. R. Williams, spent Easter and the following week at the famous French soaring centre of St. Auban-sur-Durance in the Basses Alpes.

The photo on the left shows Les Penitents slope, over which 25 to 30 sailplanes would soar at once, avoiding traffic difficulties by all turning together at each end of the beat. The curious "Penitents" rocks are in the centre of the picture, and the river Durance is seen below.

The well-known Standing Wave was only

once present over this slope during the party's visit, but it lifted them to heights of up to 17,000 feet, and produced the striking lenticular wave-cloud over the valley, shown in the upper right-hand photo. On another occasion, though the wave was present, it was only found by a French pupil who had drifted too far down wind while climbing in a thermal; he reached 14,000 feet and then carried on for "Silver C" distance in a long glide.

The bottom right photo shows the trailer containing the party's Weihe sailplane, during a halt near Paris to mend a puncture. The photos are by Wing Commander Ingle.

# Farnborough to Newcastle-on-Tyne

by Flt. Lt. A. W. Bedford, A.F.C.

*By flying 257 miles to an announced goal, Flight Lieut. Bedford has set up new records for distance and goal flight, in both the British National and U.K. Local classes. Last August he secured the British and U.K. records for gain of height and absolute altitude during a flight of 193 miles which he described in our Autumn, 1950, issue.*

ON Wednesday, 2nd May, 1951, weather conditions looked ideal for a long distance cross-country up north, and accordingly at 08.00 hours (B.S.T.) I commenced the hectic business of collecting maps, sealed barographs, an R.A.C. Observer, a tug and tug-pilot, and finally, after "sweating blood" for nearly one hour, I eventually got airborne in an Olympia at 09.30 hrs. With Usworth aerodrome named as a goal, there was a remote but optimistic chance of cleaning up both British and U.K. National goal and distance records, with a diamond thrown in the bag.

However, thirty minutes after take-off, I landed ignominiously back at Farnborough aerodrome.

By now the traffic at the airfield was such as to delay a further take-off until 11.00 hours, but by this time the cumulus clouds were building up crisply in long streets stretching from south to north and propelled along by a 15 to 20-knot southerly wind. Flt. Lt. B. Radley towed me off at 11.00 hrs., and fifteen minutes later I released in a powerful thermal at 1,500 ft., some eight miles south of Farnborough. Circling in lift of 10 ft./sec., I was somewhat irritated to see the tug still climbing away in the distance; however, the pilot eventually realised I had released and, diving down, he fixed my position as four miles south of Farnborough.

At just under 4,000 ft., I set course due north, aiming to get clear of the London Control Zone with the minimum delay; and quite quickly, first the local flying area, then White Waltham aerodrome slid underneath, and all seemed well.

Then it happened—a sudden outbreak of internal instability giving tummy-ache, headache, repeating mushrooms and that dreaded feeling of air-sickness. It soon

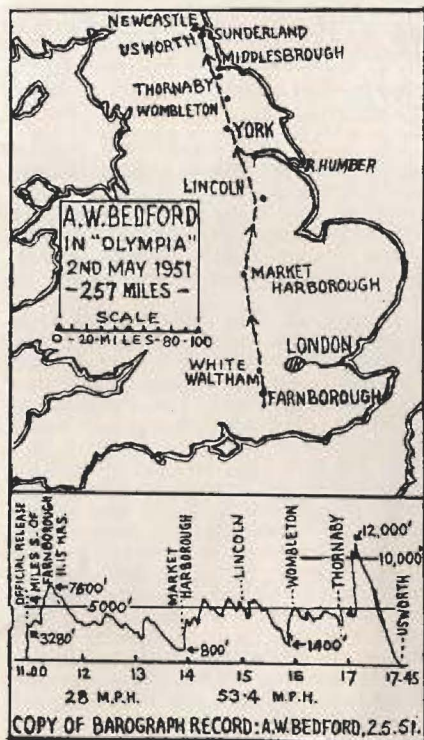
became obvious that if the goal were to be achieved the trip was going to be an unpleasant one. And it was!

I entered cloud for the first time at about 11.30 a.m. and climbed from 4,000 to 7,500 ft. in lift at 10 ft./sec. From this height I straightened out and unenthusiastically flew north, one half of my being telling me to "land now and have a cup of tea" and the other half saying: "You must go on—this is one day in a year." However, at 14.00 hrs. near Market Harborough the first half got the better over the other half, and at 800 feet above the ground I picked my field adjacent to a pleasant promising little house and I aimed for the downwind boundary.



Flight Lieutenant A. W. Bedford.





But one was not to escape so easily, since fate had arranged a tantalizing area of zero sink. My conscience made me work this area, and after a careful session of circling for some five minutes, the green ball reluctantly popped up to .5 ft./sec. and slowly but surely that cup of tea sank further away as the altitude increased to 4,000 feet.

Looking round, I realised again what a magnificent day it was, and mentally tore myself off a strip for nearly letting such an opportunity slip. From this stage onwards I decided to fly from one large cloud to another, even although at times it meant deviating considerably from the intended track. It also became obvious that the previous technique of planning the flight from one airfield to another was inefficient and quite unsuitable for covering a long distance in the available thermal day.

At 15.35 hrs. the intersection of the

Humber and the Trent passed below, and subsequently, apart from one brief spell at 1,400 ft. just N.E. of York, the going was comparatively easy right up to Thornaby aerodrome, near Middlesbrough. At this stage not only were conditions ahead rather doubtful, but conditions in the cockpit were equally bad, and quite suddenly I felt very ill and wished only to die in peace somewhere! Previously I've been very unsympathetic towards people who suffer from air-sickness, but having experienced it once, and I hope only once, I can now appreciate it from a different viewpoint.

To reach the goal of Usworth a height of approximately 8,000 feet was now required, and the only definite source of lift appeared to be an aggressive-looking cu-nim building up 5 miles E.S.E. of Thornaby aerodrome. I flew in this direction through a violent downdraught, losing 1,000 feet of height in about thirty seconds, and then I reached fairly smooth lift of 5 ft./sec. which took me to cloud base at 5,000 ft. Shortly after entering cloud the turbulence increased quite violently, and the green ball moved up to the top of the variometer. After three or four minutes of circling, 11,000 ft. showed on the altimeter, and knowing that the destination was in the bag I straightened out and flew on a course of 340°. This cloud was one of the most active cu-nims I have ever flown in, and this, combined with my "state of health," called for much concentration and care during instrument-flying. Flying on course still in cloud, an abrupt downdraught dropped me from 11,000 to 10,000 feet, followed immediately by a sudden updraught which took me up again, this time to 12,000 ft.

Then things quietened down and the cockpit grew lighter, and on opening the clear-vision panel, blue sky and sunshine were there to welcome me. The usual cockpit, airframe, canopy and pitot icing were present, but this was no handicap since already Sunderland was visible some 10 miles along the coast.

I arrived over Usworth at 5,000 ft. and touched down outside Flying Control at 17.45 hrs., having covered 257 statute miles in six and a half hours at an average ground-speed of approximately 40 m.p.h.

As the Editor is urgently waiting for this report, I regret that there is no more time for further comments on this flight, but in the next edition of GLIDING I will try and add a few points of interest.



# Goal and Return Record

By Philip Wills

THE goal-and-return flight has always been one of the most fascinating to attempt, but one's enthusiasm has always been damped by the possibility of failing to attract attention at the turning point, and so all one's efforts coming to nothing, because it is almost impossible for anyone to keep a close watch on the sky for any length of time for a sailplane wheeling silently around overhead; and if one comes down low enough to be certain of attracting attention, it is all too possible to come down too low to be able to find lift to enable one to get away again. Which has all happened to me before, and spoil what might otherwise have proved to be the beginning of a lifelong friendship.

But the Wills system of How to be Infallibly Spotted at Turning Points, described in No. 3 issue of GLIDING, page 130, seems to provide the answer; so for some time my map had been all marked out and plans made for a goal-and-return flight from Redhill to Little Rissington and back, which, being 160 miles, was Enough.

Which was just as well, because when, at 08.00 hours on 3rd June, the met. gave me at home near Maidenhead a forecast of nil wind and thermal activity to 6,000 feet starting at 11.00 hrs., the most feverish activity prevailed non-stop until I finally left the ground at Redhill at 11.40 hrs., having already missed over half-an-hour's promising-looking sky. An extra half hour or more spent in planning the flight *de novo* would have killed it.

Which again underlines that in gliding one must always be ready for anything, with the accent on "ready"; and no-one must laugh when, day after day, one takes off with the most pompous plans only to land back again at one's starting point, or worse, within a few minutes.

The day was windless and hazy, but, by the time I took off, the top of the brownish haze was dappled with whitish patches of flat cumulus, and at 1,600 feet over the airfield I released in lift varying from 3 to 5 feet per second. Along my course to the north-west the cumulus seemed to fade out, and I cursed myself for not having ready a

second string in the shape of a planned out-and-return flight along the south coast, where on such a day one might expect a sea-breeze effect. But events proved me wrong in my regrets, because various people who tried the coast route on this day came to naught.

Anyway, I had signed for Little Rissington and back, and my wife was briefed to 'phone them for a mark 2½ hours after I had got going. I released at 11.55 hrs. so Little Riss. would be on the watch at 14.30 hrs. If I was late, my wife would phone again at half-hourly intervals.

By the time I reached Leatherhead the cumulus had got smaller and paler, and I found myself driven to the west of my course in pursuit of what became mere shadowy thickenings in the top of the haze layer. At length I found myself just north of Blackbushe airfield, clouds to the west, but unbroken haze on my course to the north. It was no good funking it any longer; if I was to get anywhere I had to assume there was dry thermal at least over towns, and as I was as near to Reading as I could get without cutting away from the cumulus area, I bit the bullet, climbed as high as I could (the lift never being better than 5 ft./sec.) and took a compass course through the haze for the ten-odd miles to Reading.

I duly arrived over the town at 1,600 ft., and immediately found lift to 3,500 ft. I now saw that on the far side of the Chilterns, from about Wallingford on, cumulus was again visible. It was 13.00 hrs.; I was about 30 miles on my way, with 1 hour 20 minutes gone since take-off, so I was running a little late.

The lift never strengthened beyond 3 to 5 ft./sec. up to 3,500-4,000 ft., which limited my cruising speed to 52 m.p.h. and my average speed to around 25 m.p.h.; but apart from this there was no difficulty at all, and Little Riss. was below me by 14.55 hrs. I circled it once or twice, losing height as slowly as possible until my wife's second 'phone call should bring the Duty Pilot to life. By 15.05 hrs. I was down to 2,300 ft. (under 2,000 ft. above the airfield)



when a green Verey light streaked out of the upper window of the Watch Office, and with a shout of joy I turned for home. I found lift still on tap where I had last marked it before reaching my turning point, but left it too soon, and had to make hurriedly for Witney and waste 20 minutes in its thermal climbing from 1,800 ft. back to 4,000 ft.

Now I made straight for home, but over Henley was again faced with the cloudless stable gap over this part of the Thames Valley which I had found on my way out. Fortified, however, by my previous success in crossing it, I climbed to 4,800 ft. (the lift by now was going higher) and took a compass-course, over White Waltham, till I ran into lift again in a cloudless sky near Ascot racecourse.

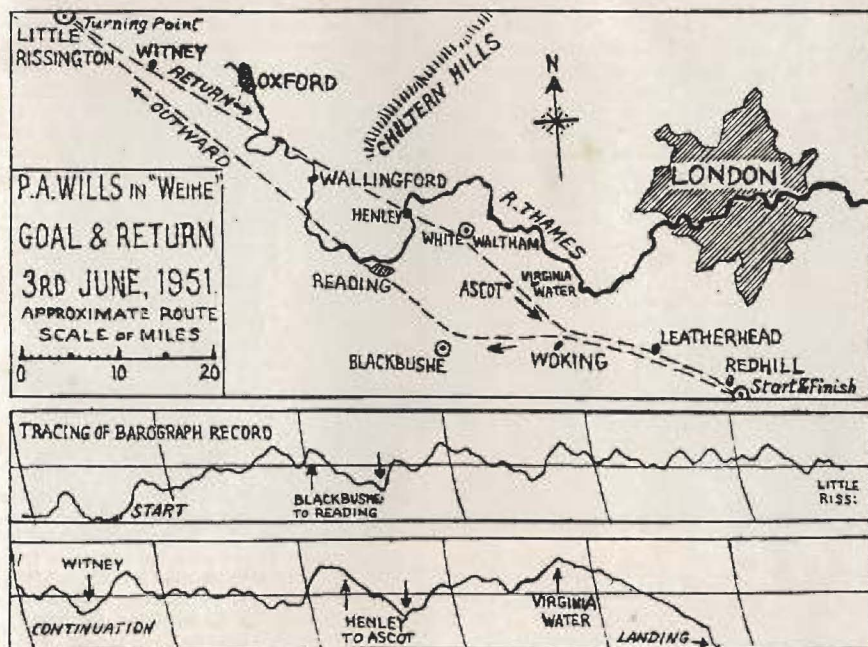
I was now within 25 miles of home, so theoretically could make it from 5,000 ft., and as there was no sign of lift ahead I spent a long time trying to achieve this height, but stuck at 4,600 ft., finding in the meantime that there was a slight north-easterly drift at this height which might slightly reduce my gliding angle on the home

course. So I had to set off and hope for one last thermal.

The towns seemed the safest bet, so I made for Woking. The lift I wanted, however, was found over a dry sandy common south of Virginia Water, and in it I climbed to the highest point of the day, 5,400 ft. with 20 miles to go. The flight was in the bag.

Further lift was found over Woking, but hardly needed. I was down to 3,000 ft. near Leatherhead before Redhill airfield became dimly visible on the horizon through the haze; I was quite shaken at the apparent hopelessness of going so far from so low an apparent height. But mathematics triumphed over emotion, and I reached it with 1,500 ft. in hand. I landed at 18.30 hrs., after 6 hours 50 minutes in the air.

There were one or two creaks from the Wills frame as I hobbled out of the cockpit, and for about a week I was the only specimen in captivity of a Chairman of a London Shipping House with a flat posterior.



# Notes on Sydney Soaring Club

by Mervyn Waghorn

THE Sydney Soaring Club is not, and never has been, a club in the generally accepted sense. It corresponds more closely to one of the private owner groups which are common in England. There are at present six active members, Martin Warner, Dr. G. A. M. Heydon, Len. Schultz, Sel. Owen, Mervyn Waghorn, and Keith Colyer. (You will notice that the American practice of abbreviating Christian names to one syllable is common in Australia). Others who have been mentioned in the past in connection with the club, but who for various reasons are no longer able to fly with us, are Harry Ryan, Fred Hoinville and Pat Neary.

Each of the nine mentioned above has a "Silver C" and Martin Warner and Fred Hoinville have "Gold C's." The former with a Diamond Height Leg.

The present group of six people is perhaps unusual for several reasons:

1. We have no constitution, agreement, committee, organisation, system or subscriptions. We share operating costs in a reasonably uniform way. The capital value of our equipment has not been shared in any systematic way at all. As we keep no records on such matters, the history of who paid how much towards what is largely lost in the mists of antiquity. However, there is no doubt that Dr. Heydon has contributed by far the biggest proportion towards the equipment we have owned.

2. The group operated for many years, soaring away quite happily, without caring in the least about F.A.I. certificates or records. When I joined the group in 1942 several pilots had already fulfilled the requirements of a "Silver C" without ever having applied for an "A" Certificate. In 1945, when we still had no barograph, Martin Warner fulfilled the requirements for a "Gold C" and still no one had applied for any certificates.

In the last two years the Aero Club Federation of Australia has affiliated with the F.A.I. and has set up the organisation for the issue of certificates, and we now usually apply for them. Martin Warner's

flight in 1945, which fulfilled "Gold C" height and distance requirements, would have been, if properly observed, the British Empire Record.

3. With one exception, we have all been flying for many years and have our own ideas on what constitutes pleasant flying. The intense desire to get airborne, no matter what the circumstances, disappeared a long time ago and we now fly on alternate Sundays at an aerodrome 40 miles from Sydney, and after a little local soaring, if the day is at all soarable, retire to our well-appointed mess for drinks before dinner. On a typical Sunday, we commence flying at about 11 a.m. and the sailplanes are seldom on the ground more than a quarter-hour between each flight until about 4 p.m. All air launches are by aero-tow and we usually have about one hour's soaring each.

