Sailplane and Glider

The First Journal devoted to Soaring and Gliding

OCTOBER 1951

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Sailplane and Glider

Founded in 1930

and ULTRA LIGHT AIRCRAFT

THE FIRST JOURNAL DEVOTED TO SOARING AND GLIDING

OCTOBER 1951 ★ Vol XIX No 10

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COVER PHOTO:

The Derbyshire and Lancashire Gliding Club's '21 B' flying at Camphill. Taken by J. C. Reussner. 1/150 sec. at f11, X2 filter.

Editorial

GLIDING has no part in politics, but it is remarkable how many totalitarian countries such as Russia, Yugoslavia, Poland, Hungary and Rumania have provided gliding free and how many others for the same reason are providing it free or almost free for all those who wish to participate. Among these, are France, Sweden and Spain. The reason is not that they wish to see their boys and girls cavorting about the skies, but purely a Defence reason, which is that they wish to establish a large reservoir of technically-minded and technically-able labour which modern Air Forces demand.

It is noticeable that in the U.S.A. and to a certain limited extent in Great Britain gliding people have to pay for themselves. The limit in Great Britain is that the A.T.C. are doing, and have done, a great work in introducing the Youth of Britain to the air, and the Kemsley Fund subsidizes a certain amount of the flying here and also publicity about it though not in *Sailplane*.

We are informed that the reason gliding has not been subsidized in this country during the years of the Socialist Government is that it is a rich man's sport and for that reason A.T.C. gliding was allowed because it restricts its opportunities to a type of pupil who would not otherwise be able to enjoy it.

Now we are not among those who would advocate a subsidy just so that it would become cheaper for those devotees who would glide anyway and are doing so now. We believe that a New Age is upon us in which Air Transport will become almost as ubiquitous as motor-coach travel. We also believe that it can do no harm if we have a vast reservoir of youthful people, and their elders, who understand the technicalities of flying and even of the simple mechanism of assembling and dismantling a glider. The recent enormously successful S.B.A.C. Show at Farnborough showed that the interest is there and it only wishes to have the opportunity and it will show itself. This is another angle from having gliding 'laid-on,' which is the greatest argument against a subsidy since it leads to a complete lack of initiative and self-help, but it is one which has to be borne in mind when arguing about State Aid for gliding. If on the other hand the development of a Defence Value of gliding leads to a general increase in the number of participants, provided that they pull their weight and are not just spoon-fed trainees, that is all to the good and we are sure that the gliding movement in Great Britain would co-operate whole-heartedly with any scheme which could be operated on a basis of payment by results as was the C.A.G. Scheme before the last War.

We recur to this subject because we feel that if there is a change of Government in this country in the next few weeks, and we make no secret of our heartfelt wishes in this matter, some such scheme might be operated by a Government with a greater sense of Defence responsibility.

What is wanted in Great Britain to-day is a great resurgence of our National Spirit, which need not be expressed in terms of Arms and Armaments, but can and should be exemplified by a high-spirited morale which by its own moral force is able to sway the minds of men and the direction of events. We would like to see such a spirit in the gliding movement in Great Britain but, as we have indicated before, it would require certain changes in the government of the movement to enable this to express itself. We believe that these changes are on the way and the next year or two may well see our movement reaching upwards to its highest level of endeavour and achievement so far ever imagined. New blood and new ideas are coming forward, which was inevitable in any case, but what we feel is important is that they appear to have the right ideas.

Incidentally it may be news to all concerned, that we hear from Germany that at the F.A.I. Meeting to consider the venue of next year's International Competitions, the Argentine representative was instructed to offer to pay the expenses of any would-be entrants and crew if the Competitions were held in that country. Compromise on Spain was probably the most sensible thing to do as three weeks in Spain anyway will take a large slice out of most people's leisure time for next year, especially those who are the most likely selections for the tea, and its helpers.

The organisers of our National Competitions must have opened their eyes wide when they read of the fifty-thousand crowd which attended the two-day Wasserkuppe Meeting in Germany at which there was very little flying. This argues well for German gliding enthusiasm and we shall have to work very hard indeed if we are to hold our own in competition flying in the next few years against renewed German Competition.

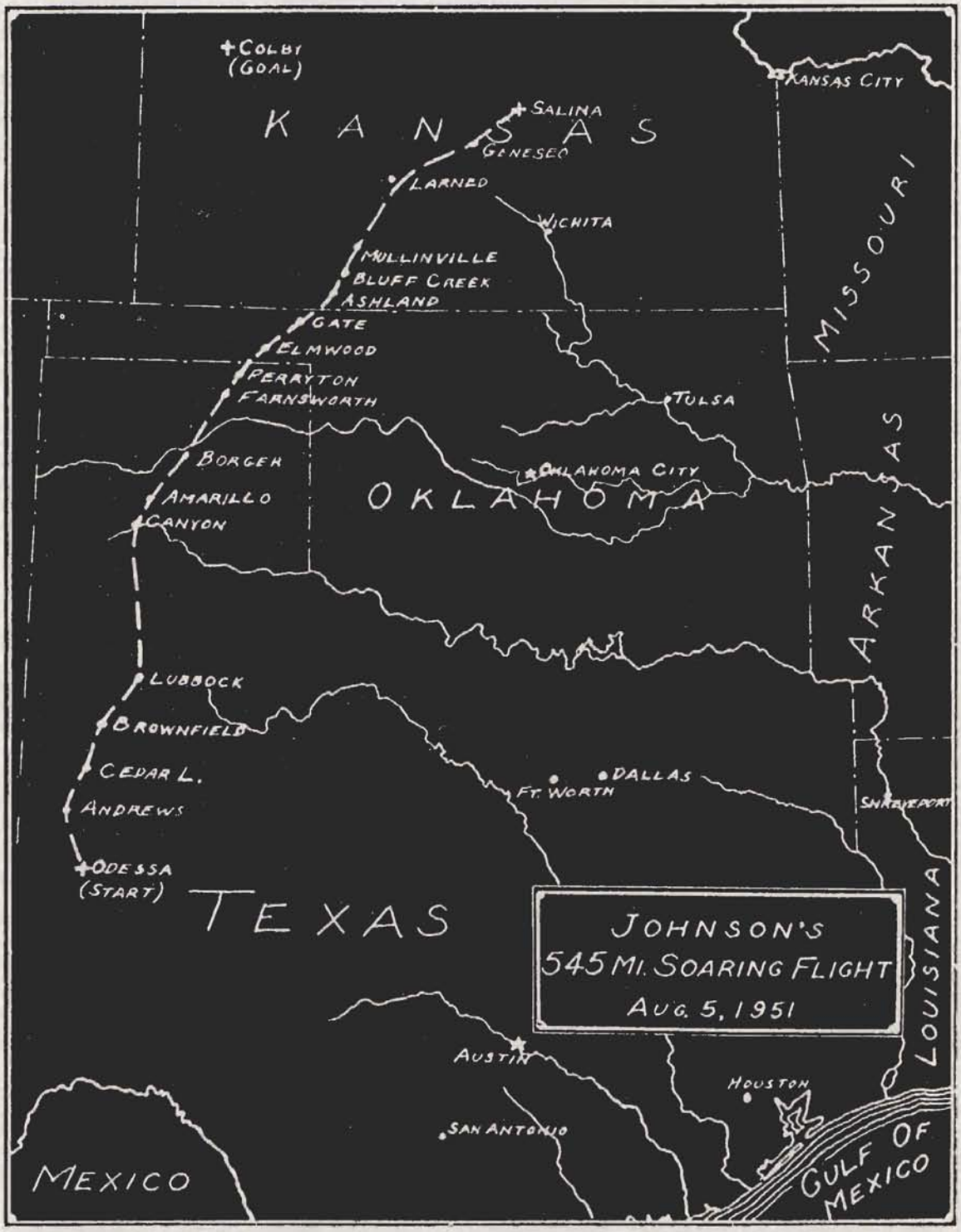
545 MILES IN A SAILPLANE

By RICHARD H. JOHNSON

On August 5th, this year, Richard H. Johnson flew from Odessa, Texas, to Sky Village Airport, Salina, Kansas, a distance of 575 miles (545 miles in a straight line), in his 'RJ-5' sailplane. This flight, which has been homologated by the F.A.I., established a **New World Distance Record.** *The record was previously held by a Russian pilot Mlle. Klepikova, with a flight of 465 miles in 1940. Johnson broke the American Distance Record with a flight of 360 miles on July 6th, from Harris Hill to Norfolk, Va., during the 18th American National Soaring Contest, which he won for the second year running.*

