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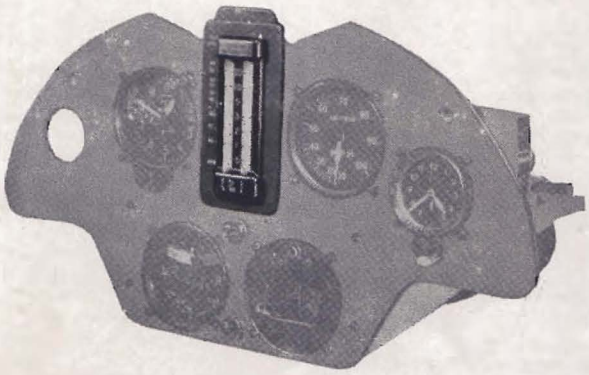


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Editor :
VERNON BLUNT
MA, LLB (Cantab), FRMetS

Asst. Editor :
VERONICA PLATT

Editorial
and
Advertisement Offices :
8, Lower Belgrave Street
Victoria, SW1
PHONE: SLO 7287

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COVER PHOTO:

Parade of International Flags and the Spanish Royal Aero Club in the background at Cuatros Vientos Airfield, Madrid.

Photo : M. Magnusson.

Editorial

WE are, of course, delighted beyond measure at the success of Philip Wills, Jock Forbes, and the rest of the British Team in the World Championship Contests which were decided in Spain last month. We unreservedly tender our congratulations to Wills, not only on his own success, which was deserved, but on leading such a well-planned expedition to such a successful conclusion. But whatever may have been the excellencies on all counts of pilots and crews there is no doubt that on any other machine but the 'Sky' the result might have been very different.

We were present a day or two before the Contests began, when everyone was dashing about to Pilots' and other conferences which were summarily arranged, and with an absence of regard to the needs of the inner man. Conditions then were hardly under control, due largely to the tenderness of the Spanish organisers towards the feelings and wishes of over twenty different nationalities. The British Pilots had taken advantage of their early arrival and Jack Rice's aero-tows to get in some useful experience of Spanish conditions and have a look at the terrain. One result had been a decision to stick to the roads in their courses and to land on or near them. It was for lack of this sort of forewarning that Richard Johnson landed on a small field and stove in a panel of the 'RJ-5' which put him out of the Contest for two events. Had he maintained his average over those events he would have been well up on the leaders, as the results show, and might even have won. His astonishing speed in the speed contest—77 miles in 68 minutes—is proof of his quality and of that of his machine. Had Paul MacCready had a little more experience of Spanish aerological conditions before the contest, he too might have done better. He confessed he had completely misread the implications of the Met. data on the first day and went in the wrong direction. So also did G. H. Stephenson who had done some remarkable out-and-return flights before the opening day.

Spanish Met. conditions were strange to all, even to the Spaniards who have not practised cross-countries, and were not equipped for retrieving.

In the main the British Team had all the advantages of superior organisation—five superior aircraft to fly, five powerful and speedy retrieving cars, two-way radio (Pye sent their tuning expert to guarantee reliability), and above all, time and experienced crews speaking the same language.

By contrast most other teams suffered from the lack of at least one of the advantages enjoyed by the British. The Americans spent one day, after arriving only hours before the Contest began, in modifying a trailer to take a '1-23.' The Spanish Unimogs used as tow cars, had not the speed of the more powerful Standard Vanguard wagons. Not all the competitors had radio. The Australians brought it but had not the time to install it. The Germans, who had been expected to make a powerful challenge, flew only in the two-seater class, but Fred Hoinville, solo in a 'Kranich,' and out of the contest one day because he could not be retrieved in time, had more success than many, including Lorne Welch, for example, in the four contests he did fly thus indicating that with a 'Sky' and the benefit of a fast retrieving car, he would have been well up among the leaders. He swears no one could have had a better crew, and certainly no crew could have more admired their pilot.

But it is invidious to single out individuals for comment. There were unhappy events, of course, but on the whole the contests were conducted in an excellent sporting spirit. We would like to mention the Met. men. No one worked harder to ensure that the pilots were briefed, but even they found the conditions puzzling. We were present at a conference with the Swedes when their course for the day was being discussed. It was agreed as South of East. Out on the field this decision was changed at the last moment, and Billy Nilsson went north, as did Pierre the French pilot of 19 who did so well in the opening days and secured 2nd place in the Championship. Next day Haakansson the Swedish Met. man had returned from Badajoz at 7 a.m. with the Met. information he wanted and was seen asleep in his car in Madrid, tired out by a night's work.

There was so much to see, so many people to meet and talk to, and so much happened that a complete account would fill a book, but in this issue of *Sailplane* and the next we shall try by word and picture, to give some idea of what went on.

INTERNATIONAL CHAMPIONSHIP

WILLS WINS WORLD TITLE

FORBES IN THIRD PLACE

SEVEN 'SKY'S' IN FIRST FOURTEEN



Teniente Colonel Ordovas



View from the bar over the terrace to the flags and hangar

ENTRIES

No.	*Nation*	*Pilot*	*Ship*	*Single or Two-Seater*
1.	Italy	Mantelli	Kanguro	2
2.	,,	Guerrini	Kanguro	2
3.	,,	Brigliadori	Pinocchio	1
4.	Australia	Waghorn	Weihe	1
5.	,,	Hoinville	Kranich II	2
6.	Sweden	Nilsson	Weihe	1
7.	,,	Lof	Weihe	1
8.	Argentina	Bazent	Horton IV	1
9.	,,	Ortner	Sky 34	1
10.	,,	Cuadrado	Sky 34	1
11.	Holland	Ordelman	Sky 34	1
12.	,,	Koak	Kranich II	2
13.	Switzerland	Fahrlander	Moswey III	1
14.	,,	Gehriger	Weihe	1
15.	,,	Kuhn	Moswey III	1
16.	,,	Schenann	Air 100	1
17.	France	Marbleu	Air 100	1
18.	,,	Pierre	Castel Mouboussin	1
19.	,,	Landi	Breguet 900	1
20.	,,	De Lasageas	Air 100	1
21.	,,	Gasnier	Arsenal 4111	1
22.	Belgium	Gildemyn	Rotary	1
23.	Brazil	Rodriguez	Kranich II	2
24.	Brazil	Munch	Weihe	1
25.	England	Forbes	Sky 34	1
26.	,,	Stephenson	Sky 34	1
27.	,,	Welch	Sky 34	1
28.	,,	Wills	Sky 34	1
29.	,,	Foster	Sky 34	1
30.	Finland	Koskinen	Pik 3	1
31.	,,	Tandefelt	Weihe	1
32.	,,	Saari	Weihe	1
33.	,,	Kahva	Kranich	2
34.	,,	Rautio	Kranich II	2
35.	Canada	J. B. Jeffery	Kranich II	2
36.	,,	A. Ovila	Weihe	1
37.	,,	Pow	Weihe	1
38.	Egypt	Kamil	Condor	2
39.	Denmark	Rasmusen	Kranich II	2
40.	,,	Jensen	Kranich II	2
41.	,,	Peddersen	Weihe	1
42.	Germany	Gasse	Condor	2
43.	,,	Reitsch	Kranich III	2
44.	,,	Kensche	Kranich III	2
45.	,,	Frowein	Kranich III	2
46.	,,	Ziegler	M.U.13	2

OLYMPIC IMPRESSIONS

By Veronica Platt

GREY skies and a cold wind as the white cliffs of England come into view. It is already hard to remember that three days ago we were scorching under the cloudless blue of Spain. Sunshine, wine, bull fights—what a difference those few miles make; for which reason a big international meeting will always be something of a toss-up. The Australians and the Argentines are flying in comparatively familiar









Top : A. H. Yates, Ann Douglas, Mrs. Yates
Bottom : Swiss Trailer

Top : Argentine Team—Cuadrado in centre
Bottom : Wills being launched

Mervyn Waghorn
(Australia)



Fred Hoinville
(Australia)





Col. Ordovas talking to Ann Douglas



G. H. Stephenson

conditions, whereas the Scandinavians and in fact all the Northern competitors have to learn them from scratch. It might be thought that the Spaniards have the advantage of local knowledge; in fact they have never gone in for much cross-country work at all, though of course they are more expert in anticipating the weather. The Americans are an unknown quantity. A rather tactless hand-out informs us that they are certain of all five first places, but we take that with caution. The Germans are a knowledgeable team of old hands but they are understandably out of practice. Canada, Belgium, Brazil, Holland . . . perhaps. Egypt and South Africa are old friends. France and Switzerland and Italy we know a bit about. And England? We did badly in Sweden, true, but we have always been quick to learn by our own mistakes and besides, this time we have a superb machine in the new Slingsby 'Sky.' Yes, perhaps we really have a chance. Our radio and our retrieving are excellent, our team already accustomed to working as a team for several years under the same manager, Ann Douglas. We ought to be able to pull off something this time with a bit of luck. How tantalising it is to have to leave before the end . . . how much fun it was to be there at the start!

More than twenty nations speaking a dozen different languages and meaning a hundred different things . . . at first sight it looked as if chaos could never be overcome. Everything had to be translated phrase by phrase into English, French and German. I sat in at one of the pilots' meetings; everybody talked at full speed throughout all the bits he couldn't understand, while others craned forward to listen. One of our friends said it made her think of the 'leaning Tower of Babel,' but it was only leaning—it never toppled. Like a successful theatrical show, rehearsals and dress rehearsals looked ever less promising, but in spite of all our forebodings it really *did* come right on the night. Colonel Ordovás kept the strings firmly in his hands, cajoling and commanding at the psychological moment, ready to smooth out the wrinkles with true Spanish courtesy, and finally everything was under control as if by magic.

It had been intended, owing to retrieving problems, to make the first day's test a speed race, to be followed next day by a goal flight. But some of the teams preferred to begin with plain distance, so in deference to their wishes the plan was changed—and as a result a most wonderful flying day was lost. Conditions were glorious after a terrific storm at the end of the first day, but hardly anyone had returned and a day of rest was declared. So we have distance on Thursday, rest on Friday, a goal flight on Saturday, rest again on Sunday, a race on Monday—and there we had to leave.

The arrangements for towing were magnificent. The sailplanes were lined up in seven files, the order of start being predetermined each day by lot. Machines were towed off by 'Fieseler Storks' or by the little 'HM—9,' and in just under an hour all fifty competitors were in the air. The met. man talked of thunderstorms to the North and by the evening they had caught us in Madrid. By then sailplanes were scattered all over the North, mostly in Aragon. The majority landed all together in a kind of wasp trap, but those who managed to avoid this were well away with the young French Diamond C, Pierre, in the lead. There were a few casualties. Foster cracked up his machine on landing and had to withdraw. Richard Johnson damaged his precious 'RJ 5,' Lasch of South Africa landed successfully but was caught by the breaking storm ten minutes later and had to watch his borrowed sailplane suffer. However, for such a monumental storm the damages were relatively slight, and some very good flights were made. Perhaps the meteorologists have something when they say that at this time of the year Spain offers ideal conditions.

Retrieving was another thing. Those teams who had their own tow cars managed pretty well, but many of them had to contend with the Unimog and an inexperienced crew, to say nothing of the hazards of the Spanish telephone service. But by the next test these were working better and retrieving on the Saturday went with much more of a swing. The same could now be said of the Press arrangements. The first day's reports had been coming in very haphazardedly, but the evening of Saturday was a marvel of organisation. The big blackboard was clearly marked and could be comfortably read from a distance. Results came in thick and fast and were put out very quickly. The majority of the pilots had picked Torre Saviñan as their goal and almost all of them had achieved it. Wills and Stephenson, more ambitious, had declared for and arrived at Saragosa, Ordelmann and Cuadrado at Albacete, Ara at Valladolid. But again the day's best flight went to the Frenchman Pierre, who elected to go off all by himself to Leon and get there—290 km. A most interesting day with goals to the North West, North East and South East of Madrid all successfully achieved. The rest of the map would have been neatly covered if the Americans, Schweizer and McCready, had arrived at their goal, for they had chosen Badajoz, to the South West!