Camden aerodrome is about 20 miles from the sea and the country between is extremely rough and wooded, and we have never done a cross-country flight from Camden as similar restrictions occur after a short while in each direction. On a good soaring day, visibility is usually good and the view most attractive. Immediately to our west are the foothills of a 3,000-ft. plateau known as the Blue Mountains. To the east is the Pacific, and Sydney can be seen.

The highlight of our gliding year is the Christmas Tour, and we regard the rest of the year as a practice and preparation period. We have had a good deal of experience on what is required in the way of equipment and procedure to make these trips a success. The arrangement is for each pilot to have a machine for one complete day in accordance with a pre-arranged roster. On each pilot's day the rest of the group assist him to get airborne whenever he pleases. He decides what sort of flying he is going to do. He keeps in touch with his starting point by radio, and towards the end of the day and usually before he has landed, a decision is made as to whether to retrieve him by air or whether the whole group will follow him by road or air to his



landing point. Next day the procedure is repeated with another pilot.

4. Many of us are connected with aviation in our daily occupations and we do all our own overhaul and servicing.

5. The following is some brief information on each member of the Club:

**MARTIN WARNER.** Employed by De Havilland; responsible for the design of the D.H. "Drover" and of a D.H. military glider built in Australia. Built his first glider in about 1930 and has been gliding for 21 years. Held a power "A" Licence but does not do so currently. He is also a certificated Ground Engineer. "Gold C" with Diamond Height.

**DR. HEYDON.** Started gliding about 1935. Has been a private owner of light aircraft since some years before that. Was associated for many years with the School of Tropical Medicine at Sydney University on the investigation of tropical diseases. Currently owns two Tiger Moths, one of

which we use for towing. Has a Private Pilot Licence. "Silver C," Height Leg of "Gold C."

**LEN SCHULTZ.** Is Chief Engineer of the Macquarie Broadcasting Network, which is the biggest commercial broadcasting organisation in Australia. Has been power flying since 1930 and for 16 years has been an honorary instructor at the Royal Aero Club of N.S.W. Is the designer and builder of the radio equipment fitted to our machines. Has been gliding since about 1933. "Silver C."

**SEL OWEN.** Has been gliding since about 1937. Flew B.25's with the R.A.F. during the war in Europe and has since been employed as a Commercial Pilot. Has done some interesting charter trips from Australia to Europe. He is currently flying with Qantas on their DC.4 service to New Guinea, Singapore and Japan. "Silver C."

**MERVYN WAGHORN.** Employed at the



Members of the Sydney Soaring Club and their Gull IV sailplane. Left to right: Len Schultz (Australian goal-flight record), Mervyn Waghorn, Sel Owen, Martin Warner (British Empire height record), Keith Colyer, and Dr. G. A. M. Haydon, who learned to fly at 55 and is now 70.

(Courtesy of "The Aeroplane").

De Havilland Aircraft Company in Australia as Production Engineering and Supply Manager. Was transferred from the D.H. Company in England to Australia in 1942. Has been gliding since 1932 and power flying since 1942. Joined the London Gliding Club in 1934. "Silver C" and Height Leg of "Gold C."

KEITH COLYER. Senior member of a family concern which has large interests in New Guinea and in import and export from that country and from Australia. Commenced flying with the R.A.A.F. in 1940 and flew Spitfires in England and the Pacific during the war. Has been gliding for only four years. "Silver C."

## Pont St. Vincent to Moulins

by Nicholas Goodhart

*Lieutenant Commander A. N. Goodhart describes how he obtained the distance qualification for the "Gold C" badge by flying 315 kilometres from the well-known French soaring centre near Nancy on 11th May. It was only his second cross-country flight, his first having been made just a year ago at the 1950 National Contests in Derbyshire.*

Two days had been spent at the French National Soaring Centre at Pont St. Vincent, and though it had mainly rained there had been a sufficient temporary clearance to carry out the obligatory dual check. The third day dawned much clearer and a good strong wind was blowing from the N.E., which is the most favourable direction at this site. Over all there was, however, a thin layer of cirrus which was appreciably reducing the insolation.

The chief instructor clearly considered distance flights possible as, after a voluble discussion with the local met. office, he issued to me and four others "Ordres de Mission" on which we were clearly ordered to execute "une mission en vol dans un but fixé a Moulins." It was now rather late and the weather still did not look too good; however, all was lined up and I was last off at about 12.00 in a rather ancient-looking ex-German Olympia which had not got even a turn-and-slip, and of whose A.S.I. I had considerable doubts. Lack of a turn-and-slip may not sound very serious as there was only about 1/8 of very scattered thin cumulus at about 5,000 ft.; however, it was not the turn needle I wanted but the slip—it seems the seat of my pants had been sat on too much to carry out this job efficiently.

Once airborne, we seemed to be doing 100 k.p.h., which by rapid mental arithmetic I eventually concluded was either much too fast or else the A.S.I. was phoney. The tug towed me round in a big circle without much sign of lift and I finally released at about 1,800 ft. in an imaginary thermal in which I sank steadily, but was soon lucky enough to find about 6-8 ft./sec. up—at least, that is what I worked it out to be. This took me straight up to over 4,000 ft and there seemed little reason for not starting, particularly as I could see none of the others. A small cloud had formed over my thermal and down-wind there were one or two in sight, so I chose the one nearest to a hurriedly estimated course of 225° M. and set off.

Problem: what speed do I fly? To answer this, I first stalled the aircraft and got a somewhat indeterminate reading of 40 k.p.h. and then by much further mathematics decided on 70 k.p.h. If you do not understand how I got this figure it's no good asking me.

It was immediately apparent that the ground was flashing by at a most encouraging rate, but it was much too early to be interested in such things, and after this short interlude of map-reading I looked up to see that my cloud had vanished; however,





Lieut. Commr. Nick Goodhart (standing) with his brother, Lieut. Commr. Tony Goodhart.

another one was forming near by and I made for it. Sure enough, it was working, and I soon contacted a rather bitty thermal at about 3 ft./sec. to near cloud base at 5,000 ft. A little map-reading and mental arithmetic revealed a ground speed of nearly 100 k.p.h., from which I concluded that either the wind was even stronger than I thought, or else an error had crept in.

Once more off downwind towards a cumulus, and this time it was working well and took me smartly from 3,000 ft. to 4,000 ft. and then more slowly to 4,500 ft. Jumping happily to conclusions, I decided that lift was strongest between 3,000 and 4,000 ft. and that I would therefore operate between these heights—approximately. Forthwith a descent, with odd bits of nothing worth having, set in and I was soon fiddling around at 2,000 ft. downwind of a town in little bits of lift here and there, all of which were extremely rough. However, there was no doubt that I had done nearly fifty miles in the hour which had gone by—80 k.p.h. anyway.

The sky was now devoid of low cloud and the layer of cirrus was still there, but by dint of removing my sunglasses I managed to convince myself that the ground still looked reasonably sunny.

Much fiddling got me back to 4,200 ft., and since there were no clouds to steer for, I set off on course, being oddly enough very nearly on track. At about 2,500 ft. preliminary burbles told me there was some-

thing around though it was hard to find. Eventually I found a minute core in which, at 65-70 k.p.h. with about 60 degrees of bank, I got a steady 6 ft./sec. and got back to 5,000 ft. So much for any resolution to work between 3,000 and 4,000 ft. Still no cumulus were in sight, so I steered 225° M. through a lot of turbulence and small patches of lift—50 k.p.h. in the patches of lift and about 70 in the sinks, and then suddenly a heavy downdraught in which I pushed the speed up to 85 and was showing nearly 10 ft./sec. down.

The ground came up rapidly and at about 1,500 ft. I picked a field some distance ahead; however, between it and me was a village on the side of a hill facing the sun which I carefully passed over dead downwind. A few hundred yards more and a few burbles warned me that something was about, and once again a lot of fumbling about finally led me to a core of extreme narrowness but encouraging buoyancy which whipped me back to nearly 5,000 ft.

After this, all was plain sailing, as clouds were forming everywhere and a comfortable 6 ft./sec. was available under each one. I now realised there was every hope of making it, and started to make gliding-angle calculations, from which I decided that from one kilometre up I could make 40 kilometre distance; however, with about this distance to go, I suddenly realised that there was 8/8 stratocumulus over the rest of the route. It was, therefore, pleasantly surprising to find everything going up slowly and straight flight produced a very slow rate of descent, with a result that I was eventually able definitely to identify Moulins and its airfield from a height of 3,000 ft. overhead.

With the dive-brakes out, five minutes sufficed to bring me on to the airfield, where I was very surprised to find no other sailplane had arrived. I was also surprised to find that the wind was only about 5-8 knots instead of the 15-20 knots there had been at the start.

Conclusion: I must be extremely lucky, as this was my second cross-country flight. Details:—

Distance: 196 statute miles.

Max. height: 6,000 ft. above height of start.

Time: 3 hours 49 minutes.

Average speed: 52 m.p.h.



# Instruments at Dunstable

by Peter Rivers

*Mr. P. Rivers, of Handley Page, Ltd., who is in charge of sailplane instruments at the London Gliding Club, gives advice about their care, and stresses the importance of their rational arrangement on the instrument panel.*

## Organisation

**A**BOUT a year ago the Technical Committee of the London Gliding Club decided that all club instruments should be in the care of one member; mine was the only voice raised against the appointment on personal grounds, and that was overruled.

Into my care, then, came an Olympia, Gull IV and Prefect, with full blind-flying panels, and an Olympia, Grunau Baby, two-seaters, and two Tutors with the basic panel of Air Speed Indicator, Altimeter and Variometer. There were also a few spare instruments, assorted barographs, and a manometer for calibrating A.S.I.'s, which were installed in a spare room, together with a turntable for checking gyro turn indicators. Unsuccessful efforts were also made to obtain a vacuum chamber in which to calibrate barographs.

My appointment gave members a tangible target for their complaints; the serviceability of instruments did not noticeably improve. Recently, the influence of the Instrument Section has been extended by giving several of the club members who are qualified as daily Inspectors the additional mark of Instrument Inspectors. This was done—

(a) to spread instrument know-how more widely through the Club,

(b) to ensure that some qualified person is always at hand to deal with unserviceability on the spot,

(c) to ensure that parties taking machines away to other sites will include members capable of looking after their instruments.

These people are authorised to check any instruments reported to be unserviceable, replace them with spares, or replace perished rubber tubing, run-down batteries, or disconnected wires, whichever applies. They may also help to calibrate instruments, but may not, at present, dismantle them without Technical Committee permission.

## Standard Instrument Panel

Early this year blind-flying instruments were obtained for the second Olympia and the Grunau Baby, and new panels needed to be made for them. The best layout for these was determined by a little scientific reasoning, and by reference to McFarland's "The Human Factor in Air Transport Design"; and as this offered an opportunity to make the co-ordination of the blind-flying instruments easier, we decided to standardise the panel throughout the Club fleet. Our instrument panels at that time were a fine example of applied anarchy, with no two instruments in the same relative positions on any panel, while Turn-and-Bank indicators were switched on by odd switches mounted anywhere on the panels, or by radio-style plugs which came off the lead at every third time of pulling. The layout of the new panel was decided as follows:

(a) to minimise eye-movement in co-ordinating them, the three primary blind-flying instruments were grouped within the smallest possible circle;

(b) the Turn-and-Bank Indicator, being associated with movements of the glider to right or left of its axis of symmetry, was placed on the centre line;

(c) the Air Speed Indicator and Variometer, being included with the forward view in the clear-air field of vision, were placed at the top of the panel;

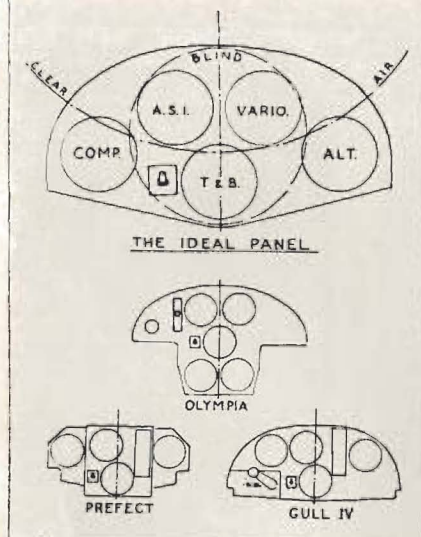
(d) the Compass and Altimeter, being positioning instruments, were fitted in as best possible, but always with the altimeter on the right, as close to the variometer as possible, and the compass on the left;

(e) the Turn-and-Bank Indicator was operated by a standard Air Ministry type switch at its left-hand side.

The drawing shows this ideal layout, and also how it suffered when adapted to the various types of machine. The main object, of keeping the primary instrument layout



LONDON GLIDING CLUB  
STANDARD INSTRUMENT PANEL LAYOUT



standard, was adhered to ruthlessly, although the use of the Cosim variometer, on all types except the Olympias, made the arrangement appear less symmetrical. The narrowness of the Olympia panel between its supporting structure forced the altimeter and compass down to their position below the turn-and-bank, rather too far down in the cockpit. There was not enough room for the full panel in the Prefect, between the cockpit sides and a very solid cross member, but a little trouble at take-off one day was followed by the rebuilding of the entire nose, so some re-design settled that difficulty. The Gull IV panel almost achieved the ideal, but was upset by the position of the tailplane incidence adjuster, for which no other home in the cockpit could be found.

The accessibility of all panels has been improved by the use of anchor nuts for the mounting screws, instead of the highly inaccessible loose nuts previously fitted, and the time taken to remove one panel in particular has been reduced from half an

hour to two minutes. The Gothic-looking Prefect panel is the most advanced from the servicing point of view, as it is hinged at the bottom, and does not have to be worked on while dangling from the battery leads.

### Ice Protection

With blind-flying on the Turn-and-Bank, it is essential that the A.S.I. should continue to function through icing conditions, and two methods of protecting it are under development. Both Olympias are fitted with electrically-heated pitot tubes, rated at 8 watts, and used for less than a minute at a time, to melt off the icicle after it has formed, one of these being the original prototype made by Paul Blanchard of the Surrey Club.

The Gull IV and Prefect have been fitted with tubes for measuring the stagnation pressure on the nose-cap, these being in the form of a sharp-edged pot,  $1\frac{1}{2}$  in. diameter and 1 in. deep, with a backwards-facing pressure tube in the centre. As far as one can see, these should not block in icing conditions, but the only proof will be their performance in such conditions. A current advantage is that small boys need to be much craftier to blow down them.

Private owners are also experimenting with ice-protected pitot heads, and one, Frank Foster, is using a continuously operated low-watt heater, which has given complete protection in light icing at about 20 deg. F.

### Future Developments

Since much energy is being put into developing artificial horizon installations elsewhere, we are devoting our attention to improving the conditions of Turn-and-Bank flying, as described above.

The Instrument Section does not consider its sphere of action as limited to maintenance, but also includes the development of such new instruments as may prove useful. As these will most probably be rate-of-change instruments, such as rate of change of rate of climb, for centring in lift, and as visual panels are already crowded, there seems to be scope for audible instruments to bring more of the pilot's senses into use.

# Why Despise the Fore-and-Aft Level?

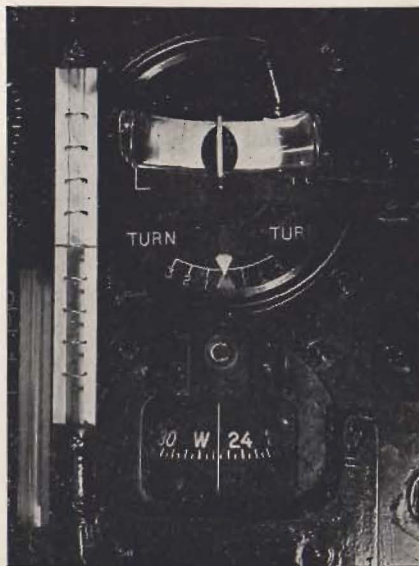
by Geoffrey Stephenson

A GREAT deal of effort seems to have been expended on the problem of "how to de-ice an air speed indicator"; but the other approach, that of finding a suitable substitute for the A.S.I., does not seem to have received the attention it deserves.