This picture of 'Dick' Johnson in his 'RJ-5' was taken after he had won the 17th American National Contests last year

LAST summer during the 17th National Contest I made three rather successful flights from Grand Prairie to various points in West Texas, and of course I was quite impressed with the thermal velocity and high cloud base that I found there. My final flight of the meet was to a goal at Odessa, Texas, where Jack Stafford, the donor of its goal prize resided. Odessa looked like a wonderful place from which to


COLBI
(GOAL)
SALINA
GENESEO
LARNED
WICHITA
MULLINVILLE
BLUFF CREEK
ASHLAND
GATE
ELMWOOD
PERRYTON
FARNSWORTH
BORGER
AMARILLO
CANYON
LUBBOCK
BROWNFIELD
CEDAR L.
ANDREWS
ODESSA
(START)
KANSAS
OKLAHOMA
TEXAS
MEXICO
KANSAS CITY
MISSOURI
TULSA
OKLAHOMA CITY
ARKANSAS
DALLAS
FT. WORTH
SHREVEPORT
LOUISIANA
AUSTIN
HOUSTON
SAN ANTONIO
GULF OF MEXICO
JOHNSON'S
545 MI. SOARING FLIGHT
AUG. 5, 1951

record distance flying. ' Pop ' Krohne spent some time there just after the National and his reports of his flights in his ' Comet L-K ' confirmed what I had seen.

A YEAR'S MODIFICATION WORK

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

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

Pat Mulloy with his ' Schweizer 1-23 ' and I arrived there July 24th, and we both made a local survey flight the following day to familiarize ourselves with the area. I had a very interesting ride when a squall line passed the vicinity. In front of the roll cloud the climb was about 5 metres/sec. and I had some difficulty staying low enough to stay out of the thunderhead whose base was about 11,000 A.S.L. With the dive brakes open and the airspeed at 70 m.p.h., I was able to reduce the rate of climb to a more moderate value. I flew upwind over the top of the roll cloud and under the thunderhead until I was on the back side of the storm and out of the lift area. The sun was shining and there was little rain now. I could not find lift after that and glided down to a landing about an hour later.

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

403 MILES WAS PRACTICE

July 27th looked promising so I set out as early as possible. Taking off at 10.45 a.m. was a little early as the air was smooth above 2,000 feet. I released at 2,800 feet anyway and had to descend to 1,800 feet before lift was encountered. The thermals quickly grew stronger and I was on my way. However, by noon, the little cumuli which started to form at 11.00 a.m., had turned into occasional cumulonimbus. This made endless detours necessary and of course slowed down progress. However, it was a thrilling flight and I did end up 403 miles away, near Johnson, Kansas.

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

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

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

Most of the pilots took off that day for a try at their Golden and Diamond ' C ' distance legs. Since there was a shortage of retrieving drivers, my driver, Joan Brouillette went, after Joe Irvine and I chased off after Shelly Charles. The day was better than I had anticipated, and it was after midnight before I got to Shelly who landed 348 miles away—almost to Colorado. This completed his Diamond ' C '—number 2 for the U.S.A. Joe went 290 miles.

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

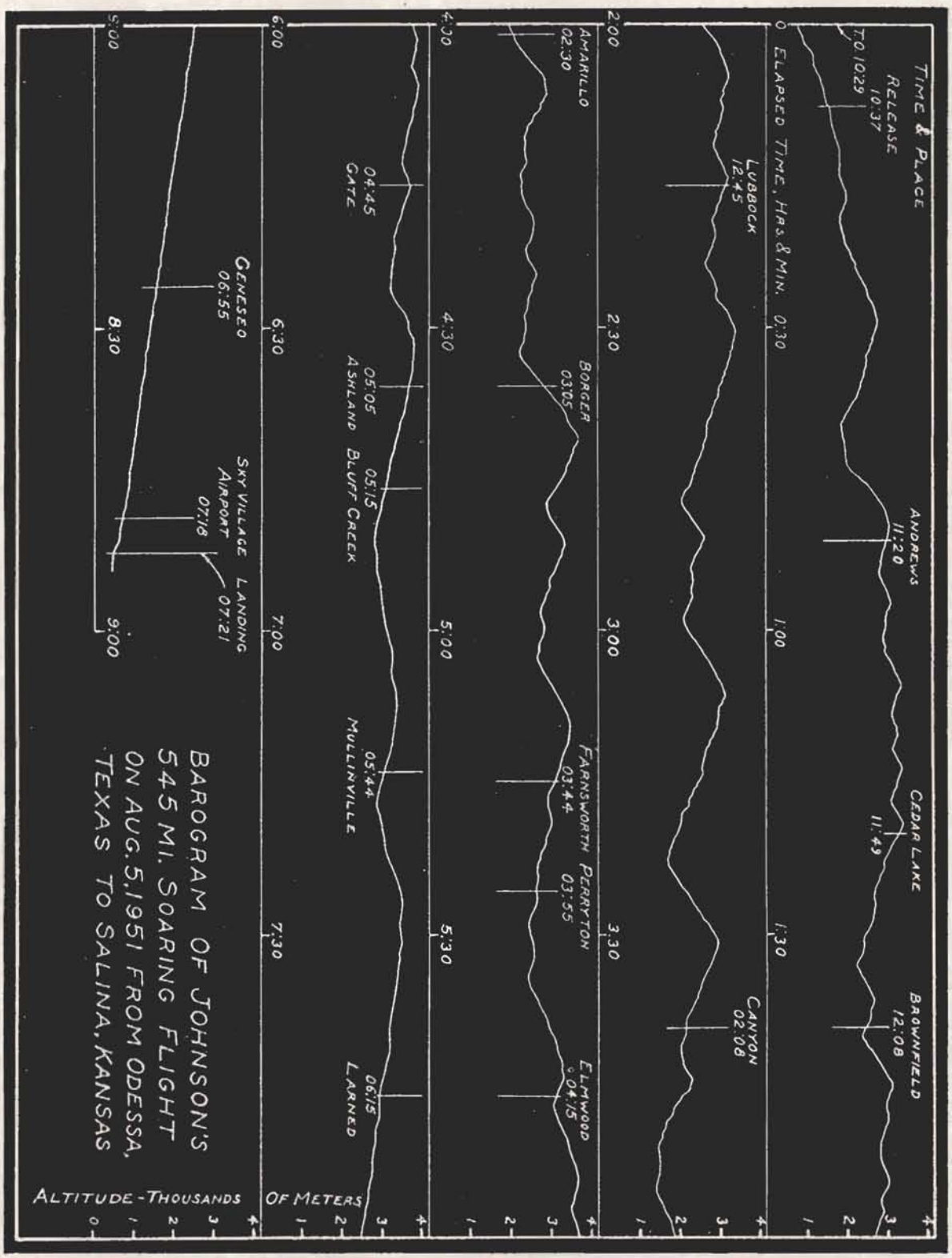
STROKE OF FORTUNE

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

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

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

Now that conditions were better I increased the indicated airspeed from 65 m.p.h. to 75 m.p.h. in accordance with that indicated most efficient by my cruising speed chart. This chart is merely the curve


TIME & PLACE
RELEASE 10:37
TO 10:29
ANDREWS 11:20
CEDAR LAKE 11:49
BROWNFIELD 12:08
ELAPSED TIME, HRS & MIN. 0:30
1:00
1:30
LUBBOCK 12:45
CANYON 02:08
2:00
2:30
3:00
3:30
AMARILLO 02:30
BORGER 03:05
FARNSWORTH 03:44
PERRYTON 03:55
ELMWOOD 04:15
4:00
4:30
5:00
5:30
04:45 GATE
05:05 ASHLAND
05:15 BLUFF CREEK
05:44 MULLINVILLE
06:15 LARNED
6:00
6:30
7:00
7:30
GENESEO 06:55
SKY VILLAGE AIRPORT 07:18
LANDING 07:21
8:30
9:00
BAROGRAM OF JOHNSON'S 545 MI. SOARING FLIGHT ON AUG. 5, 1951 FROM ODESSA, TEXAS TO SALINA, KANSAS
ALTITUDE - THOUSANDS OF METERS
4
3
2
1
0

of best cruise speed *vs.* the thermal average rate of climb, which is calculated using the flight polar of the sailplane and assuming an average downdraft between thermals.