Sunday was another beautiful day, with a cloudless sky and a pleasant breeze. The teams were able to get in a bit of well earned sleep or a bull fight, according to their several desires, and by Monday were all ready for the next attempt. This was a speed flight to Torre Saviñan, North East. It was after one when they began to take off but by three-thirty when we had to leave almost all were well on the way. Two or three had returned and set out again but the English team had gone serenely up to eight thousand feet and got cracking. The start was made notable for me by the fact that for the first time I saw storks circling in a thermal . . . three beautiful black and white birds climbing steadily up towards a huddle of sailplanes, almost more lovely to watch than the Argentine Flying Wing, which alas had not yet begun to fulfil the promise of its graceful lines. And there, to my sorrow, I had to make my adieux—to the Olympics, to Spain, and to all the friends both old and new. Spain is heaven!

FINAL RESULTS

SINGLE-SEATER

Order	*Name*	*Nationality*	*1st day*	*2nd day*	*3rd day*	*4th day*	*5th day*	*Total Points*
1.	Wills	England	673	943	1,000	963	754	4,333
2.	Pierre	France	1,000	1,000	624	713	711	4,048
3.	Forbes	England	862	637	893	926	725	4,043
4.	Cuadrado	Argentina	823	776	666	926	662	3,853
5.	Gehriger	Switzerland	979	424	771	975	637	3,752
6.	McCready	U.S.A.	793	137	974	865	802	3,569
7.	Ordelmann	Holland	749	776	890	779	238	3,432
8.	Kuhn	Switzerland	849	159	860	811	668	3,347
9.	Welch	England	619	360	851	766	542	3,138
10.	Ara	Spain	776	599	588	475	682	3,120
11.	Stephenson	England	320	943	630	926	296	3,115
12.	Haase	Germany	649	424	699	902	332	3,006
13.	Waghorn	Australia	629	424	540	870	532	2,995
14.	Ortner	Argentina	756	615	484	496	604	2,955
15.	Saari	Finland	706	424	466	541	668	2,805
16.	Tandefelt	Finland	733	424	597	820	206	2,780
17.	Salinas	Spain	706	249	526	541	689	2,711
18.	Schweizer	U.S.A.	763	37	639	520	704	2,663
19.	Gildemyn	Belgium	986	424	478	164	601	2,653
20.	Nilsson	Sweden	619	318	660	766	260	2,623
21.	Landi	France	416	125	621	709	739	2,610
22.	Feddersen	Denmark	500	424	654	1,000	0	2,578
23.	Lof	Sweden	623	321	0	938	672	2,554
24.	Johnson	U.S.A.	699	0	0	775	1,000	2,474
25.	De Lassageas	France	426	276	511	885	361	2,459
26.	Hoinville	Australia	636	424	0	766	565	2,391
27.	Gasnier	France	509	146	409	770	537	2,371
28.	Nuñez	Spain	629	215	520	393	608	2,365
29.	Brigliadori	Italy	410	424	576	504	361	2,275
30.	Falrlander	Switzerland	410	424	526	770	141	2,271
31.	Smith	U.S.A.	0	159	653	545	707	2,064
32.	Bazet	Argentina	626	130	486	779	0	2,021
33.	Marbleu	France	360	125	539	553	338	1,915
34.	Lasch	South Africa	736	305	0	656	172	1,869
35.	Pow	Canada	667	326	73	291	443	1,800
36.	Koskinen	Finland	486	424	517	129	193	1,749
37.	Boudreault	Canada	400	125	20	90	652	1,287
38.	Rodrigues	Brazil	360	46	432	164	126	1,128
39.	Munch	Brazil	613	0	0	0	0	613

TWO-SEATERS

Order	*Name*	*Nationality*	*1st day*	*2nd day*	*3rd day*	*4th day*	*5th day*	*Total Points*
1.	Juez	Spain	700	1,000	917	565	982	4,164
2.	Frowein	Germany	828	185	1,000	749	850	3,612
3.	Reitsch	Germany	697	448	879	942	466	3,426
4.	Mantelli	Italy	689	448	882	752	443	3,214
5.	Kahva	Finland	749	448	816	1,000	133	3,146
6.	Beuby	U.S.A.	1,000	149	975	870	114	3,108
7.	Kensche	Germany	565	146	687	637	862	2,897
8.	Rasmussen	Denmark	764	448	889	421	288	2,810
9.	Vicent	Spain	498	448	676	152	1,060	2,774
10.	Kamil	Egypt	697	232	244	537	827	2,543
11.	Ziegler	Germany	779	361	7	477	893	2,517
12.	Jansen	Denmark	700	357	58	457	822	2,394
13.	Koek	Holland	247	448	718	806	0	2,219
14.	Rautio	Finland	712	448	119	200	425	1,904
15.	Jeffery	Canada	131	84	589	381	233	1,418
16.	Guerrini	Italy	453	0	0	493	210	1,156
17.	Haydn	Norway	404	8	163	257	78	910

ANOTHER VIEWPOINT

TO attempt to do justice to the World Championships, one would have to write a book, and perhaps somebody will. But our readers, anxiously waiting the world over to see how their various national teams and friends have done, cannot wait until then. For this reason the final results are printed at the beginning of *Sailplane* account of the proceedings. General impressions and the Editors' first reactions, have appeared elsewhere in this magazine.

The World Gliding Championship Contests—or in Spanish, ' CAMPEONATOS MUNDIALES DE VUELO A VELA '—were held from Cuatros Vientos (The Four Winds) airfield some six miles S.W. of Madrid, which could be seen on the horizon across the valley between, and which could be reached by a sort of by-pass, cobbled some of the way, in about a quarter-of-an-hour. To the north lay the Guadarrama Mountains, which we had crossed on our way South, and above which cumulus always seemed to be growing. The feature of the airfield were the beautiful buildings of the Spanish Royal Aero Club, with its green grass surrounding the luscious swimming pool, contrasting with the desert-like sand of the airfield, on which only a few wisps of brown grass could be seen. A large hangar, several large unfurnished buildings, some low huts, a wattle-covered open air restaurant for the crews, and on the far side, a Spanish Air Force hangar, and here and there ancient German aircraft is parked, ' Heinkels,' ' Junkers,' ' Fieselor Storchs,' and at least one ' Me 109.' There were of course several modern private aircraft from the Bonanza of Max Schachenmann of Switzerland to the ' Gemini ' of Jack Rice, parked alongside the Club.

The opening ceremony took place in the evening of a hot and sunny day, and how long the sun stays up in Spain in July, and there was such a magnificent parade of Gliders, tow planes, and of course the unfurling of the Flags of the nations competing. What a grand and colourful sight they made, proudly strutting in the breeze, but which of the four winds it was, it was always difficult to know as it seemed to have the most ficklé ideas of constancy, and to blow where it listed, with no regard whatever to the direction of the clouds passing by overhead.

The pictures will give some idea of the Spanish Royal Aero Club, magnificent and richly appointed, with its air-conditioned rooms, its bar and terrace, its luxurious swimming pool, its cool and darkened dining room where the food was excellent and cheap.

The pictures cannot give any idea of the prodigies in organisation which were achieved by the Spanish personnel who ran the meeting. Perhaps they had not realised what was involved, in spite of ' Pirat ' Gehriger's advice, but they rose nobly to the occasion. The buildings round the field were in process of erection, so it was perhaps easier for them to knock two rooms into one and put a large window where there was once a wall, between night and morning. But this took time, so that the days before the contest gave rise to gloomy forecasts of chaos, which were not immediately dispelled by the events of the Practise Flight day. It may be ungallant and ungenerous to the host of other Spanish helpers, but it seemed that Teniente Colonel Ordovas carried an overload of responsibility with which he manfully strove, but which he overcame and proudly wore like a courteous plume as the days proceeded.

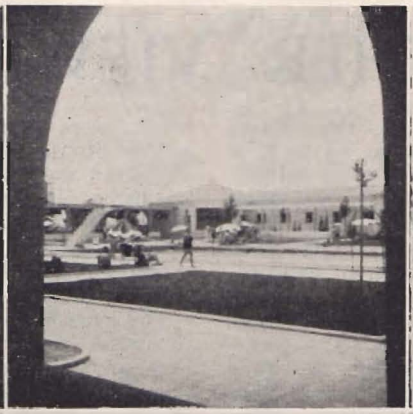
The British Team had been the first foreign team to arrive, closely followed by the Australians and French. The Australians, however, were unable to take advantage of the time on their hands as until they were allotted the machine they were to borrow from their Spanish hosts a day or two before the contests began.

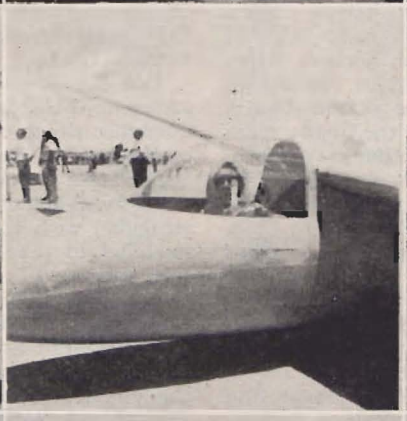
The Americans arrived in bits, and some did not arrive until the day before the contests began. Their machines which came by sea to Barcelona, were still on the road to Madrid a few hours before the contests began. In a temperature of 100° F., Ernest Schweizer, aided by a gang of equally hot and patient Americans, struggled with the Spanish trailer which had to be modified to take a ' 1-23.' The Italian ' Canguro ' was aero-towed from Rome—no mean feat. The Germans with their sleek new two-seaters, arrived in good time as did the Swiss with their umbrella trailer containing their spares. The sides opened upwards and outwards thus providing welcome shade and shelter when it rained, as rain it did. The French suffered a major disaster when their trailer containing reserve petrol caught fire and burnt out. It lay in close proximity to the British and other trailers. Had the wind been blowing the other way, the result of the contest might have been very different. As it was, only the French suffered, and it did not appear to have any effect on their efforts in the ' pruebas ' (' tests ' in the local language).

The Canadians arrived in an ancient London Taxi, said to be bought for £75, in which some of them had toured the Riviera before arriving at the contests. There it was, as impudent as any Cockney at the Palace, with ' CANADA ' writ large across its body. They had driven it over a thousand miles without a generator, which, however, was replaced for the journey home. The Swedes had their usual Army truck on which they had built in stout plywood, a bunk house, complete with washing alcove, cooking ditto and radio. As it had a sign in large letters across it, ' WORLD SOARING CHAMPIONSHIPS,' it attracted attention wherever it went.