The most likely reason why the old-fashioned, aeroplane-type of fore-and-aft level has fallen into disrepute is probably because it was not designed for sailplane use and is therefore not sufficiently sensitive. The basic principle of the instrument is perfectly sound when it is used as a device for giving information which is for use in controlling the speed of the aircraft. Actually the information is slightly easier to use than that given by an A.S.I. Although the indication is closely related to air speed, it is slightly advanced in time, and this helps the pilot by doing for him some of the anticipation which is the very essence of properly controlled blind-flying.

A proper explanation of this slight time-advance, as compared with the indication of the A.S.I., is necessarily rather mathematical, but it is sufficient to say that the rate of change of pitch produces a change of wing loading which, in turn, produces a reading of the pitch indicator. This happens to lie in the same direction as the instrument will ultimately settle to after the aircraft has settled to the new conditions of speed and pitch angle.

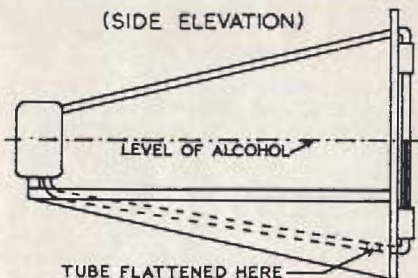
The objection to the old-type instrument, due to its lack of sensitivity, can easily be



Fore-and-aft Level mounted on panel.

OLYMPIA INSTRUMENT PANEL

(SIDE ELEVATION)



overcome by increasing the effective length of the instrument in the fore-and-aft direction. This has been done in the instrument shown in the diagram and photograph attached. Although the instrument depicted has been designed to fit into an Olympia, it seems likely that it would not require a great deal of ingenuity to adapt it to suit any other type of sailplane.

The diagram is more or less self-explanatory, but a few points are probably worth mentioning. The forward part of the instrument, the reservoir, consists of a flat throat-lozenge tin with the lid soldered on and two copper pipes soldered in at the appropriate points. The vertical tube in the front of the instrument is made of glass and is joined to the metal tubes by means of two short pieces of thick rubber tube. The flattening of the lower tube near to the



lowest point is to damp out the oscillations that would otherwise occur after the level of the liquid has been disturbed. The amount of flattening was increased experimentally until the level only just perceptibly over-sprung the final settling point after being disturbed. The liquid used was alcohol, coloured with a suitable dye. The system should be made completely airtight so that no evaporation can take place.

In using an A.S.I. to give information for controlling the elevator, one has to do a good deal of anticipation in applying

corrections, otherwise a pitching oscillation builds up and is maintained. In comparison, it is significant that one can "chase" the fore-and-aft level with the elevator and it is found that disturbances die out and the oscillations do not build up.

This is a practical verification of the theoretical superiority of the fore-and-aft level as compared with the A.S.I. The practical advantages of the instrument are (a) that it requires less mental effort to use, and (b) that it continues to work under any conditions of icing.

## Prestatyn to Dunstable

by Frank Foster

*On 17th April thermals were good right across the country from Denbighshire through Bedfordshire to Kent. We publish accounts of flights by two pilots which between them covered the whole distance, and of thermal flights at the A.T.C. Instructors' School on the same day.*

THE 17th of April broke clear and nearly calm. A bad sign, for the wind gradient effect must be small at Bill Crease's "Clwyd Gate" eyrie. The forecast seen at Ternhill the day before had offered hope of a weak ridge of high pressure and N.W. wind of 20 knots, with instability up to 8,000 ft. A cheerless 07.00 hours shipping forecast gave a hint that pressure was building up all too fast with falling winds veering to N.E. in the south. How right they were can be shown by the 5,000 ft. wind at Speke which dropped from 36 knots at 08.00 hours to 14 by 15.00 hours.

We were a party of four, and with two sailplanes to rig, permission to use the site obtained first, take-off was not until 12.20 (all flight times B.S.T.). I went first in the Rhönbussard, followed by Jack Hanks of the London Club some ten minutes later. The launching spot is an old radar site overlooking Prestatyn, and about a mile from the sea. As the N.W. air stream over this area is frequently potentially unstable, this site makes a perfect kick-off for those having golden aspirations.

Launching by Bill Crease and his unbreakable bungy (rope guard) was into a wind of some 15-20 m.p.h. Lift was fair on a short steep section of the hill. I soon

caught a weak and ragged thermal which though becoming more constant, never gave more than 2 ft. per sec. up to just below cloud base, 2,800 ft. (all heights A.S.L.). This seemed enough, with perhaps a little help on the way to the large hill having a N.W. slope near Crease's Clwyd Gate Hotel above Ruthin. To do this, rather than set course direct down wind, was the advice for making the easiest get-away. Results tend to show that for this day, with the wind blowing locally rather more north than N.W., it was unsound. However, such things are only discovered after the boat is already burned.

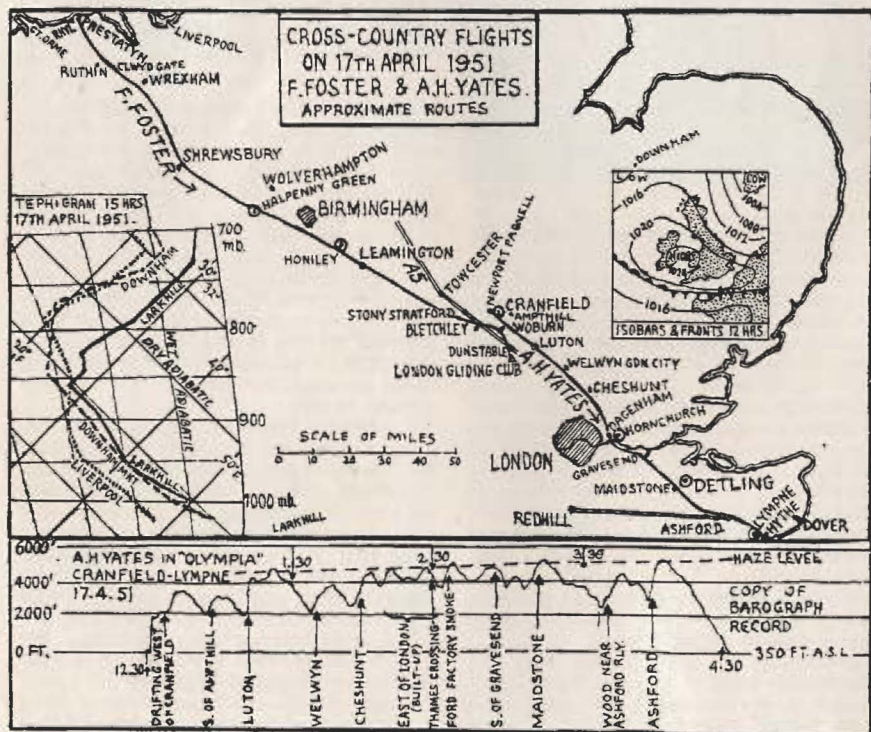
I arrived at the N.W. slope at 12.55. A pleasant spot, but peculiarly unrewarding. My thousand feet of clearance above the hill slowly unwound until at times it was a little less than nothing. Only an odd raggy stab of lift from a bowl of the hill gave out hope that at least the air was unstable. Several times I had to break off turns through being too low to circle. The heather assumed a sombre hue and I wished I had never heard advice about using this hill. Where was Jack in the Olympia? Had the cunning so-and-so by-passed this route? Thought of this and being retrieved from the field at Ruthin were too much. I found

the toughest thermal and circled as tight as I knew how. A rough ten minutes—the best thermal of the day. Bussards are built for such occasions, and the 10 up (ft. per sec.) sent my spirits up in like proportion.

I left the Ruthin area at 13.45 under a sky having 3/8 cover of strato-cu. Soon after Wrexham I entered the one-and-only cloud that gave lift, and this only in the order of 2 ft. per second up to 5,600 ft. Ahead the sky looked rather flat; cu were becoming small and without depth. Between Wrexham and Shrewsbury I overhauled and left a goods train. Even by British Railway standards this should be satisfactory progress. By the time Shrewsbury came into sight I was very glad, after over 15 minutes steady descent, to spot a factory chimney near the town, the smoke going straight to heaven. I jumped in and up we went too; 5,600 feet again this time in clear air.

I pressed on at 45 i.a.s. (position error is about plus 5). Once again not a ripple for miles on end. Coming up to the Birmingham area, an airfield, not on my map but, I believe, Halfpenny Green, gave a last-minute rescue at 1,500 ft. Climbing, I considered whether it was worth while carrying on. Time, 3.40 p.m.; a cloudless sky with a very positive lid to the instability, shown up by the Birmingham smoke. Chance of "Gold C" distance was slight. The wind on the surface appeared to be dropping. However, there was that feeling that Jack might be ahead and, though it was not a declared contest, that competitive feeling won.

From Birmingham, for the next hour and a half, there was reasonable thermal activity, though in every case it appeared to originate from a source that gave good contrast with the wet countryside. When I got down to just over 2,000 ft. at Honiley,





the airfield control from their caravan gave me a green. The insult triggered off another thermal!

After leaving Leamington I began to wonder just how long the game of picking up yet one more thermal could continue. Could the different rates of cooling give enough contrast to cause instability to useful heights even after sundown? I picked up the A.5 road and abandoned the map in favour of very precise flying. A small town south of Towcester I mistook for Stony Stratford. Its thermal wafted us serenely up at 3 ft. per sec. to 4,500 ft., higher than for hours, and this at nearly 18.00 hrs. All too good to be true.

Nearing Bletchley, I saw the tremendous wood of Woburn Park. If theory worked, this should now be releasing a mass of warm air from its dark and broken surface.

The barograph shows how well the theory worked: 5,100 ft. at after 18.00 hrs.

From here to Dunstable (town): one eye now on a safe retreat, a fading hope still for Hornchurch and "Gold C." As soon as I could clearly see the cement works smoke outside Dunstable, I realized I should need my retreat, for the smoke ascended a few hundred feet and then quietly subsided back over the town. I explored and lost height to 1,500 ft. in reduced sink. Putting the nose downward, now N.E., I relieved my pent up emotions by screaming into the London Gliding Club at high speed, landing at 18.45.

As several helpful volunteers, who had seen the Bussard over the town, helped me de-rig, the "golden glow" faded from the sky in the west.

## Cranfield to Lympne

by A. H. Yates

TUESDAY, 17th April. A clear morning sky, a north-west wind and the promise of a normal April temperature of about 55°F suggested a flight to Dover with a chance of a Channel crossing if the clouds built up high enough. I plotted the upper air temperatures at the Met. Office and found that there was an isothermal layer from about 3,000 to 8,000 feet and that the air was too dry to allow any cloud to form. Nevertheless the Met. office local forecast said "4/8 cumulus by mid-morning," so preparations for an aero-tow in the Olympia were made.

All was ready by 11.00 hours (B.S.T.) but no clouds appeared. At 12.00 tiny puffs could be seen and I was towed five miles upwind at 12.35 hours. After releasing at 1,900 feet I climbed slowly to 3,400 feet while drifting past Cranfield. Although I had my passport in my pocket I realised that there was a negligible chance of crossing the Channel but decided to fly towards Dover.

The thermals all day were of the "blue" type. There were occasional puffs of cloud, but they appeared only when the thermal had almost reached the inversion level

(4,500 to 5,000 ft.) and merely indicated that there had been a thermal there.

My technique was to circle in any thermal I found—they usually worked up to 5 ft./sec.—and, when it became small near the inversion level, to press on at best gliding angle until I met another. I was down to 2,000 feet three times in the first hour, since thermals seemed rather far apart. There was an excellent one over the eastern edge of Luton, so I flew over Welwyn Garden City later and found another good one. The next came from a large area of glass houses near the reservoirs in the Lea Valley, and for the next half-an-hour, over the dormitory suburbs of E. London, thermals were more frequent and I was able to stay above 4,000 feet.

I crossed the Thames at Dagenham and flew across with the smoke from the Ford factory. When I flew into it I climbed to 5,000 feet for the first time. The haze top was at this height and although the sky above was cloudless the dirt underneath made visibility very poor. I was now in the London smoke but thermals appeared when needed until I reached Maidstone.

The odd wisps of cloud now evaporated and I realised that thermals were becoming infrequent. I approached the long, straight railway from Redhill to Ashford and was down to 2,400 feet near the railway when I flew over a circular, thinly wooded patch which gave off an excellent thermal. At 4,000 feet I was passing brown leaves!

Lympne was now almost in range and I decided to land at this civil airfield, where there would be a flying club and restaurant, rather than complete the journey to Dover with a field landing. Over Ashford a strong thermal took me back to the haze level at 5,000 feet and I was able to glide past Lympne and out over the sea at Hythe. I was surprised to see smoke from bonfires near Lympne streaming inland—the sea

breeze presumably. As I had a following wind most of the way, I wondered if there would be a belt of lift near the coast where the two streams met. There was very smooth air certainly over the beaches and over the sea, but no more “green ball.”

I decided to spend my last few thousand feet practising aerobatics and was about to start when I realised that, if something went wrong and I baled out, I should feel rather foolish in the sea. I flew inland and did them there. I did two circuits of the airfield, noting that even up at the 350 ft. level of Lympne the wind was now southerly, and landed before Air Traffic Control at 4.40 p.m. Four hours to cover the 105 miles from Newport Pagnell to Hythe with a mean tail wind of about 10 knots.

## Thermals at Detling

by Flt. Lt. R. H. S. Burr

**T**HERMAL Activity was very pronounced at Detling on 17th April, but it was not really remarked or commented on as being outstanding. Because of wind direction the take-off run was short and 700 ft. was an average height gained from the winch launch. There were thermals about at that height but they were rather difficult to catch and the “down” was very strong. Once away in a thermal and above 1,500 ft., the sky seemed full of lift, 20 up, steadily to 4,000 ft., with very little downwind drift. Soaring was very pleasant and easy. The sky was clear and visibility excellent. Undoubtedly the best time of the day for soaring was between 15.00 and 16.00 hours. In fact, only two trips of over ten minutes are recorded before 11.00 hours on that day.

The Thermals were isolated but very strong below 1,500 ft.; above 1,500 they seemed to merge and lift was almost continuous—at least around the confines of our airfield.

It is worth noting, perhaps, that the Tutor made one reasonable flight of 24 minutes. The pilot was not very experienced but he gained his “C” and probably landed to let someone else have the glider. After 16.00 hours the thermals died completely or were too weak at 700 ft. to work.

Weather:—N. to N.E. wind, 5-10 knots. Little cloud at 4,000 ft. late in afternoon.

Total flying:—3 Sedberghs, 1 Prefect and 1 Tutor flew 52 launches for 7 hours 22 minutes.

Soaring flights are listed below. None are long flights, as it is our policy to limit soaring to 30 minutes per trip normally.

Sedbergh	14.04-14.30	3,000 ft. plus.
Sedbergh	15.06-16.00	4,000 ft. plus.
Sedbergh	15.11-15.33	3,000 ft. plus.
Tutor	15.29-15.53	3,000 ft.
Sedbergh	15.37-16.00	3,500 ft. plus.

A number of shorter soaring flights, ranging from 10 to 20 minutes, were also achieved to heights varying between 2,000 and 3,000 ft. The Tutor soared to 2,000 ft.—20 ft. per sec. up—on a test flight and had to be slipped all the way down!

CONCLUSIONS.—The 17th April was a good soaring day so far as the Home Command Gliding Instructors' School was concerned, but not outstanding, and not nearly so memorable as 11th April, when it was almost impossible not to soar, and good thermals were still rising from the domestic site of the station at 17.30 hours, and continuing up to 4,000 ft.

On 17th April the fact that only 700 ft. was normally gained on the winch launch



must have some bearing on the limited soaring achieved under good conditions. The students were doing most of the flying and not unnaturally lacked experience in picking up thermals at low altitude.