From now on the going was good—just hopping from one small cumulus to another. Every half-hour, if I could remember to do it, I marked my position and time on the maps so that we could later analyse the trip. The table on page 223 gives these check points in the first column, the time in the second, the distance and altitude in the third and fourth. In the fifth column I have corrected the arrival time for the altitude that I had when over the point, using an average rate of climb of 400 feet/min. and correcting back to take-off altitude. This gives the time that one would arrive if he did not spend more time climbing but merely arrived there at 2,990 feet A.S.L. Using this, one can get the true cruising speed.

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

A SERIOUS DECISION

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

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

DOWN TO 1,800 FEET

This worked well until my luck ran out south of Amarillo. I found myself down to 1,800 feet above the ground and only zero sink available. This was costing me and I knew it. There was one small dust devil to my left about two miles, but I did not go there but kept on downwind hoping to save time. 1,600 feet—that darn ground looked awfully close—what a sad ending to my 500 mile flight this would make. By the time I saw another dust devil two miles upwind I was ready for anything and turned around to get it. When I arrived there only 1,400 precious feet of altitude was left but I was going up in the weak lift.

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

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

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

MOST CRITICAL STAGE

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

There still were some thermals but they were decidedly weaker so I moved along more cautiously now. When the Kansas border came by (04.50 p.m.), I was working anything that could make the vario-meter read 1 metre/sec. I now had almost 12,000 feet near Ashland, Kansas, but there was not much between me and some beautiful large cumuli west of Kinsley, which was 50 miles away. I shifted to high L/D cruise and painfully waited until I got there. By utilizing one weak thermal I go there with 9,000 feet and was very happy to find 1 metre/sec. lift at my end of this long line of large cumuli that appeared to be a weak squall line or front.

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

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

At 06.15 p.m. I had 9,530 feet A.S.L. Salina, Kansas, was directly on course but its closest airport was 79 miles away still and it was 1,270 feet A.S.L. This gave me 8,260 feet to cover the 79 miles in, a

minimum glide ratio of 50.5 was necessary to get there for a downwind landing. I wasn't too optimistic about it but kept on course anyway.

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

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

Place Checking Points	*Time* 10.29	*Distance Miles*	*Altitude* 2,990 *ft.*	*Corrected Time using* 400 *ft./min. R/c.*	*Time between Points— Min.*	*Speed between Points— m.p.h.*
Odessa	10.37	—	5,300	10.31	31	67.8
N. Andrews	11.20	35	10,230	11.02	27	66.7
Cedar L.	11.49	30	11,180	11.29	25	64.8
E. Brownfield	12.08	27	8,520	11.54	31	62.0
Lubbock	12.45	32	11,000	12.25	92	63.3
E. Canyon	02.08	97	7,480	01.57	23	36.5
E. Amarillo	02.30	14	6,960	02.20	29	82.7
Borger	03.05	40	9,570	02.49	37	77.8
S. Farnsworth	03.44	48	10,350	03.26	14	55.6
Perryton	93.55	13	8,930	03.40	16	75.0
S. Elmwood	04.15	20	10,500	03.56	26	64.6
S. W. Gate	04.45	28	12,100	04.22	21	80.0
S. Asland	05.05	28	11,900	04.43	14	64.3
Bluff Cr.	05.15	15	10,080	04.57	28	42.8
W. Mullinville	05.44	20	10,020	05.25	34	86.4
S. E. Larned	06.15	49	9,530	05.59	51	58.8
Geneseo	06.55	50	4,900	06.50	31	56.1
Sky Village Airport	07.18	29	1,270	07.21	—	——
Landing	07.21					
		Total 575 Miles			Total 8.83 Hours	Average 65.2 m.p.h.

GERMANY GLIDES AGAIN

50,000 SPECTATORS AT WASSERKUPPE MEET

by our Special Correspondent, G. H. Waugh

Birthplace of Soaring

THE Glider Meeting at the Wasserkuppe in the Hohe Rhöhn on 25th and 26th August, 1951, was the first important event held by the German Aero-Club since its re-admittance into the Fédération Aéronautique International and the withdrawal of the ban on German gliding.

There have been meetings of Gliding enthusiasts at the Wasserkuppe since the war at the weekend nearest to the anniversary of the death of Otto Lilienthal, the Pioneer of Gliding, and the place is, of course, the birthplace of soaring and therefore a sacred spot.

It was, in fact, at a meeting organized by Wolf Hirth here last year that the German Aero-Club was re-founded spontaneously as a result of the unexpectedly large attendance. This year's event was organised by the Segelfugkommission of the Deutscher Aero Club and despite very great difficulties which arose out of a last minute postponement of the event for a fortnight for political reasons, the organisation was excellent and the event was a complete success.

Attendance was quite remarkable and it was estimated that there were over 12,000 spectators on the Saturday afternoon and on Sunday over 30,000; the Police, in fact, estimated 50,000 spectators and 4,000 vehicles.

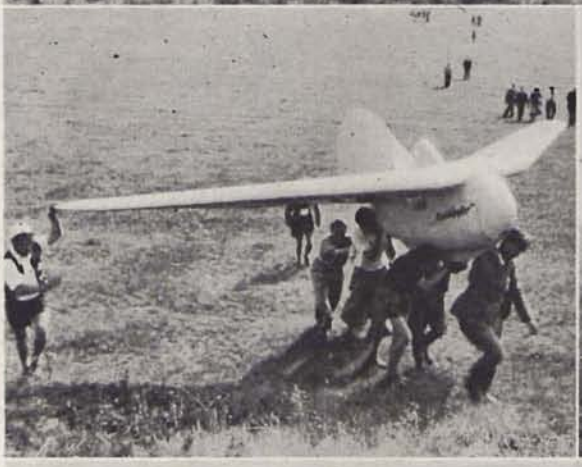
Herr Wolf Hirth, President of the German Gliding Club, and a famous pioneer of Gliding is seen talking to Air Commodore L. R. S. Freestone, O.B.E., Chairman of the Association of B.A.F.O. Gliding Clubs, who was representing the C.M.C., B.A.F.O., at the Wasserkuppe Meeting

AMAZING ENTHUSIASM

When it is realised that a great many of these walked 10 kms. uphill from the nearest Railway Station in Gersfeld and that the majority who came by motor vehicle had travelled 300 or 400 kms. it is possible to gain some idea of the enthusiasm of the German people for gliding as a sport and of the future prospects for German gliding.

Many of the spectators arrived on Saturday evening and were unable to find accommodation in the neighbourhood so they spent the night wandering about singing and making a prolonged party of it, yet the next day they were there, full of cheerfulness and thoroughly enjoying themselves and ready to give a hand with lifting and pushing gliders if the opportunity presented itself

It should be made clear that the accommodation arrangements were excellent, as a billeting office had been opened in the Rathaus at Gerfeld, the little town sponsoring the event, and all the bookings



Top—Two-seater ' Mu ' is a very interesting new type which made its first public appearance. Note crowd in background. Centre—Left : ' Heuhopfer ' (Hayhopper) being transported back for another launch. Right : Guy Marchand is enthusiastic about the ' Doppelraab.' Behind him the designer, Fritz Raab, left, World Record Holder, Ernest Jachtmann. Bottom—' Akaflieg,' two-seater, constructed by a number of enthusiasts at Munich. This is a two-seater (1½-seater) of steel tube construction

which had been made through the German Aero-Club were honoured but the number of visitors without booking exceeded anything the organizers had anticipated. Gersfeld and the entire neighbourhood were filled to overflowing but every effort was made to make the visitors comfortable and the meals available showed the advantages of the absence of rationing.

At the gliding site throughout the two days the scene was more like a Race Meeting in England than anything else except for the absence of Bookmakers, and the Refreshment Stalls and 'Hot-Dog' Stalls added to the resemblance. The site is one of the most attractive that can be imagined and the scenery from the top of the Wasserkuppe in all directions is most beautiful. For gliding it would be perfect but for the fact that the border of the Russian Zone of Germany is within a few kilometres which is a great handicap as it would be most undesirable to fly over the border.