There were some worth-while practise flights by the British Team. On one of them four ' Sky's ' set off N.E. for Huesca, about 210 miles away, followed underneath by their radio retrieving trailers. No one got there, but Frank Foster, made 170 miles—only 17 miles short of Gold ' C ' distance—and also gained 19,500 ft., which will earn him a Diamond when he gets the distance. Forbes and Welch did about the same distance, but Stephenson did only 120 miles. Foster experienced a rough trip in a cu nim with ice conditions. The radio worked excellently except when Foster put down, and there was

(*Continued on page* 11)





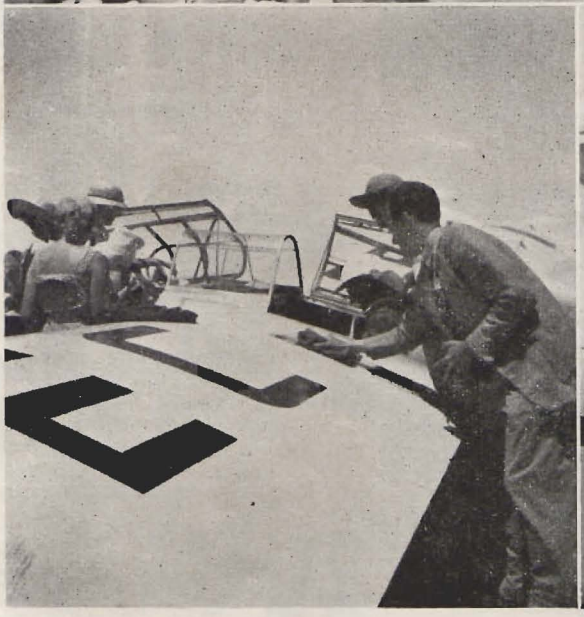



Top : The German Team
Bottom : Kahva (Finland)

Top : Ann Douglas and Wally Setz lend a hand
Bottom : Koek of Holland and a ' Kranich '









OPPOSITE—

1. *Watching the air release from the terrace of the Club*
2. *The Swimming Pool*
3. *The ' Schweizer 1-23 ' and Paul Schweizer*
4. *The Editor, Assistant Editor and the Australian team at the Escurial*
5. *Brigliadori (Italy) in his ' Pinocchio '*
6. *The Italian ' Kanguro '*
7. *Ditto*
8. *Professor Taula of Spain talks to the Pilot of the ' Kanguro '*
9. *Juez (centre) who won the two-seater event in his ' Kranich '*
10. *Rautio (Finland) and a ' Kranich '*
11. *The ' Castel Mauboussin ' seen through its butterfly tail*
12. *Bazet (Argentine) and the ' Flying Wing '*



ANOTHER VIEWPOINT—*continued from page 7*

difficulty with the telephone in getting Madrid—it took ages—and then someone said Foster was being aero-towed back from the aerodrome (which he had not reached), and his crew having returned fruitlessly had to go back for him nearly 200 miles each way. Another day Wills and Forbes had made out-and-returns of 120 miles each, and Stephenson made a flight of 125 miles westward, only to be caught in a drenching mountain storm which endured five hours and gave the retrieving crew an unhappy time.

One good result of these early test flights was that it was decided to steer courses near to main roads, mainly because of the cart-track-like nature of the secondary roads, and also because, lonely though they are, there is still more chance of being assisted to the nearest telephone by a passing car than in the interland, where communications hardly exist. The British plan was for the pilot to make for the nearest main road along which his crew were to come and to plant a Union Jack on the verge, thus indicating that he was to be found roughly at right angles to the road. The crews who had not got wireless were in worse plight, and on the opening day, one of them was lost for nearly a day, which was the time it took him to get to a telephone and get a message to Madrid. There, on the airfield in a couple of rooms in a low hut, labelled 'Recuperacion' were three telephones which were manned all night after an event by English speaking Spaniards and other volunteers from the foreign crews, and where I once found Ann Douglas the morning after, with all the British crews safely at home the night before, telephoning to Billy Nilsson and telling him where Tage Lof was so that he could be retrieved.

(To be continued).

OPPOSITE—

1. *Cuadrado and Veronica Platt*
2. *Cuadrado and Taula*
3. *The 'Flying Wing' and the Unimog towing car*
4. *The Finns in a huddle*
5. *The Editor and Jack Forbes*
6. *The 'Flying Wing'*
7. *The French Team with Pierre in centre*
8. *The second Spanish two-seater—Vicent piloting*
9. *The Norwegians*
10. *Gildemyn (Belgium) and his 'Sohaj'*
11. *The take-off table and Sr. Llaca*
12. *The French team with Pierre second from left*

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MADRID 1952

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AIR-PLANE FLIGHT

By A. YORK BRAMBLE, M.R.S.T., F.R.MET.S., A.R.AE.S.

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PART II—CONCLUSION

Sixth Flight

§ 154. To return to the question raised as to the balance or trim of the machine and the maintaining of the same, i.e. stability. Let us recall that in building our second ' aerial fish ' we caused the outer ends of the main plane to be bent upwards, so as to make our newly-shaped plane ' balance ' more readily from side to side, or exhibit the quality of ' lateral stability.' Similarly the illustration of the glider, now under examination from this point of view, shows that its main plane seems to be bent slightly upwardly from the middle, where the two wings are attached to the fuselage. This upward inclination of the two parts of the main-plane is described by saying that the two wings have a ' dihedral ' (*see* Fig. 96 (*a*)). Occasionally, in some designs of aircraft,



Fig. 96. Dihedral and Anhedral

there is a downward inclination of part of the wing from its root outwards, and this is said to be negative dihedral, or ' anhedral ' (*see* Fig. 96(*b*)). How does this dihedral setting of the wings make for lateral stability?

§ 155. Part of the truth of what happens is this. The line of reaction of lift to each wing is at right angles to its span line. If the wings are inclined upwards, then the lift reaction lines tilt inwards. If the upward inclination of each wing is the same,

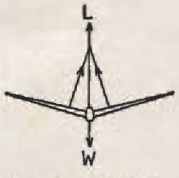


Fig. 97. The Dihedral Lift Effect

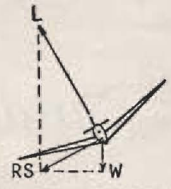


Fig. 98. Resultant Side-slip

then the two lines of lift reaction meet in a point which is immediately above the centre of gravity (*see* Fig. 97). The resultant of lift on the two wings is therefore to support the machine in a direction vertically upwards through the c.g. If, for some reason, the machine becomes tilted towards one side (*see* Fig. 98), i.e. rolls about the longitudinal axis, then the resultant lift reaction is now out of vertical, i.e. towards one side. The tendency therefore, is for the machine to be urged towards that side, i.e. to side-slip, so the wing on that side experiences an airflow from that direction (*see* Fig. 99). Clearly, this airflow will strike the wing on that side at a greater angle than the wing on the other side, giving it more lift.

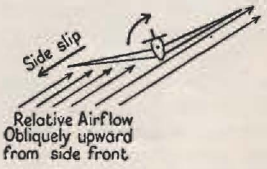


Fig. 99.
Effect of Dihedral on Side-slip

Side-slip creates relative airflow from the side. Lift reaction on wings is now unbalanced. Aircraft rotates about its longitudinal axis.

The machine consequently tends to turn again around the longitudinal axis, i.e. to right itself.

§ 156. Now as to stability in direction, i.e. stability about the normal axis of the machine, more commonly known as ' directional stability.' In our second aerial fish we employed, at the tail end of the model, a vertically-placed surface called the fin. Recalling what we said about ' moments ' in the Second Flight, we may see that even a fairly small fin area acted upon by an airflow, may create quite a considerable turning moment about the normal axis, providing the fin be placed some way from the axis (*see* Fig. 95). In the picture of the big glider quite a large fin area may be seen at the tail end of the fuselage. If the machine tends to rotate about its normal axis, i.e. if it tends to head off its course, its momentum will nevertheless tend to carry it bodily forward in the original direction. This will produce a crab-like motion and the side surface of this 'stabilizing ' fin will be presented (somewhat obliquely, it is true) to the direction of the airflow. The effect upon the machine is rather like that of the wind on a weather cock, the tail part being urged back into the line of normal airflow, the machine thus heading back towards its original course.

§ 157. Perhaps the most difficult of the three to analyse is the fore-and-aft or ' longitudinal ' stability, i.e. about the lateral axis. In our second aerial fish, we incorporated what we called a tail-plane, and we may clearly recognise its counterpart in the picture of the man-carrying glider (*see* Fig. 89). Now, since a ' down-wash ' follows the main-plane, if it and the tail-plane be set at about the *same* angle to the longitudinal axis, then the respective angle of attack of each of these two planes to its particular part of the airflow is *different* (*see* Fig. 100), the *effective* angle of attack of the tail-plane being less than that of the main-plane. Supposing the aircraft pitches, its

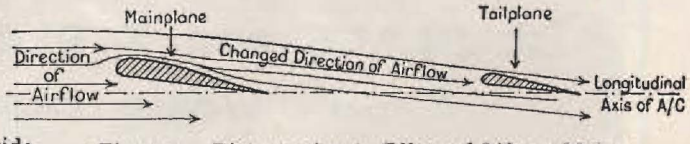


Fig. 100. Disproportionate Effects of Lift on Main- and Tail-planes

[The fundamental problem in flight is stability in the air. By permission of the author and the publishers we reproduce here the chapter on this subject in York Bramble's recent book. This simply explains the problem and how it is overcome in flight. It is also a good example of how such problems should be explained]—Ed.

momentum will tend to carry it on still in the original direction. It will therefore not be ' following its nose,' but rather presenting either its under side, or its back (according to whether it pitched upwards or downwards), towards the main direction of airflow. Now, because of the different angles of attack of the main- and tail-planes the alteration of angle of attack is not in the same ratio for both planes. It is in fact greater upon the tail-plane than upon the main-plane. So that, if the main-plane increases its angle of attack (thus causing the fore part of the machine to lift a little more), the tail-plane then lifts rather more still. In short, the original attitude of the machine tends to be restored. Similarly, if the front part of the machine is tilted downwards, and thus the main-plane is at a less angle of incidence, the reduction effect is proportionately more on the tail-plane, which drops correspondingly more than the main-plane, and again the original attitude tends to be restored.

§ 158. The idea of flight stability, then, is that of a quality which, with the machine in a steady motion, overcomes a disturbance and returns the machine to that state of motion, without external agency.

§ 159. It is evident that this condition or quality of stability may be introduced into the design of the machine to a greater or lesser degree, by variation in the setting or effective size of the stabilizers. Indeed, a machine might be constructed with such a high degree of stability that it would be almost impossible to cause it to change its steady motion, as is essential for variable, controlled flight. Conversely, without stability a machine would be almost incapable of steady controlled flight. Such latter condition is known as ' inherently unstable.' Some of the original designs of aircraft proved, on first test, to be almost inherently unstable, and had to be modified in design to provide the necessary degree of stability—capable of being overridden nevertheless by direct control.

§ 160. Our glider, according to our findings, should prove inherently stable in flight. Let us consider a pilotless test in progress—something that has actually been done, in fact. With the controls lashed in a central position, we take an average man's weight (about 10 or 12 stones) of some compact thing and fasten it into the seat—a large sack of potatoes would do! At the forward end of the skid is the launching hook, pointing downwards. On to this hook we slip a ring with a length of cable attached, say fifty yards, the other end of which we fasten securely to our tow-car. We may carry out our test in the large flat-surfaced field where we first experimented with the sheet of iron and the large stone, and later ran up and down with the kite or first aerial fish. The glider is placed at the far end of the field facing into wind. One of us stands at a wing tip of the glider holding it so that the machine sits squarely on the grass. A signal from the car tells us they are ready. At the glider we reply by waving a handkerchief. The car starts forward, slowly at first. The glider slides along over the grass, the wing-tip holder running forward with it to keep the wings level. Suddenly just as our hats were lifted when we cycled in the wind, so now the glider is lifted as it surges forward. It is airborne. It climbs five, ten, twenty feet, floating steadily in the airflow, its stability proved. Then as the car is stopping, the tow-cable suddenly sags, and the glider sails on a little. The tow-ring and cable fall from the glider hook. The machine lives up to its name and glides gently down on to the grass, coming rapidly to a standstill upon its skid. For a moment it poises there, then slowly inclines to one side, the wing tip resting lightly upon the turf. The short test flight is over.