As a point of further interest, the Detling ridge has been fully exploited in the last few months, and in a westerly wind of 15-20

knots is very definitely soarable. On 12th April 17 launches for 11 hours flying on the ridge was achieved with a steady wind of 25-30 knots. Ground handling was difficult, but the students coped with the ridge very easily. Already this year three 5-hour "Silver C" duration legs have been completed on the ridge, all in a Grunau IIB.

## Gliding Activities in B.A.F.O.

**I**N the early part of the year, flying was restricted owing to poor weather. In March, an Instructors' Course was held at Scharfoldendorf. Out of 16 entrants, 12 were awarded "B" Instructor's Certificates. In April, a party of Cranwell cadets visited the Headquarters Club and did some very extensive flying. For the month of April alone, Scharfoldendorf Club flew 379 hours 29 minutes. Cpl. Myrtle May managed to cover 115 kms. and regained the local women's endurance record with a flight of 6 hours 39 minutes.

During a visit by the Secretary of State for Air, he was taken for a flight in the Kranich by the Chief Flying Instructor.

**Annual Competitions.**—These started on 15th May. The first day's flying did not bring good results to any of the five clubs competing:—H.Q. Club, Scharfoldendorf; Royal Engineers, Hamelin; R.A.F. Fassberg; Lüneburg, and Gütersloh Clubs. The greatest distance was flown by Cpl. Gough in a Weihe, 36 kms. to Munder.

On the second day, with a westerly wind, the greatest distance was again flown by Cpl. Gough, 67 kms. to Wolfenbüttel.

On the third day the wind was easterly. Cpl. Gough reached the town of Verl, 82 kms., while Cpl. Hyde in a Grunau soared 2,200 metres in a thunder cloud. On this particular day a German policeman phoned to say that a glider had landed in his village having, as he put it, "run out of oil."

The persevering Cpl. Gough flew a distance of only 27 kms. on the 4th day; this upset him so much that he had his retrieving crew take him straight back to the launching point and, going without lunch, he set off again and flew to Ramsdorf

near the Dutch Border, 192 kms., at an average speed of 55 kms. per hour.

On the same day in the "B" Class, Major Macey of Hamelin flew his Meise to Herford, 75 kms., while Sgt. Davies of Gütersloh, in another Meise, attained an average speed of 77 kms. per hour in a flight of 45 kms. to Herrentrup.

On 19th May, after having flown fruitlessly up and down the Ridge for four days, the Chief Flying Instructor, F/Lt. Osland in a Weihe vanished into a dark cloud at 11.23 hrs. The day passed without further news of him. Meanwhile, Cpl. Gough of the H.Q. Club in a Weihe, and Sgt. Clayton of Gütersloh in a Minimoa, flew together to the Dutch Border. Sgt. Clayton came down at Stadtlohn, 189 kms. from Scharfoldendorf. Cpl. Gough flew on to Goor in Holland, a distance of 213 kms. Major Macey took his Meise to Osnabruck, 117 kms., while Cpl. Lindsell of Lüneburg flew 109 kms. to Gütersloh in a Weihe.

At 20.30 hrs. a very tired C.F.I. phoned through from Holland to say that he had landed at Valkenburg on the Dutch Coast, 15 kms. North of The Hague at 18.06. He had flown a distance of 364.5 kms. in 6 hrs. 43 mins., and at the end of the flight had reached a height of 2,300 metres (actual height gain 1,600 metres).

Flt. Lt. Carson of Gütersloh, in a Weihe, had a height gain of 2,300 metres on the 6th day's flying during a flight of 104 kms. to Bielefeld. The seventh day of the Competitions was void because of rain and mist.

The flying will end on 22nd May, at 1700 hrs. The Commander in Chief, Air Marshall Sir Thomas M. Williams, will present the prizes at a luncheon at Schar-

foldendorf on the 23rd. At the moment the Scharfoldendorf Club are leading with 1612 points, Gütersloh are second with 999 points and Hameln third with 621.

Since the above was written, the Secretary has sent us the following final news:—

On 20th May conditions had deteriorated, but Flt. Lt. Carson, of Gütersloh, gained 2,300 metres during a flight of 104 kms.

On the last day, 22nd May, care had to be exercised to avoid inadvertent crossing into the Russian Zone! Nevertheless, Cpl. Gough flew 153 kms. to Luneburg, Major Macey 58 kms. to Dunkelbeck, and Sgt. Clayton 90 kms. to Uhry. This last flight was interesting in that Sgt. Clayton originally hoped to make a flight to Buckeburg and return. Being unable to

work his way across wind, he eventually set off in an easterly direction. At Uhry, 10 kms. from the border, he landed the Minimoa 20 yards from the Brunswick-Berlin Autobahn. During the flight he gained 2,400 metres, the greatest for the competition.

Winning club was Scharfoldendorf with 1890.6 points; 2nd, R.A.F. Gütersloh; 3rd, Hameln. Class A: winner, Flt. Lt. 516.4 points; 2nd, Cpl. Gough; both of Scharfoldendorf. Class B: winner, Sgt. Clayton, Gütersloh, 254.4 pts.; 2nd, Major Macey, Hameln. Class C: winner, Cpl. Hyde, 136 pts.; 2nd, L.A.C. Miller, both of Scharfoldendorf. Best consistent performance: Cpl. Gough, daily average, 145.9 points; 2nd, Sgt. Clayton.

## Long Mynd to Sutton Veney

by David Ince

*By this flight Mr. Ince, Chief Instructor to the Midland Gliding Club, won 20 guineas from the Kemsley Flying Trust's prize fund for Winter Cross-country Flights.*

THE weather on the morning of Tuesday, 27th March did not look particularly promising. The top of the Mynd and large areas of the surrounding countryside were covered in snow and the surface wind was practically due north at about 15-20 m.p.h. However, R.A.F. Shawbury promised unstable conditions with the wind backing to N.W. in the afternoon, so we got everything ready and I was bungied off at 12.50 hrs., having declared South Cerney Airfield, near Cirencester, as my goal.

The first 1½ hours was most frustrating. The wind was still north and we remained generally at about 400 ft. above the south end of the Mynd under a sky of 3-4/8 fair-weather cumulus, which usually arrived overhead in a state of decay. It soon became clear that an almost continuous wind-shadow thermal was occurring beyond the south end of the Mynd, and having momentarily reached 2,500 ft. above sea level at 14.30 hrs., I decided to make a dash for it. Sure enough it was there, and 12 minutes later we reached cloud base at 4,500 ft. near Craven Arms. The next five minutes were spent in cloud with alternate

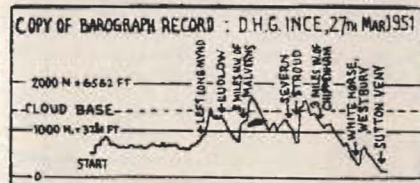
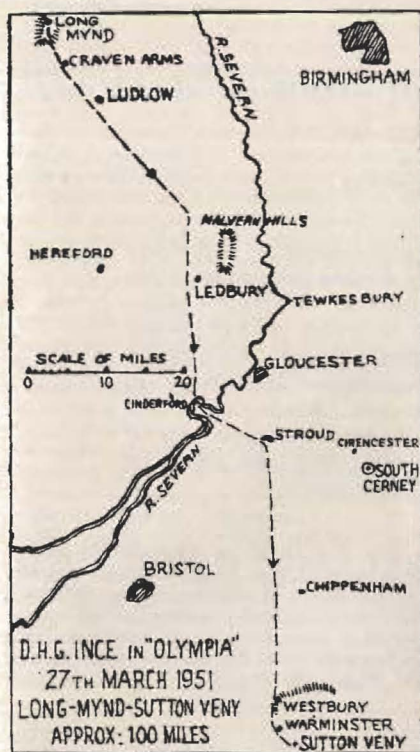
periods of circling and flying straight on course until the cloud street ended and Ludlow passed below at 14.46 hrs.

The sky for some miles ahead was clear, but after a straight glide down to 2,200 ft. strong lift was encountered, and at 15.10 hrs. we were back at 3,900 ft. about 5 miles N.W. of the Malverns, under substantial cumulus, and looking for stronger lift. This was soon found, and the climb was continued in cloud to 6,000 ft. above sea level.

At 15.22 hrs. we broke cloud with Ledbury about 2 miles to the east and 4,100 ft. on the altimeter. The Severn now lay ahead—upstream of Gloucester the flooding was considerable, although downstream this was not so—I therefore decided to cross on the down-stream side, remaining as high as possible throughout; this I was able to do under some rather seedy looking clouds, and in weakish broken lift, near Cindeford, until at 4,200 ft. I set course for Stroud, crossing the Severn at 15.45 hrs.

At this stage the sky around looked pretty depressing, all cloud north of the Severn having that unravelled look





symptomatic of decay. However, I was to be pleasantly surprised for Stroud, as we arrived there at 15.51 hrs., was bathed in sunshine and a large and active cumulus was growing overhead. At 2,700 ft. we struck smooth lift, and climbed straight into cloud at 5,800 ft. By now it was clear that I could pass South Cerney and that I should therefore fly downwind as far as possible. Westbury Hill seemed to be a good target and I accordingly set course due south.

On emerging from cloud the sky ahead was almost clear, except where occasional wisps were growing and decaying in rapid succession, mostly over wooded areas. By using two such courses I was able to delay the inevitable descent, whilst at 16.28 hrs. Chippingham passed by to the east, until finally Westbury Hill lay in sight ahead.

The next few minutes were agonising, as it was manifestly apparent that we had only just enough altitude to get there, and the air in between was most unco-operative. Finally, we arrived at hilltop level at 16.50 hrs. to encounter good hill lift and, more surprisingly, thermal to 2,500 ft.

This, however, was to be the last of the day and, after a glance at the inhospitable, roadless area to the south, I set course along the edge of the hills towards Warminster, behind which I could see another low, north facing, ridge. This we reached at 1,200 ft. and after a short and fruitless hill scrape landed at the bottom, just outside the village of Sutton Veny, at 17.00 hrs.

This flight was not one of any great merit, for the conditions *en route* were easy, but it does bring to light some useful points.

- (i) I should have been launched earlier and have realised the source of the wind-shadow thermals at the Mynd sooner. If I had got away an hour earlier it would have been quite easy to reach the South Coast. This was the cardinal mistake.
- (ii) Although the lift was turbulent, broken and continually shifting, it was strong and conditions were, in general, no more difficult than those encountered on a good summer day.
- (iii) For a given degree of instability there seems to be less tendency for cloud to overbuild itself than in the summer. This fact, which is probably due to the shorter life cycle of each cloud cell, makes it much easier to remain airborne throughout the day.
- (iv) The overall ground speed was approximately 40 m.p.h. The surface wind at the Mynd in the afternoon was 15 m.p.h. In view of the conditions encountered the ground speed ought to have been higher, but, as Don Brown has so rightly pointed out before, when conditions are easy one tends to become idle!

# The Pressure Field in front of a Hill or That Sinking Return

by R. S. Scorer

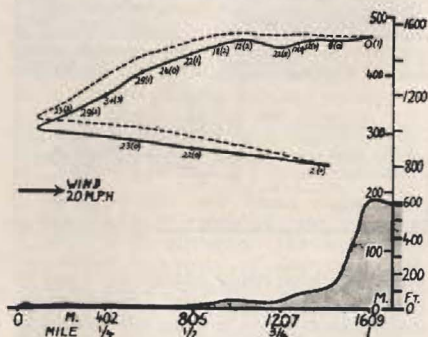
*The first combined gliding and meteorological expedition in this country spent ten days around Easter in North Wales. Taking part were pilots of Imperial College Gliding Club, including Mr. F. G. Irving, who organised the expedition; the meteorological side was in charge of Dr. R. S. Scorer, with a party from the Meteorological Department of the College. The local Standing Wave was too little in evidence for study, but proof was obtained of a curious phenomenon long suspected by glider pilots, as detailed by Dr. Scorer below.*

## The Paradoxical Observations

At Easter, while investigating the air motion around the Clwyd Range in North Wales, many sailplane pilots described their experiences in front of ridges over which they had soared. All seemed to have experienced that "sinking return" at some time or other. They had flown out in front of the ridge and found lift out to a certain point, but when flying back they found sink there and had to come right back to the ridge in order to obtain lift. Many theories were offered during our discussions, but only when thinking about it in retrospect has the true explanation been revealed. Fortunately we had one set of observations complete enough to test this explanation and these are now described.

Two theodolites were set up about  $1\frac{1}{2}$  miles apart, one on the sandhills in front of Prestatyn and one at the launching site on the hill top behind Prestatyn. From these a glider was observed and his correct height obtained. The pilot flew out from the hill towards the coast, giving his altimeter reading at intervals over walkie-talkie radio. The wind was on-shore, so that many more observations were made as he flew slowly out than when he came quickly back. In the diagram (Fig. 1) is shown a section along the line of flight and the positions where the

Fig. 1.—Flight by Malcolm Laurie at Prestatyn, 17.20 G.M.T., 28th March, 1951. At the points of observation the difference between the altimeter reading and the correct height is given with the observational error in brackets. The full line shows the path of the flight; the dotted line shows the path



indicated by the altimeter. On the outward part the variometer indicated more than the true lift, and on the return more than the true sink. The vertical scale is in metres and feet, the horizontal scale is in metres and miles. The scales are in the ratio 8 : 3. Figures on the flight path are in metres.



altimeter readings were made. The altimeter is corrected so that the error is zero at the first observation and the error is given alongside the other observations. In brackets is the approximate observational error (the distance by which the lines of sight of the two theodolites fail to intersect in space, according to the readings written down), which is small enough for there to be no doubt that as he flew outwards from the hill he thought (according to his altimeter and variometer) that he was higher than he really was, while on returning the apparent sink was produced by flying back into high pressure.

The lift on the way out and sink on return may both therefore be illusions, and when it is observed in front of a hill the explanation is that there is a very strong horizontal pressure gradient. This pressure gradient is along the wind direction and is of the order of 3 mb. per mile, but is of course localised, whereas normal pressure gradients are across the wind direction and of the order of 3 mb. per 150 miles.

We thus have the explanation, but it is by no means obvious how it comes about. "The air piles up against the hill," you may say, "thus producing higher pressure at the slope than a bit further up wind." That may be a correct description of what appears to be happening, but it will not serve as an explanation because it is probable that the wind speed is greater over the hill crest and, since the flow is steady, Bernoulli's equation shows that the pressure is least where the velocity is greatest. If any obstacle is put in the way of a stream of fluid the streamlines are crowded together and where they are crowded the pressure is least, but this is not what appears to be observed here.

The water piles up sometimes in front of a stone in a shallow stream; but where it piles up the velocity is a minimum, whereas our common-sense experience tells us that the wind is stronger on hill tops. The water analogy breaks down unless in fact the wind is weaker over the hill tops. This is a matter that must be investigated, and it may have a bearing on the best site for a windmill. Up till now it has been treated as almost axiomatic that the wind is strongest at a hill top, except in very special circumstances (which were not present on the occasion of these observations).

We therefore have a paradox—the pressure has been found to increase where

the streamlines seem to converge, and Bernoulli's equation just cannot be wrong although it says this is impossible. Ways out of this will be found: perhaps it is the stresses produced by turbulent mixing, perhaps it only occurs with certain kinds of mountain shapes—I do not know. In any case more observations will be of great value.

## The effect of a horizontal Wind Gradient

When a glider flies into wind and maintains a constant air-speed, it must be accelerated forwards relative to the ground if it is moving into a region of smaller head-wind. This acceleration can only be achieved by converting potential energy into kinetic, i.e. by sinking.

When flying downwind in the same place, then also must the glider be accelerated forwards to maintain the same air-speed because it is flying into a region where the air is moving faster in the same direction as it. In this case too it must therefore sink, but the rate of sink will be greater because the ground is being traversed quicker and so the glider comes more quickly to the place where the horizontal wind is different.

On the assumption that the wind is stronger close to a mountain than at some distance upwind from it, this result was put forward by Bill Crease at the recent investigations in North Wales, and independently by W. v. Nifferick of the Hague Gliding Club in a letter to A. E. Slater, to explain why less sink is experienced when flying out from a ridge than when flying back downwind towards it. This we may call the differential sink.