The weather for the two days was somewhat mixed. Saturday was quite good and the writer attained a height of over 800 metres with a 'Kranich' belonging to the British Club at Wahnerheide, which was one of the two aircraft sent to the meeting to demonstrate Allied good-will to the reborn German gliding movement, the other being a 'Minimoa' which was brought from Scharfoldenhorf by F/Lt. Osland, the C.F.I. of the H.Q. B.A.F.O. Gliding Club

WOLF HIRTH'S HIGH REPUTATION

This aircraft gave very great pleasure to the President of the German Aero-Club, Herr Wolf Hirth, who is, of course, the designer of the 'Minimoa' and who takes a very great interest in all his surviving 'daughters' and their present 'husbands.' Wolf Hirth, more than anyone else, is responsible for the revival of German gliding through the high reputation he holds with the Allies and the Germans alike and through the policy which he has strenuously maintained of insisting on the sporting side of gliding being kept to the forefront of the German ambitions through the difficult years.

There were 15 gliders of different types at the meet but three were turned down by the Inspection Board of the Aero Club which is setting a very high standard. The flying was purely a demonstration, any idea of a competition being impracticable because of the proximity of the political border.

The arrangements for flying control and the safety precautions were excellent. Every pilot was required to produce evidence of his flying experience and was issued with a special licence for the event which had to be handed over to the flying Control Officer before each flight. The Aero Club insisted upon Third Party Insurance for the gliders and had made arrangements for Insurance representatives to be at the official H.Q. for the purpose of issuing special Insurance Policies for the event.

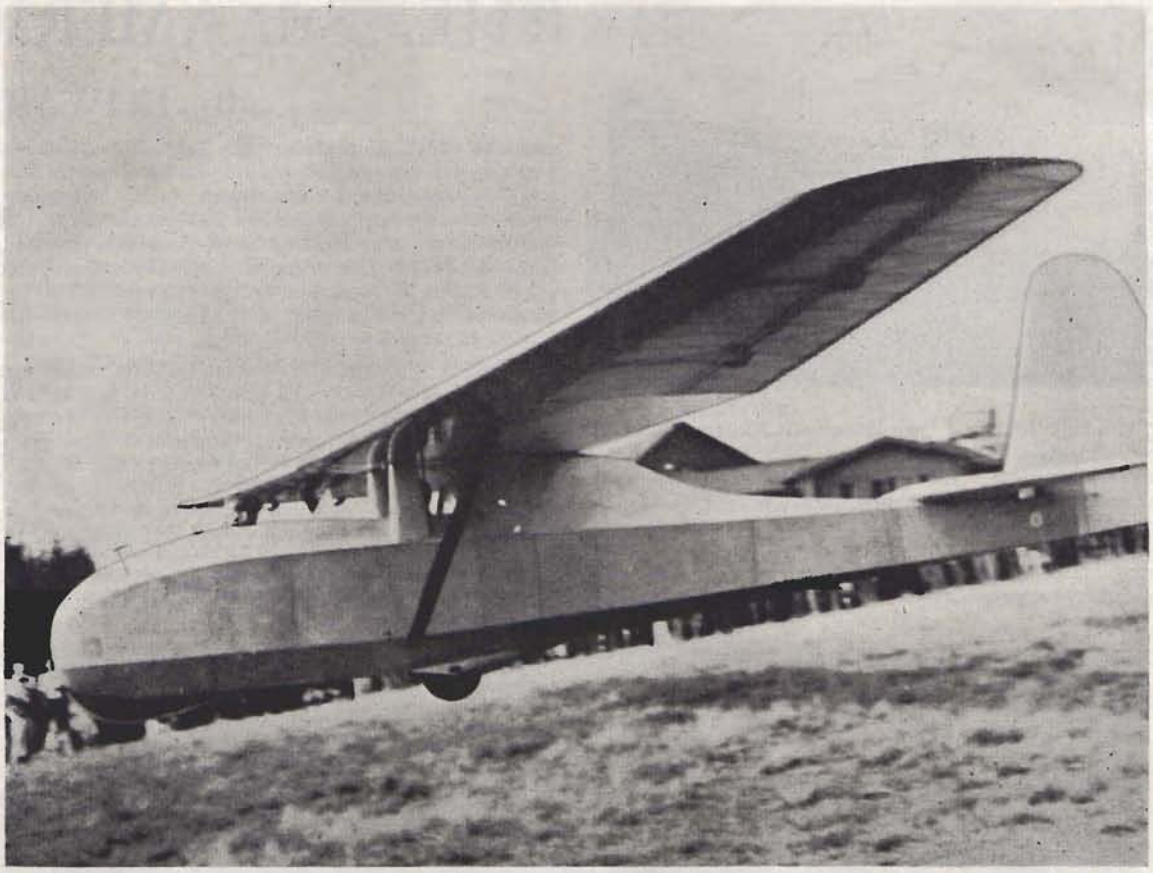
The arrangements for controlling the crowds were very good and the German Police managed the spectators quietly and efficiently, so that the whole atmosphere was cheerful and good tempered throughout. The enthusiasm of the spectators was quite remarkable and they really took some managing, but they responded to the requests to keep in line and there were no serious incidents. The large proportion of the spectators wearing glider pilots badges was very interesting.

"WALKEY-TALKEY" COMMUNICATIONS

Communications between the start points for the gliders and the winches was by means of American 'walkey-talkey' radio sets which proved most efficient. The new winches worked well and the winching was of a high standard.

The weather on Saturday was good at times for soaring, but on Sunday it became overcast and flying was suspended for a time because of cloud low enough to produce I.F.R. conditions in which

Commentator of American Forces Network in Germany in Wahnerheide Gliding and Soaring Club 'Kranich,' before doing his broadcast from the air. German youth looks on. Two other broadcasts were done from the 'Kranich' by German Radio Networks



Two-seater built by manufacturers of the famous ' Grünau Baby.' An interesting new type which made its first appearance at the meeting

gliding is not permitted under the present regulations in Germany.

The most interesting new type of aircraft was probably the two-seater ' Mu ' which made its first public appearance. It follows the construction of the famous ' Mu-13,' having a welded steel tube fuselage fabric covered, while it is designed for economical production and intended to sell at a price well within the means of the new and struggling gliding clubs. Its performance seems very close to that of the ' Kranich ' which was certainly not designated down to a price. The writer flying the ' Kranich ' in the same lift as the ' Mu ' and formed the impression that the rates of sink were very similar although the speed of the ' Kranich ' is probably higher.

TWO-SEATER DEVELOPMENT

Another interesting new type was a two-seater development of the ' Grünau.' This is also designed for cheap production and with a view to economical repair costs, but the second seat is decidedly cramped and really intended for an experienced instructor to give dual instruction to advanced pupils. There is a strong reaction amongst the gliding clubs in favour of dual instruction method of teaching and the two-seaters certainly attracted a great deal of interest.

The new ' Grünau III Single-Seater ' appeared to be a very worthy descendant of the famous ' Grünau Baby.' It has a single wheel and a nose skid which seem to be a very practical arrangement especially as the skid is very well sprung.

There were two examples of the boom-type of fuselage, but these were built by small flying groups and were not factory productions and did not appear to have flying characteristics above the average.

A privately built Pterodatcyl type of glider with a vertical fin and rudder attracted a lot of attention. It is very small, 6 m. span, but it appeared to be rather an amateur effort and did not arouse any desire on the part of the writer to fly it; only sympathy for the pilot who does. It did not fly at the meet.

A brand-new reproduction of the famous ' Zögling ' trainer was flying. Its story is typical of many of the gliders in Germany today as it was built by a woman dentist, an old glider pilot, in the kitchen of her home. Originally intended for the Glider Museum at the Rhön, and the standard of workmanship certainly qualified it for a show piece, it was decided to bring it out for flying at this meeting and it flew very well. (*Continued on page* 237.)