RECONNAISSANCE TO SIXTH FLIGHT

Equilibrium and Stability (§ 150)

§ 161. When the forces acting upon an object are balanced, the condition is said to be one of ' equilibrium.' This equilibrium may be either ' stable ' or ' unstable.' If a disturbance of the forces acting upon an object, which is either at rest or in steady motion, tends to die out, then those forces are said to be in stable equilibrium ; but if the disturbance, once created, tends to increase, then the condition is one of ' unstable equilibrium.' Aircraft are designed so that their equilibrium, in flight, is of the stable order.

Dihedral (§ 154)

§ 162. The accompanying Fig. 101 illustrates the difference between geometrical and aeronautical

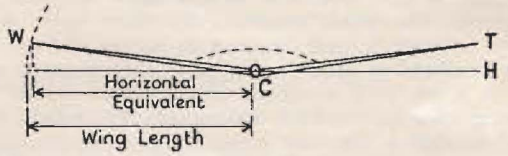


Fig. 101. *Dihedral Effect Analysed*

dihedral. The air mechanic checks the dihedral of his wings by a measurement of the angle between each wing and the horizontal. Dihedral rigging reduces the lift factor in the ratio of horizontal equivalent to wing length. Except in the case of wings of unusual design (i.e. wings which, when viewed from the front of the machine, appear to be ' bent ' at a little distance from their root) only positive dihedral is employed. In wings of unusual design (sometimes known as gull-type wings), the wing-line outwards from the root of the wing may

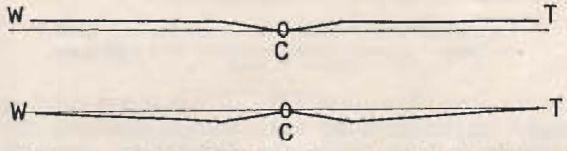


Fig. 102. *Types of Gull Wing and Anhedral Wing*

begin horizontally or with negative dihedral (anhedral), then the wing ' bends ' and thereafter has positive dihedral outwards to the tip (*see* Fig. 102).

Lateral Stability (§ 155)

§ 163. Lateral stability, or stability about the longitudinal axis, resulting from the introduction of dihedral, may be analysed a little further. Referring to Fig. 103, the resultant lift *CL*, of the two reactions *R* and *R*1 of the wings of the machine, is shown to be in its plane of symmetry *CM*, and is balanced by the weight vector *CW'*. If the machine rolls about its longitudinal axis (as shown in Fig. 104), the resultant *CL* is now in the inclined plane *CM* ; i.e. the forces *L* and *W* are no longer directly opposed or balanced. The further resultant between the lift axis *CL* and the weight axis *CW* is the vector *CS*, an unbalanced force urging the machine in its

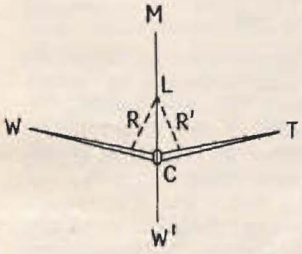


Fig. 103. *Lift and Weight Balanced in the Plane of Symmetry*

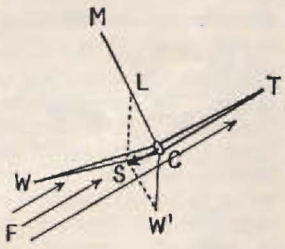


Fig. 104. *Lift and Weight Unbalanced, with Slipping towards S and Relative Side Wind F Produced*

direction (note the parallelogram of forces). At the same time, something less than the original full-lift reaction is now available to overcome the force of gravity. The whole machine, therefore, sinks sideways towards *S*, and the relative lateral airflow, i.e. the resultant of the side-wind and the up-wind, will be in some such direction as the arrow marks *F*. Owing to the dihedral setting of the wings, this airflow strikes the near wing *W* at a coarser angle than the far wing *T*. The lift reaction now produced on the two wings is unbalanced, being greater on the near wing, which, therefore, rises in relation to

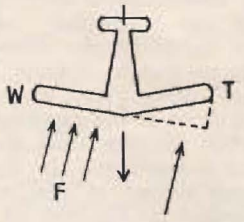


Fig. 105. *Sweep-back Effect*

Relative side wind *F* strikes unequal effective wing spans and gives more lift to the nearer (lower) wing (angles not drawn to scale)

the far wing. Accordingly the aircraft is now rotating about its longitudinal axis, and is regaining the attitude it held before the disturbance occurred. Fig. 105 shows a less-used means of inducing lateral stability—" sweep-back." Comparative settings to obtain same degree of effect are—

Dihedral, 1° . . . Sweep-back, 10°

Directional Stability (§ 156)

§ 164. In our brief review of directional stability, or stability about the normal axis, we said the effect introduced was that of ' weather-cocking.' Fig. 106 is a bird's eye view of the machine in flight. The line *CD* shows the direction of travel and the continuous outline shows the machine normal to this line of travel. The superimposed dotted line shows the changed attitude of the machine when it has been disturbed, with its nose now pointing in the direction of the line *CN*. Remembering that an air-plane is designed to travel in the line of its longitudinal axis, the machine may now be expected to move in the direction of its new heading *CN*, but we must also remember the directional force or momentum of the machine, tending to urge it in its original direction *CD*. The actual line of travel will, therefore, be in some such direction as *CR*—the resultant between the two axes *CD* and *CN*. The whole machine is accordingly proceeding rather in a crab-wise fashion, and the drag axis (*see* § 152 (*a*)) is *CX*, i.e. the line of relative airflow. This airflow is, therefore, striking the machine more on one side of its fuselage than the other (the right-hand or starboard side, in the drawing). The expression for the total side surface of the machine is ' keel ' surface, and so long as we have a greater *effective* keel surface aft of the c.g. (centre of gravity) than in front of the c.g. (*C* in the drawing), the effect of this side wind will be to make the machine weather-cock about the c.g. towards the original course *CD*. We have said ' effective ' because, as a matter of fact, it is possible to have a greater superficial area forward of the c.g. than aft of it, and yet that smaller area aft of the c.g. may be the more effective because of its distance backward from the c.g. The whole point here is that we are dealing with the greater moment, and the question of moments we discussed at some length in §§ 62 and 63, where we found that the *distance* from the turning point at which the force is applied, is all-important.

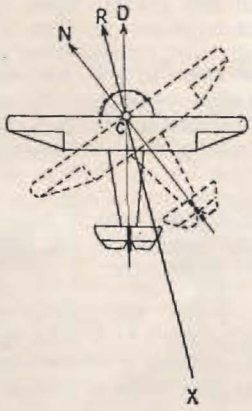


Fig. 106. *Directional Stability*

Longitudinal Stability (§ 157)

§ 165. Analysis of longitudinal stability or stability about the lateral axis, is similar to that of directional stability, but we have two aerofoils to consider—the main-plane and the tail-plane. Fig. 107 gives the outline of a machine with these two planes shown in section. We have already seen that when there is an alteration in the angle of attack during flight, the change is not the same for both planes, thereby creating different degrees of lift (positive or negative) upon them. Let us take a concrete example.

Assume that the main plane is rigged at an angle of incidence of 4°. It may be found by test that the tail-plane is also rigged at about this angle, but in flight the effective angle of incidence of the tail-plane, owing to the down-wash, will be less than this, say only 2°. Now suppose the attitude of the whole machine to be disturbed, so that its nose is now pointing in a direction (as shown in the drawing) *TN*, as differing from the original direction *TD*. The machine would normally move in the new direction in which it is heading, *TN*, but its momentum in the original direction *TD* is still present. The machine will, therefore, tend to move belly first instead of nose first, along some resultant path between the two, e.g. *T'R*. Suppose that this alteration of attitude has added, say, 2° to the angle

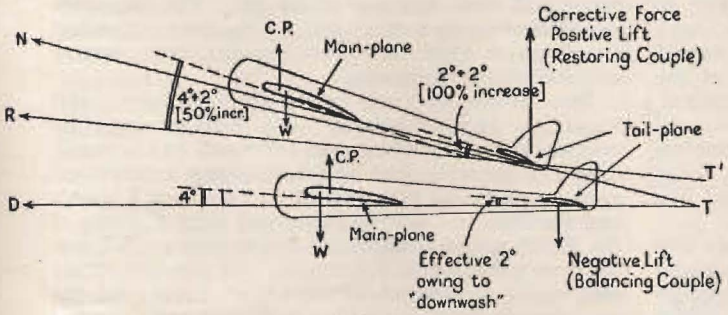


Fig. 107. Longitudinal Stability

of flight attack. The angle of attack of the main-plane will now, therefore, be 4° + 2°, whilst that of the tail-plane will be 2° + 2°. Here we have an increase in angle of attack of 50 per cent for the main-plane, but no less than 100 per cent for the tail-plane. Remembering the factors of lift of an aerofoil, we understand why the tail-plane now has proportionately a much greater lift than the main-plane, and, therefore, raises the tail, urging the aircraft towards its original attitude. Similarly, if the nose is depressed by some disturbance, so that the angle of attack is reduced by, say, 2°, then the new respective angles of attack for main- and tail-plane would be 4° — 2° and 2° — 2°, i.e. the main-plane would lose 50 per cent and the tail-plane 100 per cent. The latter would, therefore drop much more in proportion than the main-plane, so that the machine would tend to return to its original attitude. The general effect of all this is sometimes known as that of longitudinal dihedral. It may be noted that longitudinal stabilization may come into play without affecting the other two kinds, yet either of the latter in play may affect all three. It is useful to reason this out for yourself, bearing in mind the related effects of yawing and rolling. Note that over-correction may lead to what is known as ' dynamic instability,' particularly in regard to pitching motion, when such over-correction is often colloquially termed (especially in gliding circles) ' pump-handling.' Hence the instruction to handle flight controls ' firmly but gently.'

WHAT HAS BEEN LEARNED IN THE SIXTH FLIGHT?

1. What are the three lines of reference of attitude of an air-plane? Distinguish them.

2. What is understood by the ' plane of symmetry ' in relation to an air-plane?

3. What are the three planes of reference of movement of an air-plane? Distinguish them.

4. Distinguish between 'balance' or 'trim' and 'stability.'

5. Differentiate between geometrical dihedral and that understood in aircraft rigging.

6. What is meant by—

(*a*) Lateral stability?
(*b*) Directional stability?
(*c*) Longitudinal stability?

And how are they attained in design?

7. If stability makes for safety, why should an air-plane not be designed to be *entirely* inherently stable?

8. Describe briefly, but clearly, in general terms, the idea of ' stability ' as applied to a normal air-plane.

TECHNICAL VOCABULARY

longitudinal axis and stability	normal axis and stability	cross-wind axis lift and drag axis
lateral axis and stability	dihedral	looping plane
plane of symmetry	anhedral	rolling plane
	longitudinal dihedral	yawing plane

The next Flight deals with CONTROL and takes the student through an imaginary solo flight in a glider. Then follows a note on sustained gliding or ' soaring.' Later a chapter is devoted to flying through instruments or ' blind.'