The calculations below show that for a wind of 10 m/sec. (22.5 m.p.h.) and a flying speed of 20 m/sec. (45 m.p.h.), to achieve a differential sink of 1 m/sec. a wind gradient of 24.5 m/sec. per km., or for a sink of 1 f.p.s. a wind gradient of 26.9 m.p.h. per mile, is required.

If  $V$  is the wind speed,  $\delta V/\delta x$  the horizontal wind gradient,  $U$  the airspeed of the glider,  $W$  the differential sink, and  $g$  gravity then the formula is\*

$$gW = 2UV \delta V/\delta x \dots\dots (1)$$

\* The expressions containing delta denote partial differentiation.



For if  $w$  is the rate of sink (additional to any experienced already for other causes) the acceleration calculated from the rate of increase of kinetic energy is given by

$$gw = -\frac{d}{dt}(\frac{1}{2}u^2) = udu/dt$$

where  $u$  is the ground speed of the glider, and  $d/dt$  denotes differentiation following the glider.

Now

$$u = U - V$$

and so

$$du/dt = -dV/dt = -(U - V) \delta V / \delta x$$

if the airflow is steady. Whence

$$gw = -(U - V)^2 \delta V / \delta x$$

for flight into wind. Similarly for flight downwind we reverse  $U$  and obtain

$$gw = -(U + V)^2 \delta V / \delta x$$

Since  $gW$  is the difference of these we get the formula

$$gW = 4UV \delta V / \delta x \dots (2)$$

This ingenious theory requires too big a wind gradient to produce an observable effect. There are no observations to suggest that the wind does speed up very much over a hill, in fact the evidence suggests that it does not. If it did happen, then the horizontal pressure gradient required according to Bernoulli's equation would produce an apparent effect on the altimeter and variometer which would cancel half this differential sink. If the horizontal pressure gradient were just that required to produce the horizontal wind gradient, then the equation of motion is

$$V \delta V / \delta x = -\delta p / \rho \delta x$$

A variometer records rates of sink,  $w$ , according to the equation

$$dp/dt = g\rho w$$

for  $dp/dz = -g\rho$ , and  $dz/dt = -w$ .

But  $dp/dt = (U - V) \delta p / \delta x$  in steady motion and so we get

$$gw = -(U - V) V \delta V / \delta x$$

Similarly for downwind flight

$$gw = (U + V) V \delta V / \delta x$$

and so the differential sink  $W$  is given by

$$gW = -2UV \delta V / \delta x \dots (3)$$

which when added to (2) gives the result (1).

In fact, the observations suggest that

there is a pressure gradient but not the expected horizontal wind gradient, and the measured pressure gradient would if anything slow down the air over the hill. They suggest that vertical accelerations of the air may be important as the air curves over the crest of a hill, or that some other property not yet properly investigated has an important effect.

The second diagram (Fig. 2) shows the path of the glider in plan, the heights being marked opposite each point of observation. The path of a balloon released from one end of the base line about 10 minutes after the end of the flight is also shown. The heights and positions are at intervals of half a minute and the mean horizontal and vertical speeds of the balloon in successive half minutes are given in metres per second. The observational error was at most 2 metres in height and 7 metres in plan position. There is nothing in the flight of the balloon to suggest the presence of the mountain at all!

Clearly the need is for more observations.

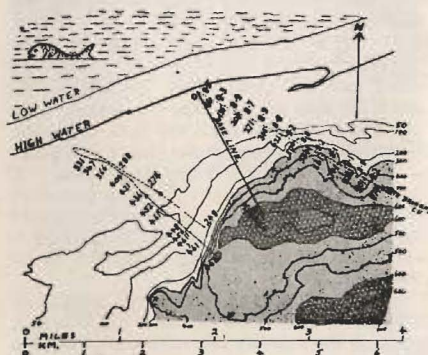


Fig. 2.—Plan showing the path of the flight with heights at the points of observation in metres. The base line showing the two theodolites is shown and the path of a balloon released just after the flight. Balloon positions are at intervals of half a minute, heights given in metres, and mean speeds over the half-minute intervals in metres per second. Contours are given in feet. Ground above 300 and 600 feet is shaded. There is no evidence of a wind gradient from this or any other balloons released that day.



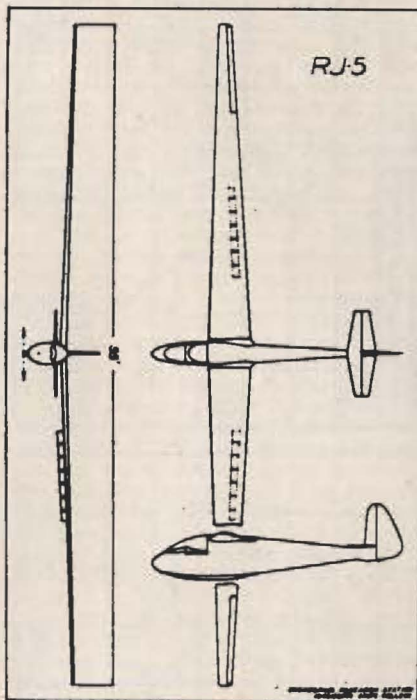
# Influence of Systematic Variations on the Drag Polar of the Sailplane RJ-5

by August Rasper

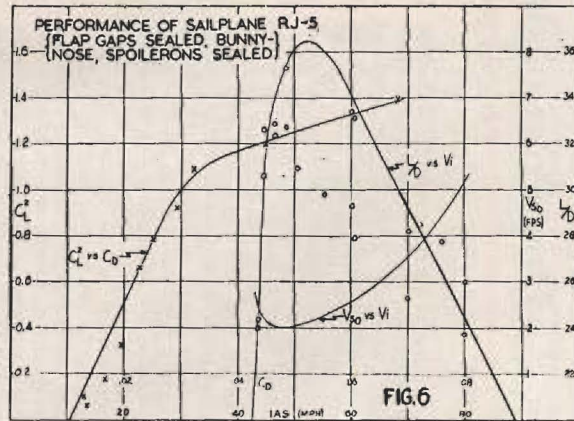
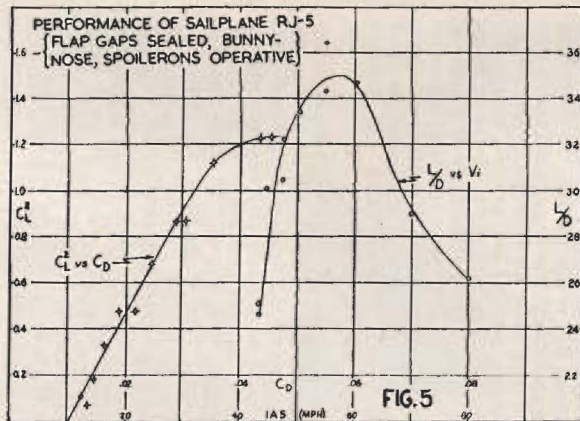
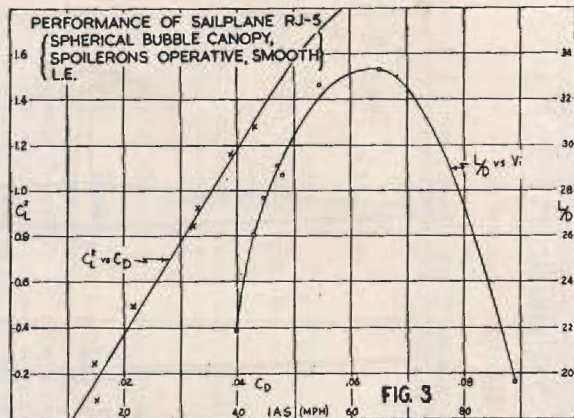
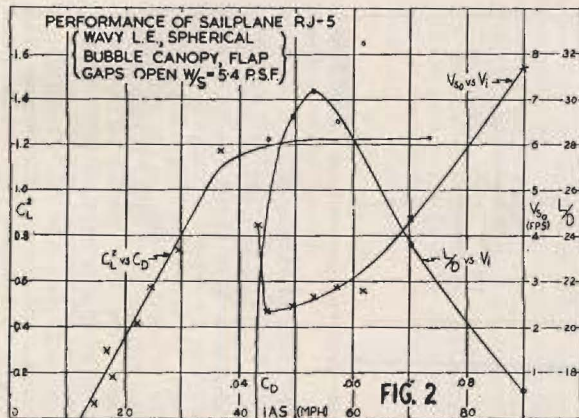
LAST year at a similar meeting the author mentioned in a paper "Motorless Flight Research" (Ref. 1) the work of R. H. Johnson on the sailplane RJ-5. Some years previously the author gave a paper "Ultimate Performance Sailplane" (Ref. 2) at a meeting of the Institute of the Aeronautical Sciences and the Soaring Society of America, in which the basis for low-loss sailplanes was laid down. In both these papers emphasis was placed on the laminar airfoil as means of reducing the over-all drag of a sailplane. During the discussion (Ref. 3) of the latter paper two schools of thought developed, one claiming any little protruberance would disturb the fine qualities of the laminar section, and the other feeling that the laminar profiles had a best chance of success on a sailplane where there is no noise or vibration to disturb the flow, and where the velocities are such as to bring the flows into the transition region around  $Re =$  one million. To the former school belonged aeronautical engineers who had had quite considerable experience in laminar sections on pursuit aeroplanes. Evidently the resolution of the problem lay in an experimental study of a laminar airfoil on a sailplane. It is the purpose of this paper to present a preliminary report on the behaviour of the sailplane RJ-5 which was designed with the laminar profile NACA 63<sub>2</sub>-615.

In 1947 R. H. Johnson commissioned Harland Ross, well known designer of the outstanding sailplanes, Zanonias and Ibis, to build an ultimate performance sailplane based on characteristics to be jointly decided. At the end of 1949 Johnson brought the unfinished sailplane to Mississippi State College to complete it. The Engineering Research Station, realising the contribution which the results of this development could make to fine aerodynamics, furnished space and some mechanical and technical help. The major effort on the completion of the craft was due to Johnson himself.

The RJ-5 employs a high aspect ratio



(24.5) wing of 55 ft. span. It is made up of the 63<sub>2</sub>-615 profile of constant thickness. The wing tapers from a root chord of 42 inches to a tip of 12-inch chord. A twist of about 1.5 degrees is designed into the wing. The area of the wing is 123.5 sq. ft. The structure consists of an aluminium alloy box bar and a closed D-tube leading edge. The after portion of the wing consisted of aluminium ribs covered with cloth and the trailing edge of the wing was fitted with plain flaps and a conventional though small aileron and spoileron. The wing is flush-riveted and was smoothed with glazing putty in order to remove the





small amount of waviness existing in the prime metal skin.

The fuselage of RJ-5 is a monocoque structure of mahogany plywood with spruce stringers. It is made of a series of conical developments intersecting at relatively small angles. The nose is carved from a block of balsa in order to get a smooth compound curved surface approximating an oblate ellipsoid. The landing gear consists of a wood skid suspended on rubber block shock-absorbers.

The tail surfaces are conventional in all respects. They are of wood-cloth covered construction. In one respect, though, a unique approach was used. The mass balance for the elevator was not placed in horns or on arms extending into the airflow as is usually done, but was placed on a lever at the centre of gravity of the sailplane. This technique gives a definite improvement in control feel in rough air. It makes for less fatigue on long flights.

The lateral control system also followed an original bent. For years sailplane designers had been using conventional ailerons of rather large proportions (as much as 20% of the wing area). It was felt that an attempt should be made to reduce the rather strong adverse yawing moments experienced on high-aspect-ratio wings employing conventional ailerons. For this reason Johnson designed a lateral control consisting of a spoiler and a smaller aileron meant only to give feel to the spoiler control.

Johnson also diverged from the classical approach of using spoilers on top of the wing for glide path control in landing. Since he wished to reduce the landing speed and steepen the angle of glide he decided on a dive flap on the bottom of the wing only. In order to reduce pitching moments due to the flap, the flap was hinged at the rear edge of the spar (50% chord). This dive flap also proved very useful during take-off, since the wing was set onto the fuselage at a low angle of incidence in order that the drag at high speeds would be low. This meant that the wing could not develop its maximum lift when the ship rested on its skid and tail skid. However, the application of dive flaps a short time after start of take-off enabled the sailplane to literally hop into the air. The total weight of the sailplane empty was 492 pounds. With pilot and parachute the wing loading in flight was 5.4 pounds per square foot.

## Results of the Flight Tests of the

### Sailplane RJ-5

When RJ-5 was first completed in the summer of 1950 the leading edge was glazed with putty but was not completely smoothed. Also there was a gap of about one inch width along the whole span on the bottom of the wing and a gap between fuselage and flap. These gaps allowed movement of flap and ailerons. Also there was a path for some air leakage from bottom to top wing surface at the spoileron openings near the tip. The sailplane had a canopy which was approximately spherical in shape. Fig. 1 shows RJ-5 in its original configuration. In Fig. 2 are shown the results of the first performance test. It will be seen that the best glide ratio is only 30.3 and that the minimum drag coefficient is 0.0122 and the effective aspect ratio 14.8. Based on this effective aspect ratio, the Oswald efficiency factor becomes 62%. Another point to be noted is the relatively low  $CL_{max}$  which the wing reaches, 1.1. This may have been due to leakage of air in the wing root through the flap gaps.

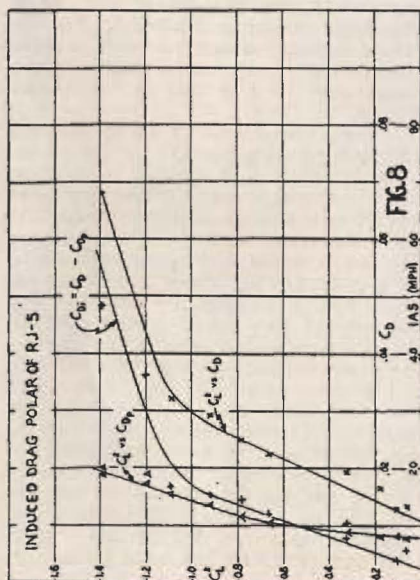
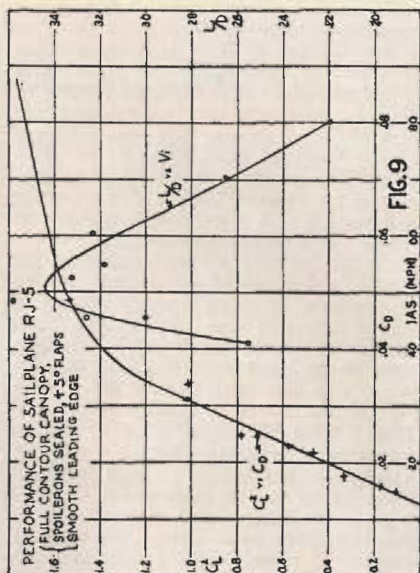
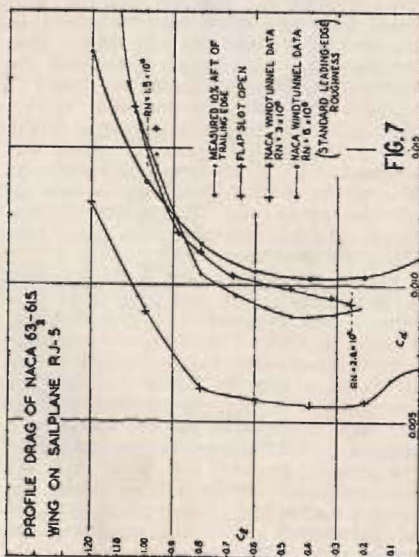
At the beginning of the National Soaring Contest in 1950 Johnson felt that plain flaps were of little use in soaring flight, and for this reason decided to set them in a fixed position and seal the long gap with tape. All other features were the same as in the previously described test, except that leading edge was further smoothed by sanding. In Fig. 3 are shown the results of a flight test with the sailplane in this condition. Immediately apparent is the high maximum lift coefficient which was attained, 1.35. The drag coefficient was lowered to 0.0108 but with a loss of effective aspect ratio. This loss of effective aspect ratio will be explained in a later test. The glide ratio rose to 33.3.