THE 18th AMERICA

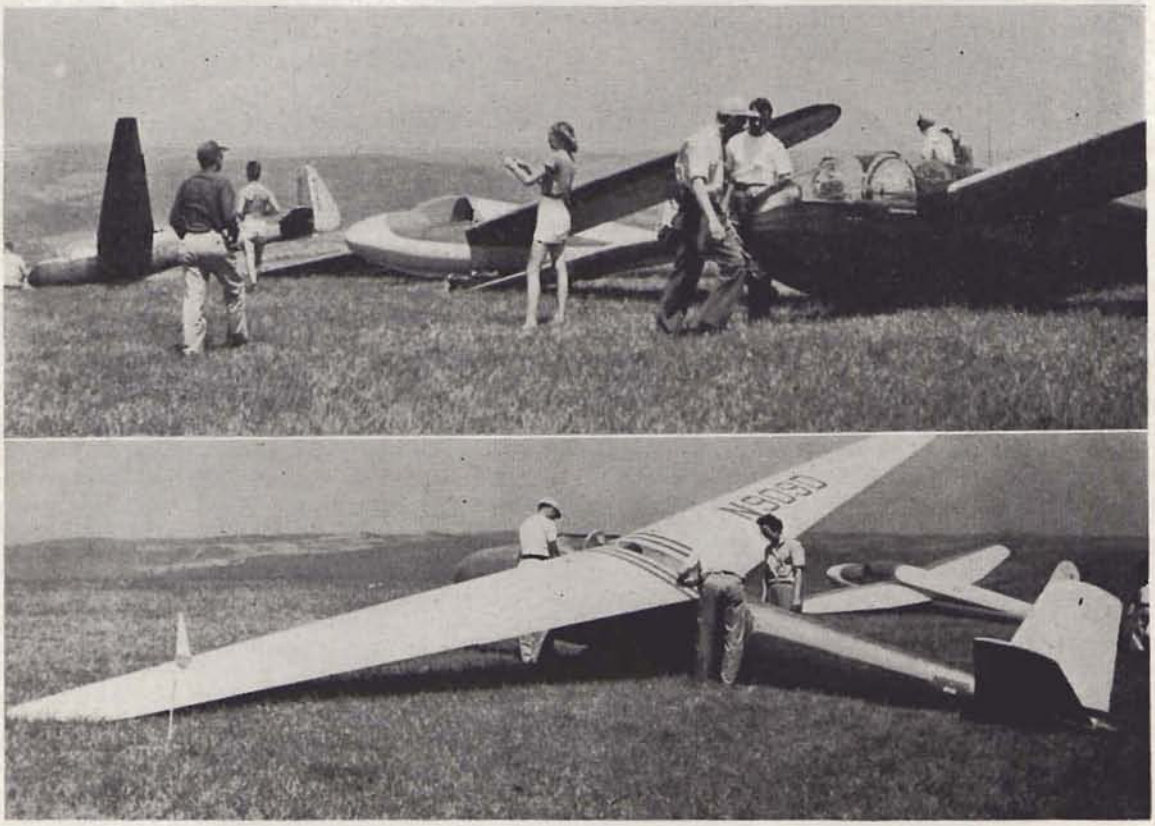
By HOWARD E.

ON July 12th the 18th American National Soaring Contest came to a close. Never before in the history of U.S. National Contests have we been plagued with so much precipitation, yet it should stand with the best, as a successful competition.

July 4th greeted the contestants with a drenching rain. The pilots occupied themselves with last minute touches to their ships while contest officials completed pilot registrations. In the afternoon movies of Waves experienced in Austria, Switzerland, Sweden and Iceland were shown by Karl Ovgard of Sweden. Slides of the 1950 International Soaring competitions at Orbero, Sweden were shown by Captain Ralph Barnaby, U.S.N., Retired. In the evening the pilots and crews were entertained by a square dance held in one of the hangars atop famous Harris Hill.

July 5th the rain and low ceiling continued until after 1.00 p.m., when 13 pilots finally got into the air to utilize the brisk north-west wind on the ridge, most of them for Silver 'C' attempts. Low ceiling and poor visibility terminated most of the flights in the late afternoon, but Larry Gehrlein of Erie, Pennsylvania managed to ride it out and thus completed his five hours required for his Silver 'C.'

Friday, July 6th promised to be an excellent day according to the briefing given by Barney Wiggen,



Top—The ships which won the first three places. Left to right: 'RJ-5,' first place, flown by Dick Johnson; 'Schweizer 1-23,' *third place, flown by Bill Coverdale; and the 'Excess Too,' second place, flown by Stan Smith. Bottom—Shows the outstanding new design at the meeting—the 'T-3,' designed and built by Kemp Trager. Sheet metal fuselage with wooden wings and tail surfaces*

N NATIONAL CONTEST

BURR—OUR SPECIAL CORRESPONDENT

Chief Meteorologist. Take-offs started at 11.00 a.m. with Dick Johnson, 1950 soaring champion, being first away. Dick released at about 200 feet above the brow of the hill, continuing his flight with the help of the ridge for some time before getting away for a new American distance record of 360 miles. Johnson's towering flight should not over shadow that of Charles J. Smith who flew a ' Schweizer 1-19 ' utility 67 miles, a flight worthy of comment.

July 7th promised to be more of what was experienced the day before, but with not quite the life and vitality. Action bore out the forecast as it was one o'clock before the first ship finally got away. As Dick Johnson was still not back from his sojourn into Virginia, another open day according to the rules, was in order. The outstanding flight of the day proved to be that of Fritz Compton who fell short of his goal and return flight to Scranton, Penn. by 6 miles.

July 8th was elected to be the first task day of the meet by the Contest Board. Norwich, New York was selected as the goal and the task was to be the Beechcraft Speed Event. Thirteen pilots completed the goal with Dick Johnson placing first, averaging 51.5 m.p.h.; Richard Ball second at 39.2 m.p.h.; and Ray Parker third at 38.3 m.p.h. This event was well timed as the 76 mile flight made it possible for the pilots to attend the Schweizer Lawn Party in the evening.

July 9th was elected an open day, but proved to be a poor day in which most pilots had difficulty remaining in the air. There were only four flights which exceeded the 25 mile minimum. They were :

Johnson	..	128 miles	.. 128 points
Coverdale	..	99 miles	
Wiberg	..	76 miles (goal)	
Miller	..	52 miles	

According to the rules Johnson gained 128 points as this was his second open day of competition. Wiberg, Coverdale and Miller gained no points as all three had two previous open day flights which had been further. Thus, Johnson was the only pilot to contribute to his score.

July 10th was again voted as an open day by the Contest Board. Take-offs started at 11 but a large number of ships had to return to the field for a second start, as conditions did not prove to be as good as they looked.

The longest flight of the day was Coverdale's flight of 107 miles, but the most dramatic was that of Stan Smith. Stan selected Dansville as his goal for a goal and return flight. Late in the afternoon at least an hour after thermal activity had apparently ceased and many of the field personnel were enjoying a swim in the pool, Stan appeared overhead at about 1,000 feet gliding down to complete his 104 mile goal and return flight which moved him from third to second place. Johnson still maintaining his first place position with ease.

The outlook for July 11th was not too promising and lack of evidence of (*continued on page* 230)

Where they got to on

FRIDAY, JULY 6th, 1951

In Order of Distance	*To*	*Miles*	*Points*
1. Johnson, Richard	Norfolk, Va.	360	360
2. Coverdale, William	Egg Harbor, N.J.	213	213
3. Wiberg, Wally	Newcastle, Del.	181	181
4. Smith, Stanley	Wilmington, Del.	175 Goal	210
5. Schweizer, Paul	York, Pa.	149	149
6. Cunnyngham, Noel	Allentown, Pa.	130	130
7. Frutchy, William	Clark Ferry, Pa.	117	117
8. Reeves, E. J.	Lykens, Pa.	107	107
9. Darling, Dana	Avoca, Pa.	82 Goal	99
10. Jednacz, John	Avoca, Pa.	82	82
11. Santilli, Alcide	Sugar Notch, Pa.	80	80
12. Daggert, Lynd	Scranton, Pa.	74 Goal	89
13. Lehecka, Emil	Falls, Pa.	70	70
14. Orban, Steve	Tunkhannock, Pa.	65	65
15. Smith, Charles*	Tunkhannock, Pa.	65	65
16. Miller, Delbert	Williamsport, Pa.	62 Goal	74
17. Carris, Bernard	Mehoopany, Pa.	60	60
18. Ball, Richard	Lopez, Pa.	55	55
19. Seaman, Richard*	Towanda, Pa.	38	38
20. Block, Winthrop	Ulster, Pa.	28	28
21. Klitgord, Howard	Ulster, Pa.	28	28
22. Gehrlein, Larry*	East Troy, Pa.	27	27
23. Yerger, Leonard	E. Smithfield, Pa.	25	25

* Class ' C ' Category.

thermal activity delayed take-offs until the middle of the afternoon. Most pilots landed short of the 25 mile minimum required for contest points. Two pilots exceeded this minimum. Steve Bennis flew 47 miles and Dick Johnson completed a 34 mile distance and return flight.

July 12th was a decisive no contest day as drenching rains prevailed. Scheduled for the day was the Scientific meetings of the Soaring Society of America. The following papers were presented :—

Meteorology : Chairman—Dr. A. Raspet :

Possibilities of Soaring on the Jet Stream—J. Kuttner.

Sailplane Design Criteria Based on Thermal Distribution—B. H. Carmichael.