16,000 Feet at Long Mynd

May 18

By A. A. J. Sanders

IN taking the ' Olympia ' up from Cranfield to the Mynd, the aim was really to have a crack at the 300-km. leg across country, either down a westerly wind to the East Anglian coast or down a north-westerly into Kent. In fact, a large woolly anticyclone sat benignly over England for the whole week, and the nearest approach to hill soaring was a few minutes of zero sink over the East face in south-easterly puffs on the Saturday. However, something more rewarding was brewing.

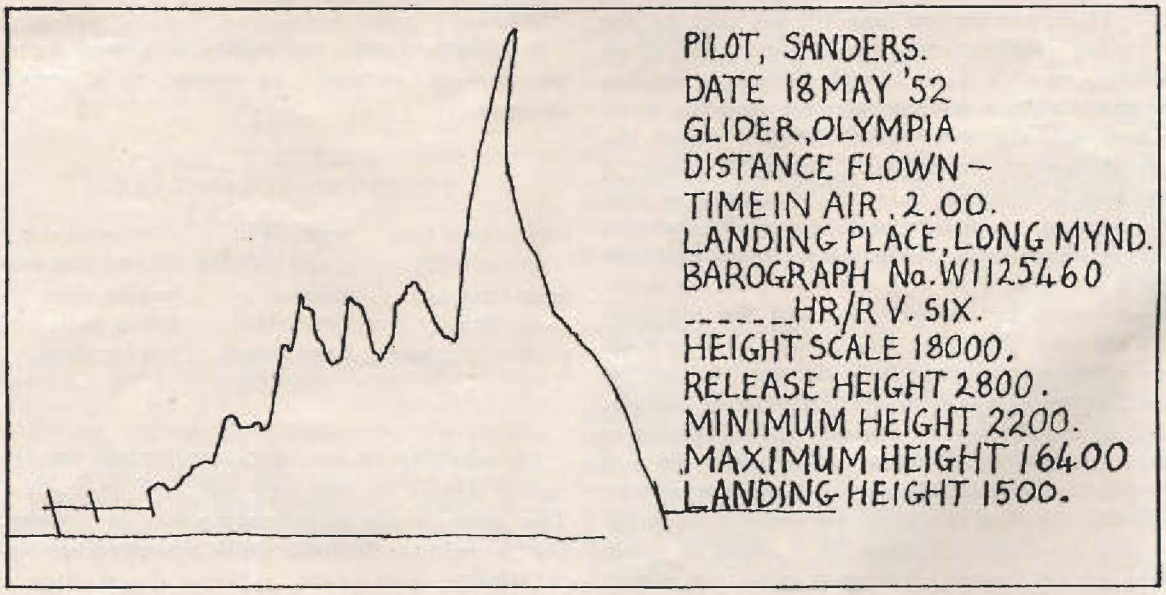
On the Sunday there was no wind, and the forecaster at Shawbury offered nothing better than ten knots, westerly, at ten thousand. The interesting news showed on the tephigram—early instability to 8,000 feet, later extending to 16,000 feet—and accordingly we made an early start. As we crossed Offa's Dyke into England and caught sight of the Long Mynd lying high and bare across the horizon, I was struck by the strange appearance of the clouds. In the warm morning air each hill bore, motionless above its summit, a tall plume of cloud and along the Mynd itself these tall columns stood ranged like a line of elm trees.

The hangar was full of activity, and already one ' Olympia ' was soaring at cloudbase as we arrived and began to rig. By noon, when with barograph sealed and ticking I was launched, two other ' Olympias ' were in cloud at 5,000 feet and the first two-seater was soaring up to join them. The clouds had hardly moved, but by now they had assumed the rich greyness of importance and were merging together. I cast off the winch wire at 2,400 feet A.S.L. 900 feet above Mynd top, and waffled round in gentle lift : then let it go, and flew off to the sunbaked south-east slope by the Horderley ' Lion,' where the new forestry road curves gracefully up to the Mynd top.

I got there in flat air, at 2,200 feet, and saw a little below me two of the famous buzzards that haunt the Long Mynd. They were circling tightly, and I followed : almost immediately the variometer began to pick up, and as the buzzards spiralled up through the middle of my eighteen-second circle the green ball was dancing at sevens. The buzzards were doing much better, and by the time I reached cloudbase at 4,000 they were cruising away, nearly out of sight, to the south.

The two-seater was also at cloudbase, and Hickling's blue ' Olympia ' was just disappearing into cloud not far away : so I flew off to the south after the buzzards, and switched on my horizon and gyro compass. At this point I realised that I hadn't had the Venner batteries recharged since arriving at the Mynd, and in fact this slip was to prove a bad one.

Three miles south, a cumulus was growing nicely and under it I found fifteen's : so I uncaged the gyro horizon and circled up inside, twenty seconds to the circle, about 35° of bank. This served very well, and I was just passing 9,000 feet when the air became rough : in a couple of seconds it was really bad, I was tossed around like a pea in a colander, the roughest air I ever met in either a sailplane or an aeroplane. I must have wandered into the eddy



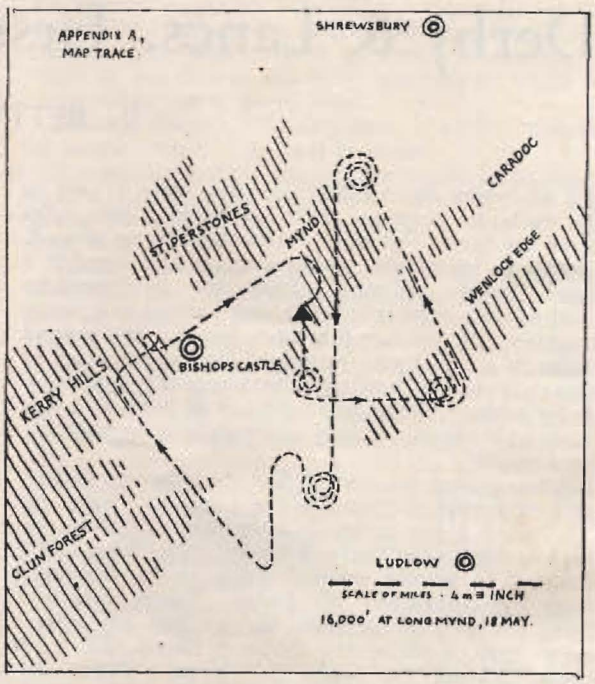
zone between lift core and peripheral sink : anyway I couldn't cope, so I opened my divebrakes and steered out on gyrocompass. At this point the gyrohorizon toppled, and the horizon bar sagged gently to the floor of its box. Luckily the turn needle still kept going, and after a very rough half minute we came out of cloud feeling very queasy and unwell and in no mood for any more cloud flying.

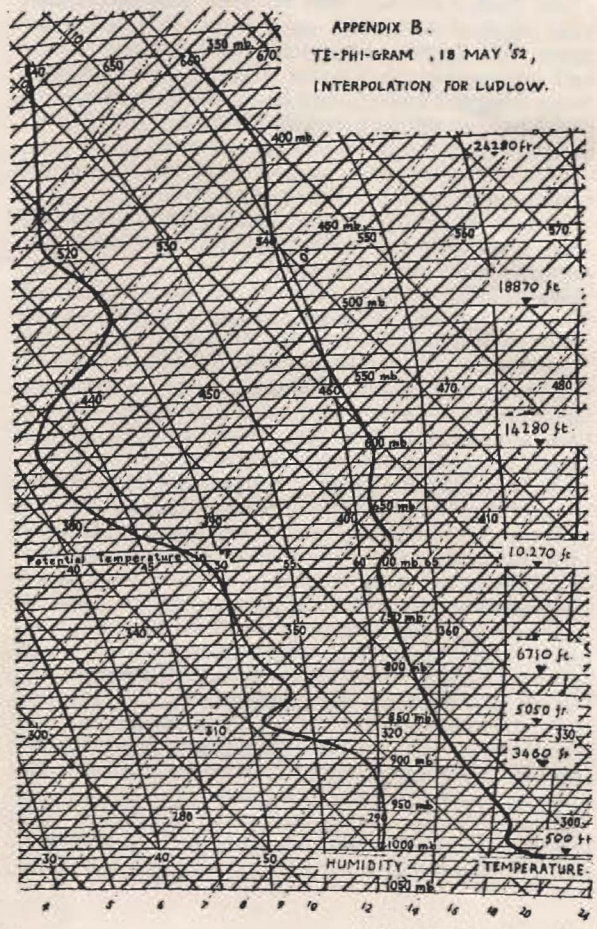
After ten minutes or so this feeling eased off, and I flew away towards Wenlock Edge where an isolated cumulus plume was rising high above a shrubbery of normal cumulus heads. I caged and re-erected the gyro-horizon, and went into the side of the cloud about 6,000 feet. Once again I immediately found good lift and, circling tightly, reached 9,000 feet ; then the horizon packed up again and in trying to follow it I stalled, dived and got quite mixed up, dive-braked and came out in a furious temper. I switched off the useless horizon and put on the little auxiliary turn and bank, then dived off towards Shrewsbury and at 6,000 feet went into the side of another cumulus, a big black brute ringed with grey puffs at the base. This was full of lift, and I quickly regained my 9,000 feet then stuck there : and the cloud dissolved about me in long grey streamers, sinking rapidly under a chaotic grey ceiling of mammatus. I was by this time thoroughly annoyed and swore that I *would* make Gold Height, happen what might.

By this time the sky was filled with creamy new cumulus, curdled grey columns of dying cloud, and magnificent white monsters rising through patches of alto stratus, with their tops hidden. I flew down the dark length of the Mynd, over the hangar and the nearby swarm of thermalling sailplanes ; and saw to the south, between two fading clouds linked above and below by stratus, a tall thin shaft of cloud before another and mightier shaft whose base and summit alike were hidden. I switched on the horizon and gyro-compass again, and the independent turn and bank for good measure, and at 7,000 cruised into the side of the nearer cumulus shaft.

As I went in my queasiness returned, and I began counting to relieve it. The lift built up to fifteen's, and fell away ; then to ten's, and then to twenty's, but I pressed on and, 84 seconds after entering cloud, hit the main core. Both the Cosim and the Horn showed maximum rise and I swung into a tight circle to starboard. The lift was tremendous, a steady surge of power, you could feel the cloud growing : and the altimeter went round and round at a great rate.

Golden Height slid by like a dream, but the lift was so strong I determined to try for Diamond ; and I kept counting and circling, until at 15,000 feet clear ice began to splash the canopy, and at 16,000 feet trouble started with a rush. I reckon the lift column branched out in a dozen boughs ; at once the ' Olympia ' became almost uncontrollable, pitching twenty degrees and back in a couple of seconds, oscillating madly in roll and with so rapid a period that the corrective control movements had no time to take effect. I opened the brakes and headed north on gyro-compass, still counting : almost 500 seconds had elapsed since I entered cloud and in another 35 I flew out, very relieved to have





(*Continued on page* 19)

Derby & Lancs. First Woman Silver 'C'

By BETTY GAYS

IT all began about eight years ago when I used to cycle to Leicester East aerodrome, two miles from my home, and watch ' Dakotas ' flying around. Began to learn more about aircraft and decided I must become a pilot. Then the Leicestershire Gliding Club came into being, and I joined as a junior member. On January 6th, 1946, had my first ground slides in a ' Dickson ' primary. One of the rules of this club was that junior members were only permitted to fly primary gliders to a height of 30 feet. So I was stuck on low hops, officially, and high hops, unofficially, for a year.