On the suggestion of Dr. A. M. Lippisch a full contour canopy was installed in RJ-5 after it had returned from the National Contest of 1950. The full contour canopy followed a rather simple formula which serves as a law for laying out low-loss aerodynamic bodies; the curvature for any change of direction of the flow should be a minimum. The canopy met the fuselage at the wing tangentially and faired in at the fuselage nose. Between these points the canopy outline had a nearly constant radius of curvature. For this condition the acceleration of the free stream velocity was

minimised. This accelerated flow passing over the wing added only a small increment to the flow velocity over the wing. As a result the critical pressure coefficient for separation was not reached even at fairly high angles of attack. Fig. 5 shows the performance curves and the drag polar of the sailplane with the full contour nose. The minimum drag coefficient is 0.0104 and the efficiency 62%.

It will be seen that at the speed of maximum glide ratio there is quite a scatter of values, in spite of the fact that the yaw was kept at zero and the airspeed as closely as possible to within  $\pm 0.5$  m.p.h. Because the sailplane displayed a marked weakness in directional stability, it was felt that the scatter of points at maximum glide ratio could be ascribed to a hysteresis in establishing smooth flow in the wing root after a small yaw caused its breakdown. For the drag polar the line was so drawn as to represent the best ultimate performance. This yields a maximum glide ratio of 35 for this condition.

Since the efficiency factor still appeared quite low after using the full contour canopy it was decided to close the spoileron openings and determine the drag polar in this condition. Some support for this move





was obtained from a previous measurement of the efficiency factor on another sailplane with and without leading edge slots (Ref. 4). In these tests the efficiency factor jumped from 70% to 78% when the leading edge slots were sealed. The result of closing the spoilerons slots is shown in Fig. 6. The efficiency factor shows a gain of 8% from 62 to 70% but it is still comparatively low. The maximum glide ratio rose to 36.5 though the values near maximum L/D still show a wide scatter. The drag coefficient due to closing the spoileron slots was not changed. It was also found that the spoilerons contributed little to the lateral control (Ref. 5).

performance was measured with the flap gap seal removed and the flap deflected 5°. This measurement is displayed in Fig. 9. It will be seen that the minimum drag rose to 0.0128. About 0.001 of this can be attributed to the gap and 0.0018 to the increase in camber and possible early separation on the top surface. It is evident from this measurement that for a flap to be effective on a sailplane it must be designed with a smooth change in curvature rather than with a sharp break as with a normal flap.

In the following table the results of the variations on the sailplane RJ-5 are summarised:

Table I

CONFIGURATION	EFFICIENCY FACTOR	L/D	CDmin
Wavy, L. E., spherical bubble canopy	62%	30.3	0.0122
Smooth L. E., spherical canopy gaps sealed	52	33.3	0.0108
Smooth, full contour canopy	62	35.3	0.0104
Smooth, full contour canopy, spoilerons sealed	70	36.5	0.0104
Smooth, full contour canopy, flap 5°, gap open	74	35	0.0128

Table II

Minimum profile drag coefficient, flap gap sealed	..	..	..	0.0088
Minimum profile drag coefficient, flap gap open	..	..	..	0.0097

Since the efficiency factor of RJ-5 appeared quite low compared to that of other sailplanes, Tiny Mite 88% (Ref. 4), and Flat Top 90%, it was thought that perhaps the variation of profile drag of the airfoil with lift was of such a magnitude that an increase in profile drag appeared as an induced drag. A measurement of profile drag was next made with an integrating rake of Silverstein and Katzoff design (Ref. 7). In Fig. 7 are shown the profile drag measurements so made. Also shown on the same illustration is the profile drag of the airfoil with the flap gap not sealed. An increment in drag of about 0.001 is apparent. When the profile drag is subtracted from the total drag as shown in Fig. 6 there is obtained a curve

$$C_{Di} = C_D - C_{DP}$$

This curve is shown in Fig. 8. The effective aspect ratio,  $AR_e$ , obtained from the slope of this curve, is 24. In other words, the efficiency factor is 98%. This behaviour clearly explains the relatively low over-all efficiency factor as displayed in the results of Fig. 6.

In order to observe the influence of a flap on the profile drag of this airfoil, the flight

## Conclusion

In the measurements reported in this paper, an effort was made to illustrate by actual numerical results the influence of aerodynamic variations on the drag polar of a sailplane in which the energy losses were kept at a minimum. While the drag polar measurements are precise to + 2.5% such accuracy cannot be claimed for the profile drag measurements using the integrating wake rake. This is true for two reasons: first, there is some doubt about the validity of such a rake (Ref. 6), and secondly the profile drag was measured at only one point on the airfoil and this point cannot possibly be truly representative of the whole wing. There also exists an uncertainty in the behaviour of the RJ-5 sailplane under small angles of yaw. This effect is to be delineated in future tests.

Furthermore, since the profile drag measurements did show a high drag, 0.0088, compared to that expected from wind tunnel results, 0.0056, Johnson, this past winter, checked the contours of his airfoil in order to see if the inaccuracies were of such a size that the high drag could result. On finding divergences as large as

$\pm 0.2$  inches he undertook to rebuild the wing completely, using wood trailing-edge ribs of high accuracy. He also plans to fill in the leading edge so that the contours will be true to  $\pm 0.02$  and waviness will be of a much smaller value. When this is done, and a drag polar measured, a good agreement should exist between tunnel data and full-scale flight data.

It is the author's hope that these preliminary results describing the stepwise trend toward minimum energy loss flows around a particular sailplane will be of general interest to all aerodynamicists, and that some of the tools, facts or techniques may be of use to these interested people in their work.

The author is greatly indebted to R. H. Johnson, who not only made his sailplane available for these measurements but also did all of the precision piloting in making the measurements.

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## Safety High

by Aesculapius

*This is the first of a series of articles, by an expert in Aviation Medicine, on the physiological problems of flying at great heights.*

First love

Is for a simple pair of wings  
With which to sniff and sniff again  
The clear fresh air  
Above.

The second love

First solo. Then that done,  
Bursts out the door  
A crisp unyielding desire  
For more.

Soft south wind blows,

And scudding clouds build up.  
Oh! Precious gem,  
One Diamond overflowing  
Fills this cup.

Darkens the sky.

Black billowing giants  
Unfurls against a redd'ning glow behind  
And suck th' ambitious youth  
To heights unknown before  
And hard to find . . .

Ah! Here at last I see

The secrets of a Heavenly prize unfold,  
Wherein there is no end  
For now behold  
How paradise becomes  
Eternity.

**E**TERNITY and paradise are hard to find in this hard world, and yet how easily they come to those in search of altitude. Beware the searching of this Heavenly goal. Romance it is indeed in those thin atmospheres, for nothing more certain than the

fall of him who would pursue his heart's desire without premeditation!

So the stage is set to think more seriously round the problems which confront the ambitious youth. Is it not becoming apparent that the sailplane pilot is faced



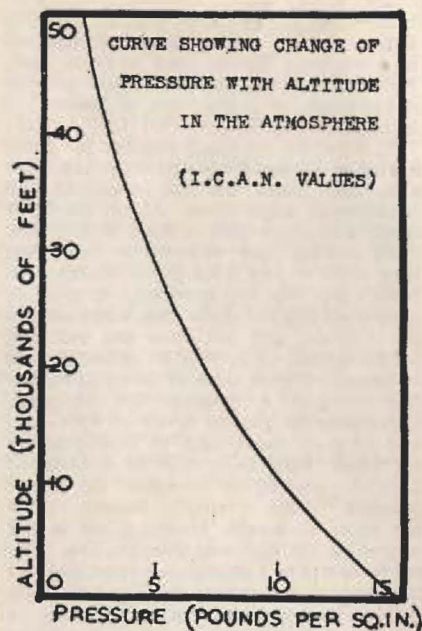
with the selfsame problems as the modern power pilot? If he is to aim high he must prepare for the inevitable consequences just as the power pilot has done before him. But more important still, perhaps, the sail-plane pilot must be prepared on any occasion when he is likely to run into uncontrollable lift.

Familiarity with flight in cumulo-nimbus and standing wave formations is apt to breed contempt, and there is a very real danger in approaching these powerful forms of lift without full knowledge of the inherent consequences. So a few words on just these consequences, how they arise and how they are best met, would perhaps not seem out of place. By way of introduction, then, we might look briefly at the set-up in the atmosphere which causes the distasteful phenomena alluded to.

The earth's atmosphere is made up in the main of nitrogen and oxygen, about four parts nitrogen and one part oxygen, together with a number of other gases present in insignificant quantities. Now gases have a certain amount of mass, or "body," to them just as does water or any other liquid, just as does iron or any other solid. As a result the earth's gravitational field or "pull" acts on the atmosphere just as it acts on liquids or solids. That is to say, the atmospheric gases collectively known as air are pulled towards the earth in accordance with the laws of gravity. So, it turns out, the nearer the earth's surface the more compressed the air. Conversely, the further away from the surface the less compressed or thinner it is.

Perhaps it is easier to think of the problem in terms of water even though its behaviour is not strictly comparable. We know that if the garden hose springs a leak it throws a jet of water into the air, and the height of the fountain is dependent on the pressure in the hose pipe. This in turn is dependent on the height of the reservoir supplying the piping. The pressure in the pipe is in fact due to the "head" or column providing it. More generally speaking, the pressure at any level in a column of water is dependent on the depth, or "head," of water above it.

So it is in the atmosphere. The pressure at any level in the atmosphere is dependent on the depth or "head" above it, and is of course greatest at the earth's surface, becoming less and less as you go further away from it. The adjoining curve shows



the way in which pressure changes with altitude, and incidentally you can see how the change for a particular 1,000 feet near the ground is greater than the change for 1,000 feet at, say, 30,000 ft.

If you have it clear in your mind, now, that you are subjected to a considerable pressure—about 14 pounds per square inch—at ground level, and that as you go up in the atmosphere this becomes less and less (i.e. about 10 p.s.i. at about 10,000 ft., 7 p.s.i. at 20,000 ft., and only 3 p.s.i. at 40,000 ft.), then you have grasped almost enough.

But before going on let us try and visualise what pressure really is. Surely it is a measure of the state of movement of the individual gas particles, or molecules. It is a measure of the "bounceability" of these particles. In fact it is a measure of the urge they can give to, say, one square inch of surface, by virtue of (a) the average speed at which they bounce against it, and (b) the number of bounces, say, per second on that square inch.

If you think of a large number of cricket



balls being hurled at a constant velocity against a door, you can imagine there will be a tendency for the door to burst open. This tendency will increase if their velocity is increased, or if the "rate of hurling" is increased, or both.

If, however, an equal number are being hurled at an equal velocity from the other side, then there will no longer be this tendency to burst open. If, on the other hand, 14 people hurl as hard as they can from one side, and only 10 on the other, then there will be a moderate tendency to burst open. In the same way, a piece of cardboard one sq. in. in area, suspended in the still air, will not have any resultant forces applied to it, because molecules are bouncing on both sides to an equal extent. But imagine a pressure of 14 p.s.i. (equivalent to ground level) on one side, and 10 p.s.i. (equivalent to 10,000 ft.) on the other, then there will be a force of 2 p.s.i. pushing it towards the lower pressure. This is simply because there are more molecules bouncing off it per second on the high side than the low. The net force will be 2 pounds in a direction from high to low. Moreover, this is not so much because the low-pressure side is sucking, as because it is pushing less than the high-pressure side.

We should now be in a position to understand nearly all the important phenomena associated with ascent in the atmosphere. Having grasped the nature of pressure and pressure difference, and the way in which pressure varies in the atmosphere, imagine now what happens to a closed pocket of air carried through it. First think of a balloon. At ground level it starts, say, as 1 cu. ft., and at 20,000 ft. it has expanded to 2 cu. ft.

But a confined space in the body can't usually double its volume, and so remains compressed, exerting considerable forces on the surrounding structures. The details of where and when these forces come in to play and how to avoid their arising will be considered later. For the time being let it suffice to declare that confined pockets of gas are to be found in the ears, the mastoids, the nasal sinuses, occasionally the lungs, and last but by no means least in the abdomen.

Next try to think what happens to the various gases dissolved in the body fluids. Although in solution, they must be at the same pressure as the fluids themselves.

which are in turn at a pressure equal to that of the atmosphere surrounding them. What happens to these dissolved gases when the pressure surrounding them is reduced? Do they try to expand? Yes, they do, and they try to come out of solution, tending to form little bubbles here, there and everywhere. In all probability this phenomenon is the cause of the symptoms collectively known as "decompression sickness," one manifestation of which is "bends."

Again, what happens when the pressure falls so low that the water itself becomes a gas instead of a liquid?

But perhaps the most important consequences of reduced pressure is the resultant depletion of oxygen intake in the body. For after all, oxygen, food and water all play essential parts in the maintenance of life, but whilst food and water can be stored, oxygen cannot. The body therefore immediately feels any shortage of this essential commodity.

How does the shortage come about? Well, since the air gets thinner and exerts less pressure at altitude, so the oxygen which is part of it becomes thinner and exerts less pressure. The thinner the oxygen the fewer molecules there are to bounce against the limited surface area inside the lungs, and so the less oxygen finds its way into the blood stream. A critical level is reached when there is insufficient to sustain life. As it happens, though, the picture is not quite so simple as this, but we will delve more fully into the subject later.

There are other factors leading to serious consequences when aiming high, and these too will be considered later. For example, air sickness, which although with a stout heart is of little serious consequence low down, becomes a serious incident at altitudes where pure oxygen is required. Finally, the question of temperature control will be contemplated.

By way of introduction then we have tried briefly to clarify the set-up in the atmosphere which gives rise to most of the relevant problems of high altitude soaring. Our next and more applied task is to analyse the separate factors individually. We will then look into the practical aspects of how best to prepare against these hazards; hazards which we are bound to encounter when enticed, or perhaps forced unawares into the upper half of the altimeter.



## Air Training Corps

As is the case with so many activities, A.T.C. gliding during 1951 has been severely handicapped by the continuous bad weather. Increased R.A.F. and other flying activity is also having its effect and several schools have had to be moved to alternative locations. During the first quarter of the year only 12,093 launches were carried out and 124 cadets qualified for the F.A.I. "A" certificate, and 9 for the "B" certificate. The Home Command A.T.C. Gliding Instructors' School at R.A.F. Detling under the command of Flight Lieutenant R. H. S. Butt have, however, done some good work despite the weather, and up to 6th May had held 10 courses and carried out 1,275 launches for a total of 170 hours 20 minutes flying time.

Successful trials have been carried out on a new prototype two-drum trailer winch powered by a Ford V.8 engine but, although it is understood that the manufacturers are going into production with the winch, it is not expected that it will be available to the A.T.C.

Much interest has been aroused by a new type of barograph, constructed locally by a R.A.F. sergeant, who is also an A.T.C. gliding instructor, at a cost in materials of only 35s. It is hoped that a prototype of this instrument will be available shortly for trials.

Perhaps the most cheering news so far, this year, is the decision to re-equip A.T.C. gliding schools with Slingsby Type 31 tandem two-seater gliders, probably to be known in the service as the Kirby Cadet Mk.III due to its similarity to and interchangeability of parts with both the Kirby Cadet Mk. I and the Kirby Cadet Mk. II (civil Tutor). This re-equipment will enable more extensive dual training to be carried out with the prospect of a higher cadet standard of proficiency in gliding, and more flying for instructors. Due to financial limitations, however, it is not anticipated that more than a few schools will receive the new gliders this year.

(From Headquarters, Home Command, R.A.F.).

## Correspondence

### RECORDING BAROGRAPHS WANTED

Dear Sir,

The advertisement pages of GLIDING show that in the general field most of our gliding requirements are now available, but there is one small but important item missing, and I am constantly being asked about it.

Is there anyone making a cheap British recording barograph? Something for ordinary club use is required, say a bracket of 0-15,000 ft. or 0-20,000 ft. and an 8 or 10-hour drum-rotation.

The supply of ex-German barographs has dried up, so what can be done?

CORUNUS.

### B.G.A. FLIGHT TESTS

(A letter from Dr. A. Raspel, of the Engineering Research Station, Mississippi State College, includes the following remarks on the article "Performance Tests by B.G.A. Flight Groups," by F. G. Irving, published in our last issue on page 7.—Ed.).