Theory of Cross-Country Soaring on Waves—J. Kuttner.

Aerodynamics : Chairman—Ernest Schweizer :

Aerodynamic Considerations of the 'RJ-5'—A. Raspet and R. H. Johnson.

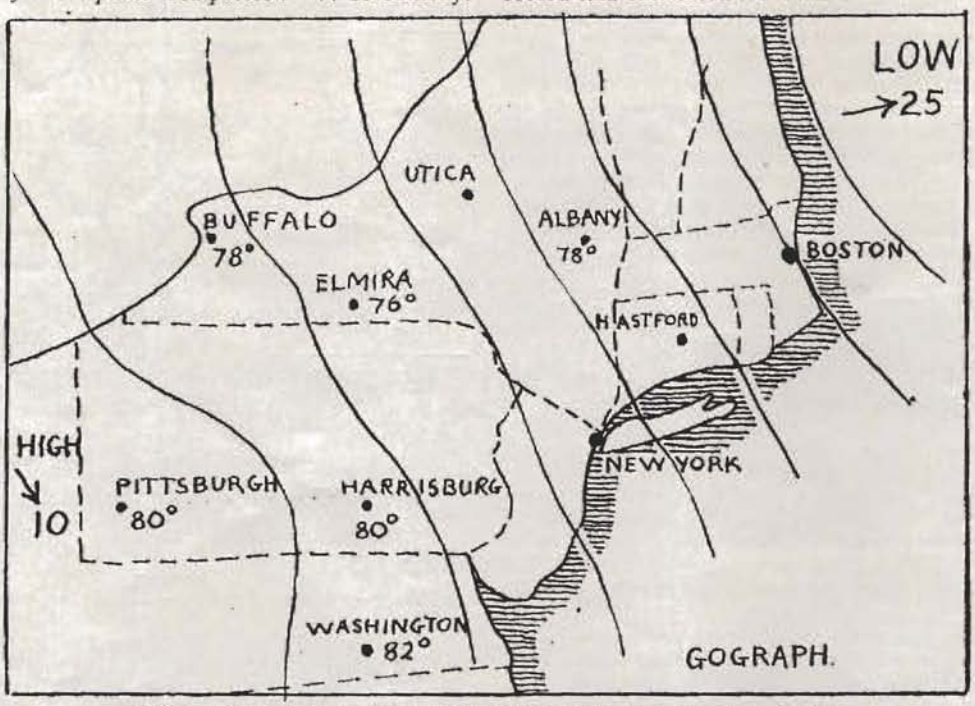
Criteria for Sailplane Comparison—V. Seredinsky.

Structural and Aerodynamic Considerations of the 'V' Tail—B. H. Carmichael.

In the evening at the awards banquet Dick Johnson received the coveted DuPont trophy retaining his title as National Soaring Champion for 1951. Total points—579. Second place was won by Stan Smith with 447 points, while third place went to Bill Coverdale with 435 points. Dick Johnson was the winner in the high performance class or class A. Wally Wiberg with 395 points was winner in class B or the sailplane class, and Charles J. Smith was winner in class C or the utility class with 105 points.

With the advent of the awards banquet the 18th National came to a close. We are pleased to report that one of our top pilots, Mr. E. J. Reeves, is up and about after experiencing a hard landing on the 9th.

Thus, amid discussions of boundary layer control and wing tip vorticies, Harris Hill spent most of the final day of the contest protruding into the clouds as mute evidence that she again holds her rightful place in the soaring world, as a new national distance record had emanated from her bosom.



U.S. Weather Bureau, Harris Hill Station, Elmira, N.Y.

SOARING FORECAST — FRIDAY, 6th JULY, 1951

General.—Rising pressure and a flow of cool dry air from the north-north-west will prevail throughout the operations area.

Clouds.—Cumulus will form with surface temperature 70. Base 28–32 HND. above surface, tops in a few cases 48–52 HND. Mid-afternoon cumulus west of main Allegheny ridges, surface temperature 75–80, will have bases at 60–80 HND., few isolated tops 150. Clouds will peter out east of the main ridges.

Winds Aloft.—SFC. 330–25 mph ; 2–330–28 ; 4–340–32 ; 6–340–28 ; 8–340–26 ; 10–340–26 ; 15–330–24.

Thermal Speed.—DRY 3–8 ft/sec. incrg. aftn. to 8–15 ft/sec. CLOUD 8–12 ft/sec. incrg. aftn. to 15–20 ft/sec. N.B.—For every upward movement there is an equal and opposite downward disappointment.

Note.—Under the cities is the prevailing maximum temperature for the period. There are no symbols. Cloud heights are given in *hundreds of feet* above sea level. The winds aloft in *thousands of feet.*

e.g. 2. 330–28 means at 2,000 feet the winds are forecast to be from 330° at 28 m.p.h.

NEXT MONTH

GUY BORGÉ fans will be sorry not to see his usual excellent article this month which was to have been on ' The Centre of Beynes-Thiverval.' This, owing to space difficulties, has been held over until November.

Other features include :—

The second part of K. G. Wilkinson's article, ' The Design of Sailplanes for High Performance ' is one of the many interesting technical articles which will appear. Others include ' Dynamic Soaring ' by Heinz Kensche, and ' The Principle of Thermals ' by H. Wermouth Jensen (Denmark).

An interesting story about a Research Institute for Soaring Flight, which has been founded in the Argentine, ' The Construction of the High Performance Two-Seater Mu-13E ' Bergfalke ' ' and data on the Horten HO-XV ' Glen Antu ' (Sunbeam) will also be published.

There is also, in lighter mood, ' My First Cross-Country ' by J. H. C. Bennett.

U.S.A. CONTESTS

Final Placings

	Pilot	Ship	Total Points
1.	Johnson, Richard	RJ-5	579
2.	Smith, Stan	Excess Too	447
3.	Coverdale, William	1-23	435
4.	Wieberg, Wally	L-K	395
5.	Schweizer, Paul A.	1-23	357
6.	Compton, Francis	L-K	316
7.	Ball, Richard	L-K	274
8.	Miller, Delbert	1-23	266
9.	Reeves, E. J.	1-23	262
10.	Frutchy, William	1-23	252
11.	Carris, Bernard	L-K	245
12.	Trager, Kemp	T3 Trager	230
13.	Lehecka, Emil	L-K	205
14.	Jednacz, Joan	TG-2	204
15.	Cunningham, Noel	L-K	196
16.	Santilli, Al	L-K	162
17.	Darling, Dana	L-K	140
18.	Seaman, Richard	2-22	117
19.	Downsbrough, George	1-23	105
20.	Smith, Charles	1-19	105
21.	See, Clarence	1-23	104
22.	Yerger, L.	L-K	97
23.	Klitgord, Howard	1-23	91
24.	Orban, Steven	L-K	91
25.	Parker, Raymond	1-23	91
26.	Sweet, Floyd	L-K	91
27.	Dagget, Lynn	TG-2	89
28.	Schmid, Allen	L-K	63
29.	Woodward, Betsy	L-K	57
30.	Schillberg, A.	L-K	54
31.	Gehrlein, Lawrence	2-22	53
32.	Bennis, Stephen	L-K	47
33.	Austin, Warren	1-20	33
34.	Smith, Thomas	1-19	33
35.	Block, Winthrop	Chardon CS-32	28

The Design of Sailplanes for High Performance

An Analysis of the Basic Requirements for Maximum Performance in Thermal Soaring

By K. G. Wilkinson, B.Sc., D.I.C., A.F.R.Ae.S.

1. INTRODUCTION

A sailplane designer will normally base a new design on his experience of the relative success of various earlier types in competitive flying and will be guided by a few simple performance criteria such as minimum sinking speed, glide ratio and the less precisely defined property of 'penetration' (this being, roughly, the ability to achieve a good glide ratio at a high forward speed). This empirical approach has resulted in the evolution of an aerodynamic form of considerable efficiency. It is not easy, however, to see precisely why the present form has proved so effective or what potential development lies ahead. One reason for this is that none of the criteria mentioned is an absolute index of efficiency nor does it represent the range of operations that a sailplane is called upon to cover in practice. A clearer insight demands a deeper analysis of the basic requirements for sailplane performance, to see whether a more effective index of efficiency can be found. Such an index is developed in this paper and the effectiveness of varying the main design parameters is examined with its aid

In defining the scope of this study it must be explained that sailplanes may be designed to have characteristics best suited to one of a variety of conditions. The most widely useful type has evolved from thermal flying experience. Mountain soaring (as in the Swiss Alps) requires, possibly, some sacrifice of performance in the interest of agility; thus the larger spans developed for thermal flying will be less advantageous. High altitude work in standing waves brings with it such engineering developments as pressure cabins (as took place at D.F.S. in Germany during the war), but involves a less intricate aerodynamic and performance problem. It is therefore appropriate in the first place to study the performance characteristics of the thermal flying sailplane.