After getting my ' A ', I flew the ' Grunau Baby,' and on a week-end visit to the Long Mynd got my ' B.' Had a few aerotows after this. In 1948, we paid a visit to the Derby & Lancs. club. Soon after, I had a 11 minute thermal flight at the Leicester club, and earned my ' C ' badge. Things were not going too well in the club, and we flew less often. So in 1949, I joined the Derby & Lancs. G.C. and began putting the hours in. From ' Tutor ' to ' Eon Baby ' in 1950, and on Whit-Sunday of that year reached 4,000 feet in a wave this being my Silver ' C ' height. After that came many attempts and failures for the 5 hours' duration. One attempt being 4 hours 10 mins., and being forced to land with cloud base at 400 feet, bad visibility, and three other machines also trying to stay up 5 hours.

Did a 20 miles cross-country in September gaining height under a cloud street.

November, a good wave appeared and I reached 6,800 feet, again trying for the duration, and landing after 3½ hours nearly frozen.

April, 1951. Stayed airborne in ' Eon Baby ' for 4 hours 42 mins., the wind dropped completely and I landed at the bottom of the hill.

In August the club acquired an ' Olympia,' and in the comfort of this I succeeded in staying airborne for 5 hours 17 mins. I found that more difficult than any other part of the Silver ' C ' and gave a huge sigh of relief when it was over.

On May 10th, this year, I contacted a good strong thermal at 400 feet over the South edge, and circled in it up to 7,000 feet. At cloud base (3,000 feet) I decided to go away. This cloud was not as turbulent as I'd expected it to be, and when we came out at 7,000 feet we were still the right way up.

We (that is the ' Olympia ' and I) entered cloud two or three times after this but my brain got a bit fuzzy ' and the speed was anything between 30 and 70 m.p.h., turn and bank needles all over the dial. However, the ' Olympia ' remained in one piece, and we landed at a village named Markington, between Harrogate and Ripon in Yorkshire. A distance of 55 miles from Camphill.

So now I'm the very proud owner of a Silver ' C ' badge, and think myself extremely lucky to be in a club like the Derby & Lancs.



CLUB NEWS

THE YORKSHIRE GLIDING CLUB

FOR the past few weeks all our efforts have been concentrated on planning the Rally which is to take place at Sutton Bank from August 23rd to August 31st (if sufficient entries are received).

This Rally, which incidentally has the full approval of the B.G.A., is a get-together for pleasure flying rather than a formal contest, but competitions will be arranged as competitors desire, and small prizes will be awarded for the best performances during the week.

We are looking forward to meeting many old friends, and hope that those to whom the name ' Sutton Bank ' means but the battleground of barbarians in the bleak and barren North, will make the most of this opportunity to try out a splendid soaring site, one of the first to be used in this country.

It is anticipated that the usual talent will be discovered in impromptu evening entertainment, so don't hide your light under a bushel, bring out the old banjo.

Of course there's no need to wait until the 23rd . . . Come along any week-end, some of us will be there whatever the weather, wielding a paint brush or bunging up leaks in the roof in readiness for the great event.

We think we have circularised all clubs, but if by mischance we have missed out any, please take this as an open invitation.

Entry forms are available from the Hon. Sec., ' Norlands,' Middlecave Rd., Malton, Yorks., but please get your entries in as soon as possible, for owing to the nature of the site, the number of entries must be limited.

Whether you come to fly, or merely to lie in the heather and admire the view, you may be sure of a truly Yorkshire welcome.

(To continue the story of the ' Exploits of Henry ' . . . On Sunday, July 13th, he gained the height leg of his Silver ' C ', a fine example of persistence after an unsuccessful attempt of 4 hours 41 minutes on the previous Saturday).

SUZETTE PARKE, (*Hon. Sec.*).

ULSTER GLIDING CLUB

Saturday, 7th June. It is a peculiar thing that our members turn up when there is no wind and fail to come on our best soaring days ; however greedy as it may seem, Beck and Liddell ate the whole cake. They each motor-cycled the 70 miles to Downhill, rigged the ' Tutor ' and ' Gull,' and got away just before full tide with no excuse to come down until the beach was clear. Beck had 2¾ hours and Liddell 5 hours.

All the time below a drama was being enacted. 15-year-old Tommy Linton and his crew of still younger boys undertook to retrieve the trailers from the far end of the beach. The car and trailers got caught in the soft sand with the tide coming in around them and it speaks well for the courage of the new generation that by sheer digging and energy the car and trailers were saved. These youngsters merit our gratitude ; without their willing help we never would have rigged the machines let alone have flown.

The feast of beauty over this beautiful site was beyond description. Visibility was good for 80 miles around. The ' Gull ' reached cloud base at 3,000 ft., and only for the overcast might have gone higher. The air was extremely turbulent for the first two hours as though the wind was bouncing off the ceiling and causing down draughts where there should have been lift. Beck lost 800 feet in trying to reach Binevenagh and had to scurry back to the West Cliffs. In all a lovely day.

Sunday, 8th June. Still no other members turned up. The wind was light Northerly and the ridge only just soarable for about half an hour. Beck and Liddell amused themselves with light soaring in the ' Tutor.'

Saturday, 14th June. Strong North wind. We were delighted to find Duggie Cooper in residence in a Magilligan bungalow. He put us to shame by taking the ' Tutor ' through cloud to 3,000 ft., and reaching Binevenagh. Beck thrilled us with his remarkable ' ride up the face of the N.W. bowl trick ' which is ' impossible ' in a North wind.

Soaring times ; ' Tutor ' Beck 1 hour ; Cooper 1¾ hours. ' Gull ' : Liddell 3½ hours.

The highlight of the day was late supper at Martin's Cafe. Dish washing presents no problem after our young retrieving team have finished with a real Irish ham.

Sunday, 15th June. Strong N.W. wind. A typical Magilligan day. Intermittent sunshine at coast and overcast inland. Thermals to cloud base at 20 ft./sec. Under the umpiring of William Douglas, Duggie Cooper opened the bowling with 1½ hours in ' Tutor,' and then just before the tide came in Liddell went off in ' Gull ' and Beck in ' Tutor ' to record 6 hours and 3¾ hours respectively. It is delightful to know that one need not come down until the tide goes out. The ' Gull ' ploughed through the overcast to 3,300 ft. The air was very rough and both ' Gull ' and Tutor ' pilots staged a private Rodeo.

A good week-end with over 17 hours' soaring between two machines.

Is it boring to stay up so long ? Come to Magilligan on a windy day, never a dull moment.

16,000 FEET AT LONG MYND—*continued from page 17*

the ' Olympia ' still in one piece. The canopy was deeply glazed with clear ice, and wings and dive-brakes bore nearly an inch of knobbly growth. The dive-brakes were quite stuck, so I lost height fast.

I was in clear air between immense cumulus domes, whose spreading anvils almost hid the blue sky overhead : and on every side rose great cumuli, creamy yellow shaded darkly with bluish shadows. Far below, the bulging walls of the clouds met like the sides of a great gorge ; and I sank swiftly through the clear space in this crooked lane, following its twists and turns until at last I saw the sun ahead and realised I was flying south. The great clouds still hid the ground : but soon I flew out of their labyrinth and saw through a chaos of mingled cumulus and stratus the thin black thread of the Radnor railway. I swung north-west around the flank of the great cloudmass, and at 10,000 feet ran into snow falling from a spreading shelf of black stratus ; at 9,000 feet it turned to rain, and washed from the dive-brakes enough ice to allow me to hold them almost closed.

Over the Kerry hills at 7,000 feet I resolved to try once more for height, and made for a gleaming anvilled mass of cumulo-nimbus, shaded darkly on the north by its overhanging cloudcap : but, while still a mile away, I saw a vivid fork of lightning flash across the blackness, and I changed my mind. Away to the east my cloud was roaring fiercely, and its indigo base merged with the dark heather of the Mynd, hiding the hangar in rain. I flew slowly homeward across the sunlit plain while the blackness drew slowly away from the hangar and, as the rain lifted, splashed into the flooded heather by the club-house and its delightful warmth, and beer, and two o'clock Sunday dinner.

THE SAILPLANE AND GLIDER

TWENTY-ONE YEARS AGO

THE Caterpillar Club, whose membership, as all should know, is confined to those flying men who have saved their lives by parachute, has received its first recruit from the gliding fraternity.

He is Rudi Pätz, and he has written a detailed account of his adventure, which is printed in full by *Flugsport*.

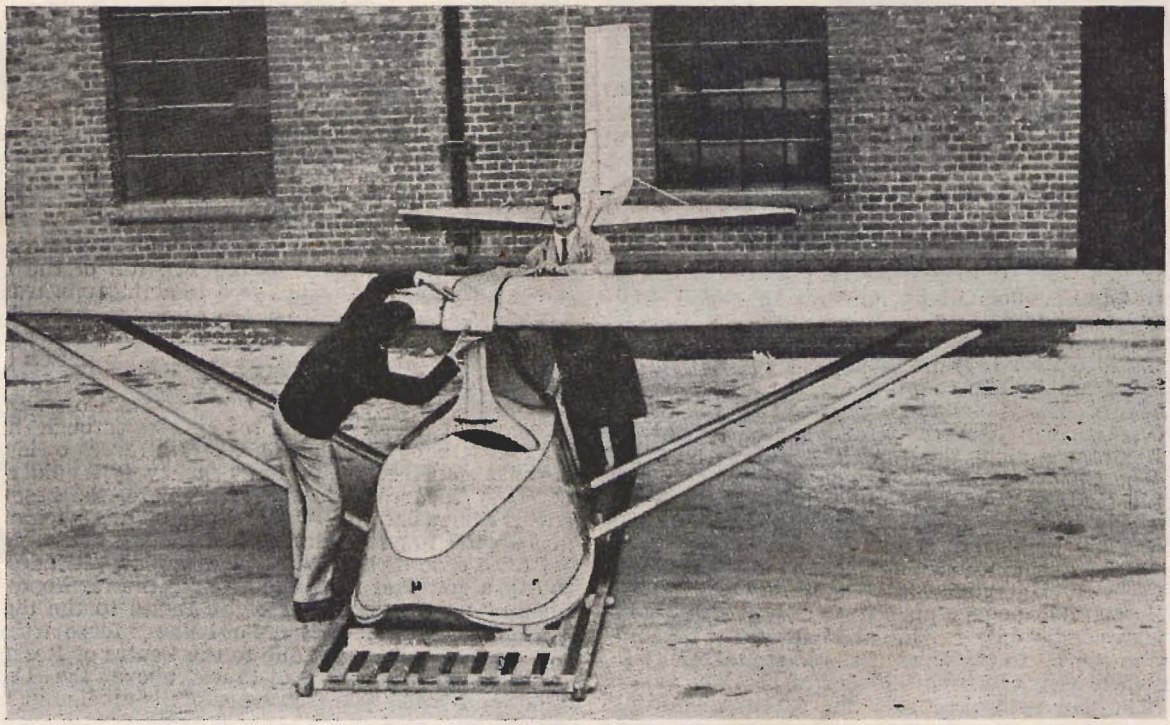
A DIFFICULT START

He was one of twelve pupils undergoing a course of training in towed flight at the Wiesbaden-Mainz aerodrome. They had hitherto been practising on the ' Falke ' type, and today the transition was to be made to a high-performance machine, the ' Cumulus,' a ' Professor '-type sailplane adapted for towed flight, with a sinking rate of over three feet per second. He strapped on his parachute (the first time he had worn one), and off he went, towed by a ' Flamingo ' at about 40 m.p.h. He found it difficult to keep at the correct relative height, as it was a day of strong vertical currents; both machines ' danced up and down,' and often one machine would be in a down current when the other was trying to go up. At about 1,300 feet the casting-off signal was given, after which the ' Flamingo ' darted down steeply and unintentionally directed its slip-stream on to the sailplane, giving it an uncomfortable few seconds.