It was no surprise to learn that yours experiences with atmospheric disturbance were as disappointing as ours. With the sinking speed method we will always have difficulties due to vertical air mass motions. We are now developing a new performance measuring method which consists of a trailing sonde stabilised by fins. This sonde always flies in the direction of the flight path of the sailplane below which it is towed. In the sonde will be a camera which will photograph the sun at dawn or evening when the sun is low. From the known altitude of the sun one gets a direct measure of the inclination of the flight path to the horizontal. This measurement is independent of air mass motions. I believe such a method will put our sailplane development on a good basis.

AUGUST RASPEL.

# A South African in Sweden

by H. R. Lasch

*This account of a particularly interesting day's flying at last year's International Contest has been written by Mr. Lasch at our special request.*

**SUNDAY**, 9th July.—Order for the day: Speed Race to Norrköping. The weather on this day was not as good as it had been, and although Norrköping is only 90 kms. away, many of us had doubts whether we could get there.

I was launched, and while circling up I discovered Paul MacCready releasing under me. This, of course, was a great stroke of luck, because I don't know of any man who can fly a sailplane faster than Paul, and so I made up my mind to watch him like a hawk and follow him. I had not reached cloud base, which I intended to do, when I saw Paul, perhaps 500 ft. below me, set course for Norrköping, and off he was like a flash with me on his tail.

It was wonderful to watch him fly, not exactly in a straight line, but weaving from side to side, pulling up whenever the air carried a little better, and on his way again when things were normal. He did not bother to circle in any weak stuff and occasionally he just did one turn in the thermal and went on his way, putting his nose down to go through the down area, the way you start a loop. As soon as the down area was left behind, he pulled back again to his pre-calculated cruising speed, I presume based on his famous circular slide rule.

This game went on for about forty minutes when I lost sight of him, but I was now half way to Norrköping with enough height to go there in a straight glide, and this I decided to do. I flew over some pretty bad country, encountering a lot of red air, and it didn't take long for me to sit some 250 metres up over some really well-grown Swedish pines. The position was extremely awkward, as there were no fields near by, and I remembered Colonel Hugasson's words: "If you have not picked your spot to land at 300 metres, the competitions will be over for you."

Floundering about over these trees, I eventually found a spot where the variometer showed a few inches rise. I could not

afford to go on and look for anything better, so I began to circle most carefully in this extremely small vertical breeze. I was lucky that a little lake was near by, just within gliding range, and I had made up my mind that if I lost any more height I would go into it rather than land in the trees and, if possible, enjoy a swim.

I actually gained as much as 100 metres in what seemed an eternity, but having got there I found that drift exceeded gain of height, and so I went back to the patch in the forest which generated this lift. On arriving at the spot, I found that I had gained a net total height of about 10 metres, and I repeated this procedure again and again until after forty minutes I had gained some 200 metres, which enabled me to sail out of the forest over a little field. I was happy to have got this far, as it meant I would not lose my ship, and I had given up all ideas of ever getting to Norrköping.

Arriving over the field I found some new lift, and this was a different proposition because after ten minutes I had 1,500 metres, enough height to get me to my goal, for which I set course. The irony of it all was that from here onwards to Norrköping I found such phenomenal lift that in the end I had to use dive-brakes for some time just to get rid of my excess height.

I arrived at Norrköping exhausted. The first man to greet me was Paul, who enquired what had happened to me, and he roared with laughter when I told him that I regretted ever having met him in the air and explained that I was so low over the Swedish forest that I could see the famous Swedish trolls (goblins), and that I was also obliged to inflate my life-jacket to save myself from drowning in the cockpit because I sweated so much from exertion and fright while being so low.

I presume the next Championship will not be held in Sweden, this will be a relief because the country side to be flown over couldn't possibly have as many trees and lakes and so few places to land.



# CLUB NEWS

## Portsmouth Naval Gliding Club



**T**HIS year the club is running a special "all-in" scheme, including a year's subscription and all instruction and flying fees up to "B" certificate. The charge is £4, and posters have been sent round all naval establishments in the area with the slogan:

**LEARN TO FLY FOR £4.**

The Club's competitors at Gosport, the R.N. Flying Club, are inclined to suggest that gliding isn't "flying" and that our slogan is therefore a misrepresentation of fact. Our reply refers, in a very friendly way, of course, to power-assisted aviation (in the same way as the dyed-in-the-wool yachtsman turns his nose up at his motor-boating confrère).

To celebrate the beginning of his third year as Chairman, Tony Goodhart has presented a trophy to the club for award annually to the pilot who makes the most progress in the year. The trophy has been awarded to Lieutenant Hunter for 1950, he being the only one to gain his "C" certificate in the year.

On Sunday, 15th April, in perfect weather, the Portsmouth Club staged the official opening of its 1951 gliding season, and was honoured by a visit by Major General Tollemache, commanding the Portsmouth Group Royal Marines.

Membership of the Club is open to officers and ratings of the R.N., R.M., W.R.N.S., and the Naval Nursing Services. It is hoped shortly also to admit personnel of the R.A.F. serving in the Portsmouth area.

## Oxford Gliding Club

**T**HE Kemsley Trust have agreed to our buying a T-31 and a Tutor, provided we can get sufficient membership (i.e., 30 members). Their other conditions—tenure of airfield and hangarage, and winch—have been fulfilled: the latter, however, only temporarily. So the only thing that now prevents us ordering aircraft is insufficiency of paying members.

Four of us, with the help of the Kemsley Trust, have bought Toby Fisher's maroon and silver Olympia. We are very pleased indeed with it: we have aero-tows behind a Tiger Moth.

Incidentally, readers might like to know there are aero-towing facilities every day except Monday and Tuesday, at Kidlington, by previous arrangement with Goodhews, who own the airfield and the Moth, at the rate of £3 10s. per hour.

M.G.



**The Goodhart Trophy, awarded annually to the member of Portsmouth Naval Gliding Club who makes the best progress during the year.**

*(Courtesy of "The Aeroplane").*

## Royal Aircraft Establishment Gliding Flight

O.C. Gliding Flight: Alex. W. Cameron.  
Inspector and i/c Servicing: A. E. Rouse.  
Flying Instructors: S/Ldr. R. Smyth,  
A.F.R.Ae.S.; S/Ldr. A. Ashworth, D.S.O.,  
D.F.C.; F/Lt. A. W. Bedford, A.F.C.;  
F/Lt. B. Radley; Mr. G. Roberts, D.F.C.,  
D.F.M., B.Sc.; Mr. T. I. Q. Hall; Mr. D. B.  
Minterne.

Winch Driving Instructor: Mr. S. D.  
Taylor.

Aircraft Fleet: 1 S.G.38, 2 Tutors,  
1 Grunau, 1 Sedbergh, 1 Kranich, 1 Storch  
(Tug).

**T**HE Flight was established in February, 1949, by the Ministry of Supply to give practical training to fourth and fifth year students of the R.A.E. Technical College reading aerodynamics and theory of aircraft structures. This course of glider flying, repair and maintenance, and design work, lasts two years with an intake of thirty pupils each September. Each pupil must be medically fit up to "A" Licence standard. At the present time there are forty-eight pupils under training, but next September it is confidently expected that the maximum capacity of sixty will be reached. Whilst the O.C. Flight and the Inspector are paid posts, certain voluntary instructors are approved by the Commanding Officer Experimental Flying, Group Captain Snaith, and at the moment four Service test pilots and three civilians are helping in this way.

The early months of 1951 produced some very poor flying weather and progress in training received a setback. Since April, however, we have returned to more normal conditions and are desperately trying to catch up before the summer camps commence. In November last dual training began on the Slingsby Sedbergh and we believe that final results will be gratifying. This year we hope to develop more advanced training, and with this in view our Kranich Mk. II two-seater has been instrumentated for cloud flying and equipped with oxygen and inter-com. Flight Lieut. Bill Bedford is developing this aspect of our training, and during a "quick test flight before lunch" to check on the modifications he flew with Albert Rouse to Old Sarum (46 miles). Two days later, on

13th May, Flt. Lieut. Bedford and myself were forced to land at Lasham (15 miles), after some very tedious thermalling, where we held up the Army Gliding Club.

There is considerable gliding activity starting up at Farnborough. Two new organisations are the Royal Air Force Research and Experimental Gliding Club and the gliding section of the R.A.E. Aero Club Ltd. The former, with a money grant from Command, hope to concentrate on high performance work at moderate charges to its Service members. The gliding section of the Aero Club offers ab-initio training to R.A.E. employees and also desires to charge as modest a sum as these expensive times will allow.

In addition to these organisations there is the Empire Test Pilots' School with its two Olympias available for the course students, and our own Flight which operates, if more humbly, just as any other Flight at the R.A.E.

## Cambridge University Gliding Club

**I**T is unfortunate that May, a month so renowned for its joyful carryings on and general instability, should harbour within its academic interstices the dread of examinations to come. Fewer and fewer members have been coming out to make use of the club's small but reliable cumulus over the cement works chimney, and cumulo-nimbi over the station and the gasworks have lightened and thundered in vain.

Working backwards, however, to the earlier part of the term, we find that some activities have in fact taken place. To begin with, Marshall's airfield was excessively flooded and training continued with the T-21 at Bourn. A good deal of soaring training in thermals was achieved, and this was continued at Cambridge when the airfield was dry enough for us to move in.

At our Easter camp at the Long Mynd last vacation, a total of 110 hours was soared in three aircraft—the Kranich, the Prefect and the Cambridge or "Pons." A number of pupils qualified for "Silver C" legs and two members, Roger Austin and Rick Prestwich, obtained their badges.

G.S.B.



# ALL ABOUT "GLIDING"

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We have so far been able to pay our way, but the present inflation affects paper and printing costs in a big way. We want to avoid increasing the price of the magazine, as this may only reduce our circulation, whereas the only healthy answer is to increase it, more rapidly.

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For our many readers who wish to preserve their copies, we have a special board cover, with gold lettered spine, and nine self-adjusting cords into which two years issues of 'Gliding' can be fitted, price 11/- post free from the B.G.A.

Lastly, though it may seem early to talk about Xmas some of our more distant readers will not get this issue for a few weeks yet, so we suggest that all your Xmas present troubles may be solved by giving a complete set of 'Gliding,' in one of these covers. With all numbers from January, 1950, to July 1951, the price is 23/6 post free. With the addition of our forthcoming Autumn issue, 26/- post free.

## Southdown Gliding Club

**U**NDoubtedly the most interesting event recently was the arrival of our Olympia from Elliotts, and eligible members are gradually being converted to it from our Tutors. Those with 30 or more hours and a 5-hour duration were first, and these are the qualifications for the rest, plus, of course, first-class flying.

At Friston the Olympia got up to 3,000 ft. but as the compass has still to be fitted Johnny Billenness could not continue up into cloud much to his regret. Tutor II also did very well. On Whit Saturday, Chris Hughes got up to 2,250 ft., and Ray Brigden in Olympia obtained 2,800 ft., the former was at Firlie. Our T-21 B with the writer and a pupil managed 2,000 ft. in the mix-up on the edge of a warm front and managed over half an hour until lift died.

Since our last notes our site has been cut in two by a barbed wire fence, and what was once called a "too easy" site has now become a field where great care has to be taken on coming in to land. Spot landings are now almost a thing of the past. We can still operate the N.-S. direction as

before, and even with a reduced runway to the S.W., can easily reach the cliffs for our usual soaring.

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## Royal Engineers Flying Club, Gliding Flight

THE club held the first gliding camp in its history from 21st to 29th April, 1951, at Detling Airfield, near Maidstone, the club gliding site. This was voted an almost unqualified success. Fifteen members flew in the four club gliders during the week, and close on 300 launches were made. In spite of some heavy landings and adverse weather later in the week, the winches and retrieving vehicles were out every day, sometimes for over twelve hours. The emphasis of the camp was on ab-initio training, since it was thought important to get new pilots qualified to "B" certificate standard as early in the year as possible.

## Bristol Gliding Club

THE first worth-while soaring at Roundway this year was done during the Easter Camp, when 17 hours were flown on the west and north slopes. April also provided several good soaring days, the best being the 15th, when 10 hours were flown in hill and thermal lift over the west slope. On the 29th, J. D. Jones caught a thermal from a 500-foot winch launch and climbed to 6,000 in the Olympia, thus getting his "Silver C" height.

The Whitsun camp was less successful, and the longest flight made was a thermal flight of an hour in the Grunau, now modernised by the addition of belly-hook and drop-wheels. A few trial aero-tows have also been made recently at Roundway, using the 600-yard N.W.-S.E. run.

At Lulsgate a large number of "A's" and "B's" have been obtained on the S.G. which has been brought out of retirement while the two-seater is out of action. Week-day evening parties have also been popular lately, up to 20 launches being made in an evening.

Our summer training courses start in June and are already well booked up. These courses are held at Lulsgate throughout the summer and aim to get a complete beginner up to "B" certificate standard in a week. They are run by a full-time professional instructor and the standard charge of £12 12s. 0d. includes all flying, meals and accommodation at a nearby country hotel.

J. N. COCHRANE.

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ON first sight it may seem unusual that there should be an establishment for two high performance sailplanes at the E.T.P.S. but on further examination there are several very good reasons which support such an arrangement.

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Finally, apart from all other reasons gliding is a healthy enjoyable recreation suited to people keen on flying.

In addition to about thirteen different types of powered aircraft, the School has two Olympia sailplanes, fully equipped with oxygen and electrical artificial horizons. The majority of students, although experienced power pilots, have not previously flown sailplanes but, since gliding is part of the course syllabus, they soon find themselves on their first sailplane solo, strapped in an Olympia, dangling from a 5/15 inch nylon rope on tow behind the Auster.

In 1949 the School acquired a trailer which enabled members to attempt cross country flights; these in general consisted of 31-mile goal flights to Farnborough from Chilbolton, the E.T.P.S. relief landing aerodrome.

During 1950 E.T.P.S. was called on to provide a pilot and machine for an aerobatics display at the Royal Air Force Show, and accordingly the training associated with this prevented any serious cross-country work until after the event.

Following the display numerous cross country flights were made, varying in

distance from five miles to one hundred miles. Then on 24th August, 1950 one of the Olympias travelled 193 miles from Farnborough to Driffield, at the same time breaking four altitude records by climbing to 21,340 ft. en route (see GLIDING, autumn edition). This same Olympia also reached an indicated height of 19,500 ft. in a snow-storm on 7th April, 1951, but conditions were unsuitable for a serious cross country-flight and the sailplane landed 38 miles away, near Thame aerodrome.

There already exists a nucleus of experienced sailplane pilots at the E.T.P.S. and it is hoped to expand this potential to form an enthusiastic gliding movement capable of getting the most out of the Olympias and the weather during the coming season.

FLT. LT. A. W. BEDFORD, A.F.C.

## Gloucestershire Gliding Club

HAVING hibernated for the worst of the winter months in comparative comfort (and they were some wet and dismal months in this part of the country), gliding activities at Staverton have steadily gained momentum during the months of April and May, culminating in some really enjoyable soaring over the Whitsun holidays.

Whit Sunday and Monday saw the Prefect once again searching and finding thermals, although it cannot be said that they were up to their usual strength for the time of the year. However, some useful experience was gained which proved encouraging to those members who have not yet had the pleasure of thermal soaring. The following day, however, dawned overcast and dismal with a N.N.E. breeze, prospects indeed depressing. Thermals being out of the question, Sim Reeves decided to aero-tow to Leckhampton Hill to get some hill soaring hours in. Alas, he failed to find sufficient lift to keep him aloft. It was early afternoon before the retrieving crew reached him, by which time the breeze had stiffened considerably and it was decided to shoulder launch. From the word "go" the site was proclaimed a success and although flights were limited by the waiting list the hill soaring enjoyed that afternoon and evening were the best this club has so far experienced.

F.C.W.