2. SOME AERODYNAMIC CONSIDERATIONS

2.1 Basic Data on Wing Sections

A fundamental obstacle to certainty in aerodynamic design has been the scarcity of reliable data for the sailplane designer. Wind tunnel tests at Göttingen on suitable wing sections were published in the 1920s: these data were at about the correct order of Reynolds numbers for sailplanes and formed the basis for early design work. In spite of subsequent development of improved wind tunnel techniques and increased knowledge of the influence of turbulence, nothing very useful has been added to this early knowledge until very recently, when N.A.C.A. published results (Ref. 1) on a number of wing sections tested during a programme designed to aid helicopter development. Many of these tests were carried out over the complete range necessary for the sailplane designer; furthermore, the data were obtained in low turbulence tunnels so that a further important parameter was correctly represented. The reason for the virtual absence of useful test data during this long period is that the main trend of aerodynamic research has been in the interests of large fast aircraft calling for optimum characteristics at Reynolds numbers of no concern to the sailplane man. Attempts to make use in sailplanes of wing sections designed for powered aircraft have not been conspicuously successful and the older Göttingen sections have remained the best available until the present time.

FIGS. 1, 2 and 3 have been developed from Refs. 1, 2 and 3 to show the new light shed on section characteristics by the recent work. FIGS. 1 and 2 are

REFERENCES TO LITERATURE

(1) Loften and Smith. Aerodynamic Characteristics of 15 N.A.C.A. Airfoil Sections at Seven Reynolds Numbers from $0{\cdot}7\times10^6$ to $9{\cdot}0\times10^6$. *N.A.C.A. Tech. Note No.* 1945, October 1949.

(2) Loften and Bursnall. The Effects of Variations in Reynolds Number between $3{\cdot}0\times10^6$ and 25×10^6 upon the Aerodynamic Characteristics of a Number of N.A.C.A. 6-Series Airfoil Sections. *N.A.C.A. Tech. Note No.* 1773, 1948.

(3) Abbott, Doenhoff and Stivers. Summary of Airfoil Data. *N.A.C.A. Rep.* 824, 1945.

(4) W. Spilger. Flugleistungsmessungen an verschiedenen Segelflugzeugen. *Jahrbuch der Deutschen Luftfahrtforschung*, Bd. I S 293, 1937. (*N.B.* Data from this reference was reproduced in the *Journal of the Royal Aeronautical Society* for August 1948 in an article by B. S. Shenstone.)

(5) W. Spilger. Weitere Flugleistungsmessungen an Segelflugzeugen. *Jahrbuch der deutschen Luftfahrtforschung*, 1938.

(6) Hans Zacher. Ergebnisse der Leistungsmessung und Flugeigenschaftsprüfung des Segelflugzeuges D30 'Cirrus'. *Mitteilungen der Flugtechnischen Fachgruppen und Arbeitgemeinschaften Folge* 6/Sept. 1944.

(7) *Flugzeug Typenbuch*, 1944.

(8) Dr Karl O. Lange. Thermals at low altitudes. *Soaring*, Sept.-Oct. 1945.

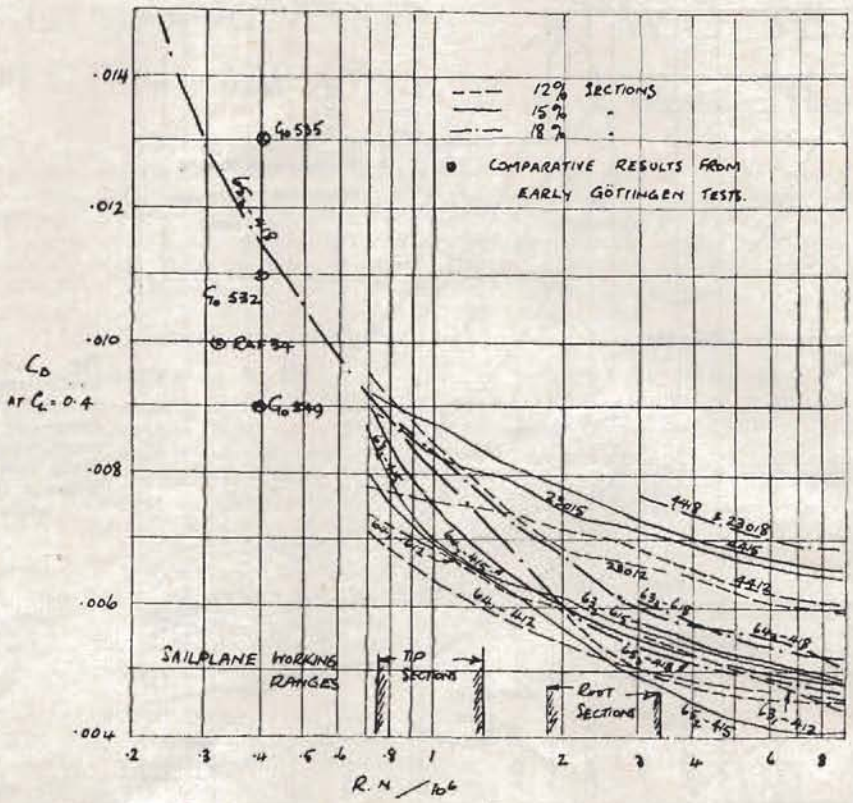


Fig. 1.—Drag coefficients at $C_L = 0.4$ over a range of Reynolds Numbers from low turbulence tunnel tests

plots of section profile drag against Reynold's number at constant lift coefficient. Two lift coefficients have been chosen; 0·4 represents a typical value for fast cruising flight and 1·0 is characteristic of conditions near to the minimum sinking speed. Spot points for successful sections from the old Göttingen series are also shown though these are not directly comparable, because tunnel turbulence was certainly much higher than for the more recent tests.

It is clear that of the older sections the 230 Series N.A.C.A. Sections are not very suitable and that although the 44 Series are satisfactory at low forward speeds ($C_L \simeq 1{\cdot}0$), they are far from the best in fast cruising conditions.

From the range of newer N.A.C.A. Sections tested it appears that, broadly speaking, the best results can be obtained by use of a high design lift coefficient of between 0·4 and 0·6 and design minimum pressure point not further aft than 0·4 chord from the nose. 64_1-612 and 64_3-418 are apparently good choices from those tested for tip and root sections. The benefit to be gained from the use of these sections is apparently large, but it must be remembered that the tests were made on perfect models, whereas the normal sailplane wing is far from perfect with the structural methods currently in use.

Further data on maximum lift coefficients are given in FIG. 3 which again show the new sections to good advantage. The vast difference between maximum lift at sailplane and powered aircraft Reynold's number is noteworthy. Although not demonstrated here, the stall characteristics of the new sections are also much superior to 230 series sections and are indicative of trailing edge flow separation.

Of the old Göttingen sections, the most popular were Gö 535 and 549. Lippisch's Fafnir II used a section similar to Gö 652 (10 per cent camber at 0·5c, 17 per cent thickness at 0·2c): Gö 535 (6 per cent camber at 0·4c, 16 per cent thickness) has been used widely on such types as Grunau Baby, Sperber Junior and Kranich, and the less cambered Gö 549 (5 per cent camber at 0·35c, 13 per cent thickness at 0·32c) on the Weihe. These sections all operate effectively at relatively high lift coefficients: Gö 549 appears to have very similar characteristics to N.A.C.A. 4412, while Gö 535 and 652 have even higher maximum lifts at the expense of higher drag in the cruising range. (At RN $0{\cdot}4 \times 10^6$ the lift coefficients at which appreciable profile drag increase starts are 0·9, 1·2 and 1·5 for Gö 549, 535 and 652 respectively.)