A prize had been offered for the first flight of an hour over the town of Wiesbaden, so he made off in that direction, finding himself in rising air all the way. Over Wiesbaden he alternately rose and fell, till at last he found a good patch of air which kept him rising at two or three feet per second till he had got up to about 2,000 feet above the town; looking down, he noticed everywhere numbers of people staring up at him.

ENCOUNTERING A STORM

When he had started his flight, there had been an unbroken line of cumulus crossing the sky from S.W. to N.E., the air on the ground being almost calm with a slight drift in the contrary direction. But, during the flight over Wiesbaden, Pätz had noticed a sharp shower approaching from the S.W. He had still fifteen minutes to go to complete the hour when the storm began to cross the Rhine, and before long the first few drops were wetting his goggles, which he had ' put on again ' (this suggests that goggles are correct wear for aeroplane tow, but are discarded when free flight begins). The variometer now showed 2 metres (6½ feet) rate of rise. Pätz suddenly conceived the ambition to climb to 1,000



For Auto-towing. The latest B.A.C. product, the Bat-boat, which is a two-seat machine for towing behind a motor-boat (August 14th, 1931).

feet above the casting-off point. By the time he had reached this height (4,600 feet) the hour was up, and, as he found himself to be close under cloud base, he decided it was time to return to the aerodrome. But he could not resist the temptation to perform a last circle over Wiesbaden. And that is what proved his undoing, for a few wisps suddenly appeared below him, and the next moment he was swallowed up in the cloud. He had tried to escape by increasing the speed to 50 m.p.h., but the 'plane went on climbing ' like a lift,' so he gave up the attempt and eased the stick back again. The machine went on climbing rapidly at 10 to 13 feet per second, while the altitude rose from 6,300 feet to 7,300 feet; but, strange to say, the speed showed a tendency to increase, although the pilot pulled the stick back slowly to prevent it. The pace soon grew fast and furious; the air-speed indicator passed the 70, 80 and 90 km. mark, till at 100 km. (63 m.p.h.) the pointer had reached the end of the scale. Then suddenly there was a violent jolt; his head banged against the padded side of the cockpit, then behind, then again in front; his left hand lost its grip, his right was torn from the joystick, there was a sound of cracking and breaking, and, just as suddenly ' all was still '; he found himself alone in space, surrounded by nothing but milky-white cloud. He at once congratulated himself on having the parachute, but too soon, for the expected jerk of its opening never came. He seized the package on his back, brought it round between his legs, and tore it open, only to find it empty! He said to himself: ' Lost; 26 years, 2,000 metres; the end '; but then, on looking up, saw, to his joy, the parachute overhead; it had opened too gently for him to feel the shock.

THE DESCENT

It was several minutes before he came out of the cloud; in fact, he was evidently being kept in it by the upcurrent, which he estimated to be five metres per second, equal to the sinking rate of the parachute. But finally an opening appeared, and on looking down he saw to his surprise a sailplane flying far below. He was still more astonished when he recognised it as his own ' Cumulus,' which he had been quite convinced had already broken up in the air. He watched it land in a wood and noted a few landmarks so as to be able to find it again, and then had to attend to his own landing. This also took place in the trees (' legs crossed, hands ready to grip '), but he received nothing worse than a clout behind the ear from a branch. He found the final 50 feet of his descent to Mother Earth the most trying part of the whole afternoon's ordeal; there was no foothold on the tree trunk at all—only a few rotten stumps which tore open his pants as he slipped past.

What with that and the bleeding ear, and the rain coming down on him in buckets, when he sought refuge in a hiker's hut nearby he was taken for a tramp, until someone recognised the parachute straps for what they were. As he was taking the road back to Wiesbaden, a car rattled round the corner and there greeted him the beaming face of Mr. Sun, a Chinese pupil at the school, who but a short while before had been helping him on with his parachute, and was now among others, scouring the countryside for his remains. To crown the end of a perfect day Pätz received the 100-Mark prize for his hour's flight over Wiesbaden. No doubt the short soaring flight of the parachute could have been added in, if necessary, to make up the required total.

An examination of the machine revealed what had really happened. The pilot had been thrown out through the right wall of the cockpit, breaking through the longeron and plywood. The release cord of the parachute was still attached inside the machine; it had evidently been cut by some broken part as the pilot shot out. Apart from this damage, the structure of the machine was intact, except for a few broken ribs in getting it down from the trees.

A MORAL

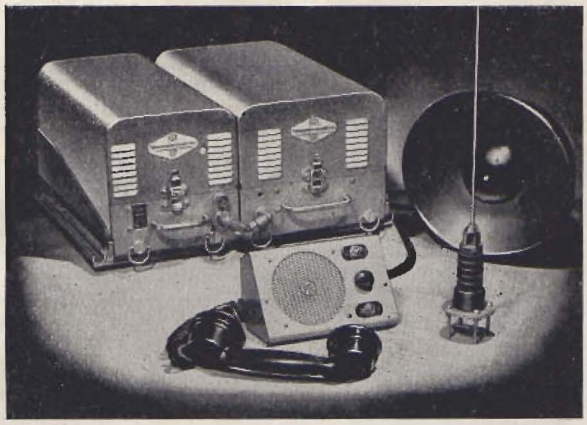
These happenings suggest at least two questions. Is a sailplane really safe inside a cumulus cloud? and, can a pilot avoid getting drawn into such a cloud against his own will? It should be noted that Pätz's cloud was not just plain cumulus, but a shower of rain, and a heavy one at that. He himself attributes the accident to his having got into ' the kernel of the storm-eddy '; apparently the Germans nowadays look on every cumulus-nimbus cloud as a miniature ' cold front,' complete with revolving eddy in the advanced part. What is more, the sailplane stood up to the strain perfectly, its only weak spot being the means by which the pilot was held in.

As regards avoiding of cumulus clouds, the above adventure is rather similar to that of Groenhoff with his two-seater ' Rhonadler ' three years ago; in each case the pilot got too close under the cloud-base and suddenly found himself surrounded by cloud before he could do anything about it. The fact is that entering a cumulus from below must be quite different from flying into its side or its top. In the latter case, there is usually a sharply defined surface which a pilot can avoid or not, as he pleases. But when a sailplane goes up into a cloud through its base, it does not strictly ' enter ' the cloud at all. What happens is that cloud suddenly begins to form in the air in which it is flying; so that a pilot who looks up at the cloud base with the intention of nosing down before he hits it, has a false idea of what a cloud-base is, and will be taken unawares. Perhaps this is the real cause of the trouble. It should surely be possible to get away from the updraught into a cloud provided that the pilot starts doing so early enough. How about the following formula: if the border of the cloud is x times as far off as the height of its base above the sailplane, then the horizontal speed of the 'plane should be at least x times its rate of ascent, in order to get beyond the border of the cloud before being drawn up into it.

(This explanation is not quite clear. In a relatively small cumulus cloud the base is usually well defined, but in a larger cumulus, e.g. a squall cloud, the turbulent motion of the air below it causes the base to be more ragged and the sailplane pilot, sitting on a rising current, is in the cloud before he is aware of it. The main upward current is generally towards the front of the cloud, while in the rear there is, frequently, a descending current. A pilot who is caught in an up-current and wishes to get out of it

TWENTY-ONE YEARS AGO—*continued.*

has to decide in which direction he is going to fly. If he flies towards the back of the cloud he will, most likely, get out of the up-current sooner than if he makes for the front edge of the cloud. In a well-developed cumulus the speed of the upward current immediately below and within the cloud may easily assume dangerous proportions.—ED.).





PYE RADIO

THE above are illustrations of the Pye Radio transreceivers as used by the British Team in Spain, and which played such a large part in their success. The set weighs only 8 lbs. as installed in the glider and works on a micro wave. Range in the air without intervening obstacles is in excess of 40 miles, but on occasion can be several times that range. Range on the ground up to 30 miles.

One set is installed in the retrieving car and by its aid Ann Douglas was able to shoot on ahead on the journey to Madrid, order rooms, give directions as to how to get there, and even to read out the menu so that the crews could make their choice and smack their lips for the last 20 miles.

These radios would be a boon to some homecoming motorists we know, in fact a boon to T.B.M's.

BRITAIN'S NEW GOLD 'C' AND DIAMOND

CONGRATULATIONS to Wally Kahn of the Surrey Club who on a recent visit to Pont St. Vincent made a goal flight of 308 kms., thus winning his Gold 'C' and a Diamond.

NOTICE

IF any reader of this paragraph knows who found the Editor's new Exacta VX 1.9 Mayer Optik camera in the bar of the Spanish Royal Aero Club at Cuatros Vientos on July 8th at about 11.0 a.m., would he please communicate with the Editor. A reward is offered for its recovery.

ROYAL AERO CLUB CERTIFICATES

(Issued under delegation by the B.G.A.) **JUNE, 1952**

CERTIFICATES	**'A'** ..	**176 (14770-14945)**
	'B' ..	**153**
	'C' ..	**34**
	Silver 'C'	**10**
	Gold 'C'	—

'B' CERTIFICATES

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
3670	F. D. Butler	No. 45 G.S.	23. 3.52
7243	R. E. Greenslade	No. 125 G.S.	31. 5.52
8468	A. MacCormick	No. 2 G.S.	8. 6.52
8498	R. T. Wingfield	No. 146 G.S.	20. 6.52
8882	E. J. Sjoberg	Bristol G.C.	14. 9.50
9034	M. J. Hodgson	Bristol G.C.	23. 6.51
10128	P. G. Cock	Cranwell G.C.	7. 6.52
10355	J. W. Borland	No. 26 G.S.	23. 4.52
11314	A. Renton	No. 26 G.S.	15. 6.52
11602	G. E. Bass	No. 22 G.S.	2.12.51
11615	G. C. French	Gutersloh G.C.	4. 6.52
12225	D. J. Philcox	No. 166 G.S.	10. 5.52
12774	R. D. Phillips	No. 122 G.S.	27. 3.52