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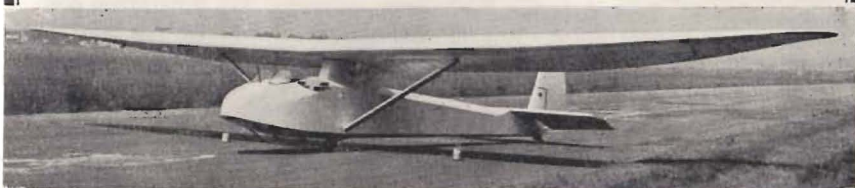
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## London Gliding Club

March was used by many pilots for repeated attempts to get away across country for the remaining Winter Prize offered by Kemsley Flying Trust. This offer certainly stimulated a lot of week-day flying, such as 20 hrs. 6 mins. on Monday 12th, and 15 hrs. 25 mins. on Thursday 15th, but although some good heights were reached, such as Pereira's 3,400 ft. on 12th, nobody found it good enough for going away until Sunday 18th, when two "Silver C" distances were done. That evening a spectacular dark cloud street, very like a cold front, drew everybody up from hill-top level to its base, reminding the old hands of a similar phenomenon on the same day 17 years earlier, which had been responsible for the first good cross-country flights made from the club. On the 24th Stephenson went 85 miles to Friston via the east of London and John Currie made a spectacular dash of 59 miles to Forest Row in only 64 minutes. Both these flights were commended by the Kemsley Trust but just failed to get the prize. Next day Vernon took the Gull IV 45 miles to Brentwood.

During the month there were seven cross-countries totalling 286 miles. Six "Silver C" legs were flown, and Currie and Vernon completed their "Silver C."

April started with an attempt to arrange a task match, with the goal at Stanstead Mountfichet, 45 degrees across the wind direction; but no-one got high enough to leave the site, where nearly 23 hours soaring was done. During the following four week-days soaring times were 14 hrs. 8 mins., 5 hrs., 9 hrs. 41 mins., and 14 hrs. 21 mins.; then another 13 hrs. 51 mins. on Saturday and 49 hrs. 54 mins. on Sunday. On this Sunday, the 8th, Dan Smith went 65 miles to Colchester and Hiscox to Bassingbourne. Jack Hanks crossed London in the Camel on Tuesday 10th, resisted the temptation to land on the Dome of Discovery, and came down at Motspur Park. Saturday, 14th was another cross-country day: Ron West went 55 miles across wind in an Olympia to Bury St. Edmunds, after leaving Dunstable at only 700 feet; John Hands 38 miles to Hornchurch in the other Club Olympia; Ramsden 23 miles to Cheshunt in the Prefect in a glide down from his only thermal.

A task match on the 29th, for a cross-

wind flight to Odiham, resulted in Pollard landing at Bovingdon and Wheatcroft at Reading, while Ellis actually reached Basingstoke, the same distance but upwind of the goal.

Totals for April: 12 cross-countries, 431 miles; 8 "Silver C" legs, 3 "Silver C's" completed.

## Scottish Gliding Union

SUMMER Holiday Course season at Balado is again in full swing. The success of last year's courses have shown that there is a real demand for a holiday of this type and the experience gained has been made use of to the best effect in planning this year's series. Accommodation and all meals are provided by a first class hotel less than a mile from the airfield. As far as possible the evenings are left free for whatever activities appeal to the individual members. The training includes combined solo and dual methods, which have produced excellent results. Arrangements can still be made for either ab-initio members or those with previous experience.

The week-end 28th-29th April brought Ann Douglas and Lorne Welch to Balado to run an Instructors' Course and to categorise those who qualified. The flying tests were done on Saturday. After lunch on Sunday, Lorne gave an impromptu but most instructive talk on thermal soaring, the results of which were soon apparent, as the Tutor began soaring long and high where, before, winch circuits were the order of the day.

During spring, northerly winds were frequent. This was most frustrating, as launches at Balado can be made in all wind directions other than north or south. It was decided to explore the many excellent north-facing ridges within a ten mile radius of Balado, to find a site suitable for launching and landing a Cadet and Tutor, which was easily accessible. The club therefore, split up into half a dozen parties, one of which found a good ridge with ample facilities and served by a public road.

A recent development at Balado has been the formation of the Coastal Command Gliding and Soaring Club who operate as a "lodger unit," providing their own aircraft, but sharing other facilities.

D.H.



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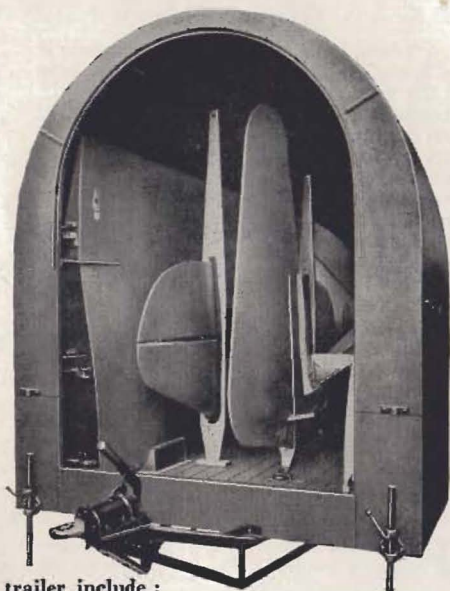
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## College of Aeronautics Gliding Club

**A**T long last the Club Grunau is again in use. So far no cross-countries have been made with it, but as soon as the business of retrieving has been organised no doubt some of our members will be able to try for their "Silver C's." This is of course, extra to the main aim of the club, which is to bring its members up to "C" certificate standard during their stay here; so far this year we have carried out this policy to the extent of 5 "C's," bringing our total up to 14.

Ab-initio training is carried out with an Eon Primary when work, Tiger Moths and B.E.A. permit. The standard of flying would probably be improved if two-seater training could be introduced, but like many another club our finances do not run to such luxuries.

J.C.

## Handley Page Gliding Club

**F**ULL-SCALE auto-towing at Radlett is now eagerly awaited. Thanks largely to the efforts of Geoffrey Wass, the 2,000 ft. piano wire had been procured and fitted with all the trappings such as parachute, weak-link, storage drum, etc., and the tow car. A Ford V-8 is having its chassis and rear body stiffened to take the necessary aircraft type release hook.

The mainstay of our future training programme is intended to be the auto-tow circuit, using the two-seater Cadet conversion for instruction. This project is proceeding at a steady pace, the design becoming more complicated every week. At first the two-seater training will supplement the solo Dagling winch tow training, but at a later date the latter may be entirely superseded, leaving only the economical "one vehicle" auto-tow operations.

Our visit to Friston on 28th-29th April, with the Rhönbussard and a crew of four, started eventfully when the trailer tow-bar broke in the main street of Reigate. Repairs were effected with the help of some Surrey Club members, but our consequent night arrival at Friston involved much groping for the hangar. After a late start the Bussard was floating over Firle Beacon soon after lunch, but both Rivers and

Ratcliffe spent most of their time gaining enough height to land on top after which the wind failed completely.

Sunday dawned with a light variable wind and some soaring was accomplished at Friston. Thanks to the great hospitality of Southdown Gliding Club a most enjoyable week-end was had by all.

Handley Page interest in gliding has now spread to Reading and, but for the lack of a site (Woodley aerodrome is controlled by the R.A.F.V.R.) a club would be now be operating.

G.R.

## Yorkshire Gliding Club

**W**E welcome to our midst the Newcastle Club who have linked up with us. It is a most pleasing sight to see these hardy enthusiasts and their womenfolk around.

Two more machines have been added to our already crowded stable in the shape of Capt. Buckley's Grunau from Germany and Swinn's Scud III (less engine, which has retired to the Kensington Science Museum). It is rumoured that the opulent Slingsby group will be producing another machine out of the hat shortly, a Grunau, to which they are putting the final touches in the evenings. Our S.G.38 has been called in to assist with the ab-initio training.

We have recently obtained two wireless sets which enable us to keep in contact with the pilots. This will be most helpful for beginners doing their first solo on the hill.

R.S.

## Aberdeen Gliding Group

**T**HE Group recently obtained the use of Inverallochy aerodrome, near Fraserburgh, and although there is still quite a lot of work to be done about the place, we managed to make use of the good weather on Sunday, May 20th, to do some ground slides, this being the very first time that any gliding has been done, except when the glider was tested.

We have had a loan from the Kemsley Flying Trust approved in principle, and have been making enquiries about used gliders, and also perhaps another winch, in anticipation of the loan being finally approved.

F.W.C.



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## Surrey & Imperial College Gliding Club

THESE notes from Redhill cover the first six months of the year.

On 23rd February, Lorne Welch captured the prize for the aero-tow section of the winter cross-country competition by his flight to Westwell. Three members have completed their "Silver C's" this year, A. B. Stevens getting his height, D. Stevens his height and distance on a trip to Havant, and Ted Ashwell his by going to Portsmouth.

At Easter there were two successful expeditions, one to the Mynd, where two duration legs were gained, the other to Crease's North Wales site. This latter party included some non-flying meteorologists from Imperial College complete with theodolites. The evening discussions were mutually beneficial to both glider drivers and met. men.

Whitsun produced one good day's flying—on the Saturday—and two days of north winds. On the Monday an Olympia and bungee were taken to Firls Beacon, where six people did half an hour's slope soaring each. The landings were made on the top of the hill, in the 75-odd yards between a fence and the escarpment. Peter Brooks said it was the nearest thing to deck landings he'd seen. A more thorough recce of the hilltop might well discover an easier landing strip. Don Brown and a small party spent the week-end in the pubs near Roundway.

"Daisy" (our T-21 B two-seater) made her maiden cross-country to Kemsing, near Sevenoaks, on 15th April. Three car loads of people went to assist in de-rigging, to find that the crew (Don Brown and Norman Frazer), plus Walter Morison, had already done the job. However, they were all required to assist in loading the trailer, which has since been nearly finished.

Two task-flying matches have been organised. Both have resulted in all the gliders landing a small distance away from the aerodrome, and being generally rather inconclusive.

Two private owner syndicates have been formed—Neilan, Moore and Laurie with an Olympia, and Irving, Hooper Hall and Ashwell with a Kite II—which has not yet actually arrived at Redhill.

It is now certain that we have to move

from Redhill aerodrome by the end of the year. At present no alternative site has been chosen. The difficulty is to find somewhere reasonably close to London, and preferably south of the Thames.

A.J.L. and H.S.S.T.

## Army Gliding Club

DURING the last quarter we have been able to reap the rewards of the preparations which we made in February. We have concentrated, above all else, on having serviceable aircraft and ground equipment, to the detriment of comfort and window-dressing—indeed, the amenities are temporarily such as to drive the idliest of members for respite to the hangar or the workshop, where there are always, and will ever be, "things to do."

Auto-towing has proved an immediate success, excellent smooth launches with quick turn-round being achieved with far greater economy than before. At the moment we are handicapped by repairs on the main runway, and are obliged at times to revert to winch, but this is only a temporary measure.

The first course of the season took place in early April, but was marred by poor weather. However, a lot of groundwork was covered, and John Free was able to whisk several delighted soldiers up to cloudbase, where their ambitions have remained ever since.

Since the course we have had some very fine weather. Our site is at 600 feet above sea level, and thermals are encountered with encouraging frequency on quite moderate launches. When necessary, the piano wire can be augmented for use on the long runway, and launches stepped up according to taste.

We welcomed our first gliding visitors on Sunday, 13th May, when Flt. Lt. Bedford and passenger arrived in a Kranich equipped with everything except the kitchen sink. "Gold C's,"—encrusted at that—are not yet commonplace at Lasham, and we were sorry when the Auster came and bore them away after lunch.

We shall be happy to welcome visitors from any other club, who can always join us for a day Membership fee of 3s. 6d., whereafter they will be treated exactly as any other club member, a fact which need not be taken as cause for undue alarm.

R.L.P.



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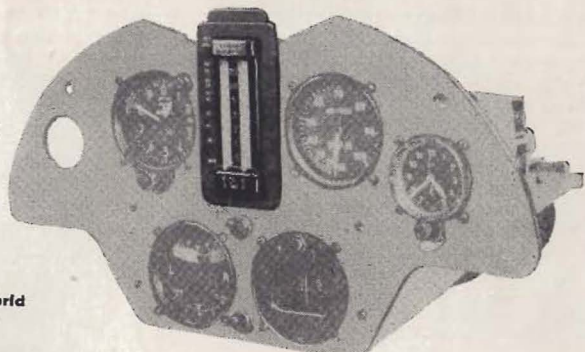
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## Derbyshire & Lancashire Gliding Club

IT was late in March before any useful thermals went up from the site, but they provided lift to 3,000 feet on the 25th and two cross-country flights, of 20 and 30 miles, were made on the 30th. Then R. Booth took his Grunau 58 miles on 7th April. There have been many good slope-soaring days, sometimes interrupted by storms, and a lot of instructional flights in the two-seaters T-21 and T-31.

At Whitsun, persistent northerly winds over the country were replaced on Saturday and Monday afternoons by the Club's local west wind, providing some good soaring for the members and a party of visitors from London Club. On each day the "evening thermal" supervened and gave extra lift to 2,000-3,000 ft.

## Deeside Gliding Association

SINCE our last bulletin Dame Fortune has joined us, and as a result, our immediate future looks extremely rosy. Thanks to our good friend Louis Leith, who handled the London end so brilliantly, negotiations with the U.S. Air Force have borne fruit, and we now occupy Sealand Airfield.

Our permanent hangar will be a disused cannon range in the N.E. corner of the airfield; a lot of spadework is required, however, before this becomes habitable for machines. By spadework we imply the true meaning of the word, since at present our hangar-to-be is chock-full of sand, gravel and, we hope, dummy or discharged shells!

In the meantime, we have been successful in borrowing use of a hangar, and will be flying in June.

Two Nissen huts and two small brick buildings stand adjacent to the main Range building in the N.E. corner, and these will be put to good use. As this section is already fenced off from the main airfield, and is accessible through a private gate from the road (wired up at present), we hope to win permission for friends and other non-members to be admitted into this enclosure.

We hope to arouse enthusiasm amongst U.S.A.F. personnel on the Station, encourage them to help run club affairs and seek out a few Paul MacCreadys!

GLYN THOMAS.

## Blackpool & Fylde Gliding Club

THE Club was originally formed by a group of enthusiasts in 1931, and the writer's father was its President; but at 64 years of age he is no longer a willing member of the bungee crew.

In 1945 the writer took command of No. 181 Gliding School, Blackpool, and shortly afterwards transferred it, together with the grandest band of instructors and assistants one could hope to be associated with, to R.A.F. Station, Warton.

Our happy little group of Instructors and U.T.'s was made redundant after a Suspension Notice reached us, and we were left high and dry to kick our heels. Several of us continued to glide and so keep our hand in by joining or visiting civilian clubs in England and France.

At this juncture we commenced to give serious consideration to the formation of a civilian club, but were quite naturally faced with the usual financial difficulties which beset most gliding clubs. Dozens of cadets who secured "A" certificates, and many with "B's" constantly pleaded with us to do all in our power to organise something for them. After many meetings we decided to open a club on Blackpool (Squires Gate) Airport and develop it with great care and the best of our ability, in order not only to help considerably with the purchasing of equipment, but also to subsidise as much as possible the actual maintenance and operation, in order to make it possible for even the most impecunious air-minded youths to derive the ambrosia of motorless flight.

J. S. AKED.

## Ulster Gliding Club

THE Club has a Tutor, complete with T.C. of A. and instruments, an efficient Humber towing car, and a Nissen hut on the Club's old site at Downhill, Magilligan Strand. William Liddell still has his Gull, and put in about 15 hours' soaring last year; also, Naval visitors from Eglinton got their "C" certificates.

Flying started again at Easter. On 13th May wave clouds were much in evidence, and W. Liddell and A. A. J. Sanders soared Gull and Tutor respectively to 4,000 feet.



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

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## MIDLAND GLIDING CLUB LTD.

Long Mynd, Shropshire

Summer Camps will be held as follows:

**May 12th — 20th**

**June 30th — July 8th**

**August 4th — 12th**

**September 1st — 9th**

*Inclusive fee for each Camp of 9 days with board  
and lodging and all flying, £14-0-0.*

Full particulars from:

**J. W. HORRELL, 92 Knightlow Road, Harborne,  
BIRMINGHAM, 17.**