'B' CERTIFICATES—*cont.*

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
13248	R. Illidge	Bristol G.C.	12. 6.52
13306	W. G. Scantlebury	No. 82 G.S.	25. 5.52
13336	D. A. J. Caister	No. 166 G.S.	17. 5.52
13366	B. Smitheram	No. 82 G.S.	20. 4.52
13411	M. A. Laurance	No. 166 G.S.	18. 5.52
13504	J. W. North	No. 43 G.S.	18. 5.52
13726	E. M. Hammans	No. 130 G.S.	14.10.51
13829	E. R. Bastin	No. 125 G.S.	31. 5.52
13843	M. H. Vaughan	No. 123 G.S.	24. 5.52
13937	R. Burcher	No. 83 G.S.	25. 5.52
14711	P. J. Horrell	Midland G.C.	25. 5.52
14045	D. N. Crapper	No. 49 G.S.	25. 5.52
14232	J. E. Jackson	No. 183 G.S.	24. 5.52
14557	J. McKenny	No. 161 G.S.	18. 5.52
14559	B. C. Bernet	No. 126 G.S.	21. 6.52
14770	G. Maitland-Smith	No. 45 G.S.	25. 4.52
14771	A. W. Seddon	No. 45 G.S.	25. 4.52
14773	C. H. Hansford	No. 168 G.S.	20. 4.52
14774	G. C. Poole	No. 104 G.S.	14. 4.52
14775	D. G. Roninson	Hereford G.C.	17. 5.52
14777	L. H. Plummer	Army G.C.	15. 5.52
14778	C. M. Drew	Cambridge U.G.C.	6. 2.52
14779	A. G. Tait	H.C.G.I.S.	16. 5.52
14780	P. G. Sheppard	No. 22 G.S.	27. 4.52
14781	A. Stephenson	Cambridge U.G.C.	14.10.51
14786	A. A. Wilson	No. 2 G.S.	28.10.51
14787	B. C. Whittaker	No. 141 G.S.	25. 5.52
14793	F. Kasz	No. 2 G.S.	7. 7.46
14794	R. Hillman	No. 141 G.S.	25. 5.52
14795	G. Kirby	Gutersloh	17. 6.51
14796	B. Lord	No. 49 G.S.	17. 5.52
14797	B. W. Meaby	Cranwell G.C.	16. 4.52
14798	L. E. Swain	No. 45 G.S.	25. 4.52
14799	P. E. Wheeler	No. 45 G.S.	25. 4.52
14800	K. J. Ide	No. 126 G.S.	2. 6.52
14801	R. Platt	No. 49 G.S.	25. 5.52
14802	F. A. E. Betts	No. 166 G.S.	17. 5.52
14803	J. A. Bolt	Oxford G.C.	31. 5.52
14804	T. Hagan	No. 186 G.S.	18. 5.52
14805	J. D. Roberts	No. 2 G.S.	25. 5.52
14809	J. W. L. Graham	Oxford G.S.	18. 5.52
14811	K. Allison	No. 89 G.S.	24. 5.52
14812	J. Starnes	No. 105 G.S.	18. 5.52
14814	E. W. Asheroft	No. 143 G.S.	18. 5.52
14815	J. E. Barton	No. 105 G.S.	25. 5.52
14816	P. C. Bullock	No. 87 G.S.	20. 4.52
14817	F. R. Moore	No. 188 G.S.	23. 3.52
14818	J. L. Purves	No. 2 G.S.	24. 5.52
14819	B. Stubbs	No. 130 G.S.	27. 4.52
14820	G. J. Mellalieu	H.C.G.I.S.	5. 6.52
14821	P. N. Kingwill	No. 123 G.S.	10.10.51
14822	J. H. W. Palmer	No. 146 G.S.	7. 6.52
14823	J. D. Putnam	No. 141 G.S.	18. 5.52
14824	R. A. Streather	Cambridge U.G.C.	2. 2.52
14825	J. Towse	No. 104 G.S.	8. 1.52
14826	J. F. Thurlow	No. 104 G.S.	18. 5.52
14828	L. Reid	Shorts G.C.	30. 9.51
14829	R. M. Cowburn	Fassberg G.C.	13. 2.52
14830	C. D. Clarke	No. 106 G.S.	25. 5.52
14831	P. Temple	No. 43 G.S.	18. 5.52
14832	B. W. Towersey	No. 141 G.S.	25. 5.52
14833	J. W. Duck	H.C.G.I.S.	6. 6.52
14834	T. G. Price	No. 186 G.S.	8. 6.52
14836	J. F. Stevens	No. 87 G.S.	27. 4.52
14837	A. W. M. Cunningham	Celle G.C.	15. 9.51
14838	R. H. Heathcote	H.C.G.I.S.	27. 4.52
14840	P. A. Macnaghten	Midland G.C.	2. 6.52
14841	R. R. Warbuton	No. 186 G.S.	23. 3.52
14843	W. A. Weaver	No. 125 G.S.	24. 2.52
14844	B. E. Fytche	No. 22 G.S.	2.12.51
14845	S. J. Hill	No. 22 G.S.	8. 7.51
14847	J. D. French	No. 22 G.S.	16.12.51
14848	A. C. Smith	No. 22 G.S.	16.12.51
14849	G. E. Holland-Martin	No. 123 G.S.	27. 1.52
14850	J. W. Fulford	No. 123 G.S.	8. 6.52
14851	P. J. Odling	No. 146 G.S.	11. 6.52
14852	D. W. Stowe	Bristol G.C.	6.10.51
14853	R. T. Bowden	No. 146 G.S.	8. 6.52
14854	A. V. Turner	No. 183 G.S.	6. 6.52
14855	R. A. White	No. 130 G.S.	27. 4.52
14857	I. W. Hardie	Derby & Lancs. G.C.	8. 6.52
14858	E. R. Mackenzie	Hameln G.C.	5. 6.52
14860	G. W. Smith	Derby & Lancs. G.C.	8. 6.52
14864	R. J. Hogan	No. 201 G.S.	19. 7.46
14866	E. K. Goldthorpe	No. 23 G.S.	15. 6.52
14867	J. H. McKew	Fassberg G.C.	10. 4.52
14868	T. H. Perolls	Portsmouth N.G.C.	15. 6.52
14869	R. V. B. Smith	No. 43 G.S.	8. 6.52
14870	H. B. Veasey	No. 168 G.S.	4. 5.52
14871	S. J. Warwick-Fleming	Portsmouth N.G.C.	16. 6.52
14872	W. M. Lacey	Celle G.C.	1. 3.52
14873	W. J. Cumpston	Scharfoldendorf	14. 4.52
14874	M. J. Chamberlain	No. 123 G.S.	17. 5.52
14575	I. Mackay	No. 2 G.S.	8. 6.52
14878	M. R. Conner	No. 141 G.S.	8. 6.52

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'B' CERTIFICATES—*cont.*

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
14879	J. W. Garland	No. 146 G.S.	25. 5.52
14880	G. I. F. Thomson	H.C.G.I.S.	3. 6.52
14881	M. E. S. Evans	Bristol G.C.	10. 6.52
14883	J. B. Parkinson	Cranwell G.C.	16. 4.52
14884	G. C. Bonnar	No. 2 G.S.	5. 4.52
14885	T. Cook	No. 2 G.S.	13. 4.52
14886	J. C. Sharkey	No. 2 G.S.	23. 3.52
14887	G. R. Barrell	No. 23 G.S.	15. 6.52
14888	B. W. Chadwick	No. 2 G.S.	1. 6.52
14889	A. R. Cowlin	No. 104 G.S.	16. 6.52
14890	J. M. Mitchell	No. 2 G.S.	14. 6.52
14894	L. R. S. Freestone	Scharfoldendorf	11. 6.50
14898	A. M. Moseling	H.C.G.I.S.	19. 6.52
14899	A. A. Redman	No. 89 G.S.	20. 4.52
14901	W. J. Unwin	No. 23 G.S.	18. 6.52
14902	A. G. R. Jetty	No. 104 G.S.	15. 6.52
14903	D. A. Smith	No. 141 G.S.	20. 4.52
14904	A. J. Topp	No. 2 G.S.	8. 6.52
14905	E. J. Utteridge	No. 146 G.S.	14. 6.52
14906	M. J. White	No. 45 G.S.	18. 5.52
14910	R. N. Belgrove	Surrey G.C.	27. 5.48
14911	F. E. Heenan	Heron G.C.	15. 7.51
14912	T. Jackson	No. 146 G.S.	14. 6.52
14913	Jessie M. Ruffle	London G.C.	24. 9.49
14914	G. Laughton	No. 141 G.S.	16. 3.52
14915	W. F. Woodward	No. 141 G.S.	18. 5.52
14916	R. A. Hills	No. 141 G.S.	23. 3.52
14917	C. F. Cook	No. 122 G.S.	22. 6.52
14918	L. A. Ware	No. 2 G.S.	18. 5.52
14919	P. H. Weavin	No. 83 G.S.	25. 5.52
14921	D. R. Jones	No. 89 G.S.	15. 4.52
14923	A. A. George	Hameln G.C.	13. 4.52
14924	L. Zietara	No. 105 G.S.	22. 6.52
14925	R. C. Balls	No. 104 G.S.	22. 6.52
14926	A. McGilvary	No. 2 G.S.	25. 5.52
14927	A. W. Neal	No. 146 G.S.	19. 6.52
14928	J. C. Riddell	Cambridge U.G.C.	26. 3.52
14938	P. J. Fitz	No. 104 G.S.	22. 6.52
14939	L. Hartley	No. 22 G.S.	22. 6.52
14940	L. A. Kernaghan	No. 146 G.S.	25. 5.52
14941	T. L. M. King	No. 104 G.S.	14. 4.52
14942	F. A. Abbott	Cranwell G.C.	25. 5.52
14943	R. G. A. Norcott	No. 106 G.S.	15. 6.52
14944	L. J. A. Maisonpierre	Cranwell G.C.	2. 6.52
14945	J. M. van Leempoel	Perak G.C.	20. 4.50

'C' CERTIFICATES

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
3758	F. Rawlings	No. 130 G.S.	10. 6.52
9034	M. J. Hodgson	Bristol G.C.	19. 4.52
9442	W. Small	Midland G.C.	7. 5.52
10425	R. A. E. Goode	Fassberg G.C.	20. 5.52
10475	J. M. Drummond	Cranwell G.C.	7. 5.52
11536	F. Hughes	No. 42 G.S.	14. 4.52
12522	E. Martin	Derby & Lancs. G.C.	6. 6.52
13147	B. R. Wright	Bristol G.C.	23. 4.52
13182	J. G. B. Daniell	Bristol G.C.	26. 4.52
14187	D. J. Carey	Col. of Aeronautics	25. 5.52
14365	R. Tringham	Midland G.C.	2. 6.52
14376	A. Brown	Western Area Club	20. 4.52
14768	H. Currel	R.A.F. Binbrook	11. 6.52
14610	P. G. Johns	Wahn G.C.	8. 6.52
14711	P. J. Horrell	Midland G.C.	3. 6.52
14751	L. Stockdale	H.C.G.I.S.	11. 6.52
14778	C. M. Drew	Cambridge U.G.C.	20. 3.52
14781	A. Stephenson	Cambridge U.G.C.	20. 3.52
14793	F. Kasz	No. 2 G.S.	19. 7.51
14795	G. Kirby	Gutersloh G.C.	29. 1.52
14824	R. A. Streather	Cambridge U.G.C.	28. 5.52
14829	R. M. Cowburn	Fassberg G.C.	13. 3.52
14837	A. W. M. Cunningham	Celle G.C.	19. 4.52
14840	P. A. Macnaghten	Midland G.C.	2. 6.52
14852	D. W. Stowe	Bristol G.C.	7. 6.52
14872	W. M. Lacey	Celle G.C.	19. 4.52
14873	W. J. Cumpston	Scharfoldendorf	2. 6.52
14894	L. R. S. Freestone	Scharfoldendorf	13. 6.50
14910	R. N. Belgrove	Surrey G.C.	17. 6.48
14911	F. E. Heenan	Heron G.C.	10. 6.52
14913	Jessie Ruffle	London G.C.	7.11.49
14923	A. A. George	Hameln G.C.	19. 6.52
14928	J. C. Riddell	Cambridge U.G.C.	15. 6.52
14945	J. M. van Leempoel	Perak G.C.	7. 1.51

SILVER 'C'

No.	*Name.*	*A.T.C. School or Gliding Club.*	*Date taken*
375	G. G. Lee	Scharfoldendorf	20. 5.52
376	G. Kirby	Scharfoldendorf	9. 5.52
377	J. Hodgson	Scharfoldendorf	2. 6.52
378	R. H. Adair	Scharfoldendorf	24. 5.52
379	I. D. Gray	Scharfoldendorf	24. 5.52
380	C. Hughes	Derby & Lancs. G.C.	7. 6.52
381	G. H. Nixon	London G.C.	7. 6.52
382	Dorothy Bell	Hameln G.C.	21. 5.52
383	R. G. Frechville	Derby & Lancs. G.C.	3. 6.52
384	L. R. S. Freeston	Scharfoldendorf	19. 5.52

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