Although the recent tests establish the relative merits of some suitable sections for an ideal wing surface finish, it is certain that the average run of current construction will not permit these results to be achieved in practice. Comparison with calculated drag coefficients suggests that laminar flow probably exists up to 50 per cent chord at $C_L = 0{\cdot}4$ for the two best sections shown in FIG. 1. This would be most unlikely to happen with a spar ridge at 30 per cent chord. From the point of view of predicting sailplane performance, therefore, the later

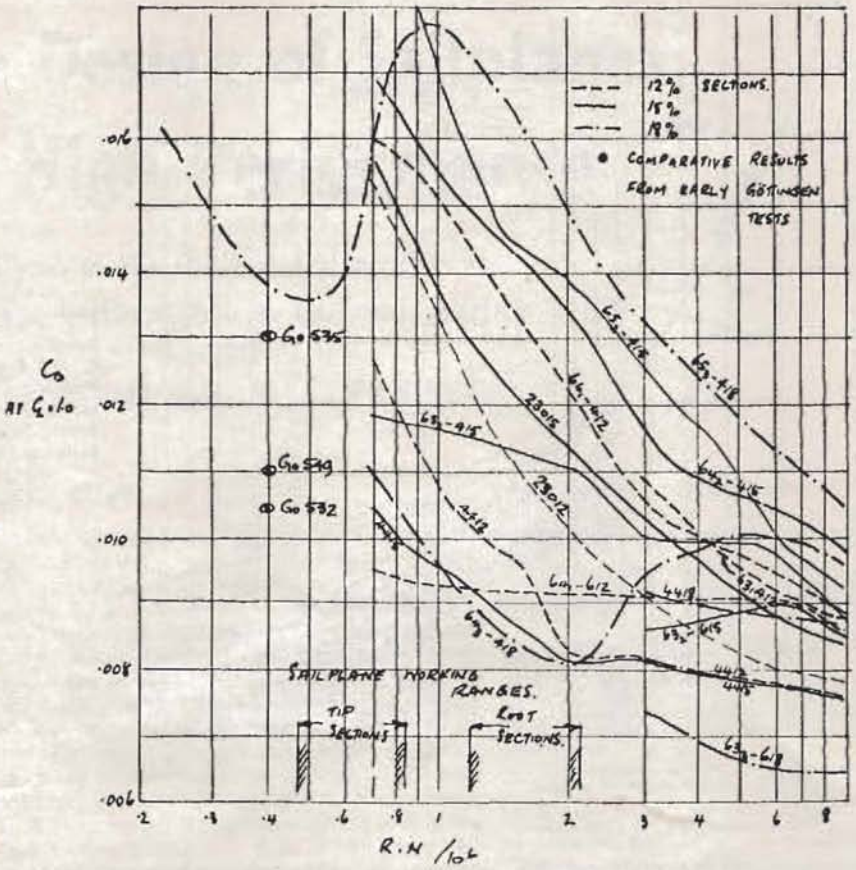


Fig. 2.—Drag coefficients at C_L=1·0 over a range of Reynolds Numbers from low turbulence tunnel tests

tests are not much more useful than the earlier ones, unless we are contemplating a wing with a perfect surface.

2.2 Flight Test Data on Sailplanes

In the situation outlined in 2.1 the only reliable way of predicting trends is first to analyse the flight performance of complete aircraft and find out whether the results can be explained in terms of some self-consistent method of predicting component drags. Fortunately, good test results are available both from pre-war German work (Refs. 4 and 5) and post-war work (unpublished) of Flight Test Groups of the British Gliding Association working under an experimental contract from the Ministry of Supply. In all, data are available on sixteen sailplanes from these sources; TABLE I summarizes the principal characteristics of the sailplanes (they are arranged so far as possible in chronological sequence according to design date).

With the exception of the uncertain derivation for the Reiher, all data were obtained by carefully executed partial glide tests during which forward speed and sinking speed were measured by calibrated instruments.

Drag polars for ten of the sailplanes have been reproduced in FIG. 4 to show typical results. The data have been plotted as curves of C_D v. C_L^2 to show readily the range over which a linear relationship exists between C_D and C_L^2.

It is regretted that owing to pressure on space, we are unable to print Figs. 3 and 4 and Table I referred to in the above article, reproduced by the courtesy of *Aircraft Engineering*. These will, however, be published with the second part of K. G. Wilkinson's article to appear in the next (November) *Sailplane*.

ROYAL ENGINEERS' FESTIVAL AIR DAY

OVER 6,000 spectators were present at the Royal Engineers' Festival Air Day held at Rochester Airport on July 28th. In perfect weather, all types of aircraft from balloons to helicopters were presented to give an idea of the part played by aviation in military development over the past 70 years. The variety of aircraft displayed was made possible by the kind assistance of the Royal Navy, The Royal Air Force and many aircraft manufacturers.

PIONEERS OF FLYING

The Sappers were the pioneers of military flying. They manned observation balloons in 1885, and in 1907 the first British airship was flown from Aldershot to London by Colonel Capper, R.E. Three years later Lieut. Cammell, R.E., piloted a 'Bleriot' monoplane on the first flight by a British Army aeroplane.

Out of the R.E. Air Battalion formed in 1911 to create '. . . . a body of expert airmen,' emerged the Royal Flying Corps in 1912, so from then on the Sappers came down to earth again, proud to have initiated in England this revolutionary change in the art of war.

However, in 1934, the connection with the air was resumed with the formation of the R.E. Flying Club. It now has two branches, one for power flying, the other for gliding and soaring. Neither are officially supported, and the expenses are met from individual contributions.

The Air Day began with precise formation flying by three 'Chipmunks' from 24 Reserve Flying Training School. There followed a display entitled 'Instructor and Pupil' in two 'Tiger Moths,' a memorable exposition of how an aircraft should not be flown.

GLIDERS DISPLAYED

The Gliders, which were launched by winch towing, showed the various stages of training, starting with an 'Eon' primary trainer, and working through a 'Kirby Cadet,' a 'Gull I' and a 'Slingsby T-21' to a final display of aerobatics in a 'Grunau Sailplane.' These were all flown by pupils of the Gliding and Soaring Branch of the Flying Club.

A Pageant, showing the history of military flying, started with captive observation balloons and Cody kites. These kites were designed to operate where high winds made the use of balloons impossible, and would raise a man in a small basket to a height of 3,000 feet.

The dropping of supplies by parachute, a technique widely used in modern war, was followed by a display of parachuting by members of a R.E. Territorial Army unit from a captive balloon. As each man floated to earth, the commentator, Franklin Engelmann of the B.B.C., gave their names and a short resumé of their war service with the Airborne Forces, adding much to the interest of this event. An exhibition of airborne equipment in a tent on the airfield attracted many interested visitors.

TWO-SEATERS

By G. Blessing, Hamburg-Harburg

The seating of the second man is one of the problems of the two-seater. With both tandem and side-by-side arrangement this entails a considerable increase in weight in comparison with the single-seater. The aircraft with the side-by-side seating is out of the question in my opinion. For a given span it is inferior.

The arrangement as shown by the drawing combines the advantages of the two usual types, without raising the empty weight very much above that of the single-seater.

The second man kneels behind the main spar with his elbows resting on it. His seat may be supported. This is not an unusual position, it is rather a kind of lounging. The advantages of the suggested arrangement are striking :—

(a) The visibility of the second man is good although he sits in the centre of gravity.

(b) The resulting extra weight is kept quite small since everything is very crammed. The cockpit-cover is smaller than that of the usual type of two-seater.

(c) The cross-section of the fuselage is only slightly larger than that of a single-seater.

(d) The instructor has the pupil's head right in front of him ; so there is no need for him to shout or beat about himself ! ! !

(e) Only one set of instruments is required.

If we want to use this type of aircraft for training only, e.g. teaching thermal soaring in suitable weather conditions, then a wing area of 130 to 150 sq. ft. should be sufficient. But this could also provide us with an efficient single-seater which might well be aerobatic.

A two-seater of this description would not cost much more than a 'Grunau-Baby II-b' with air brakes, if we content ourselves with spoilers for the two-seater.

[*Translation from 'Thermik,' Jan., 1951, by G. S. Neumann.*]

'WAS THIS A STORM FLIGHT ?'

By DUDLEY HISCOX

ON Sunday, August 12th, soon after mid-day, G.M.T., the father of all cloud streets approached Dunstable from the north-west. It took the form of continuous cloud stretching at least 28 miles from west to east, and its southern edge resembled the text book drawing of a cold front.

There was even rain to be seen beyond. But further north still there was sunlight again.

CONTINUOUS LIFT

I was soaring in my Chilton ' Olympia ' G-A.L.J.N., with a wind of about 15 knots, but as the influence of the approaching cloud became superimposed on the hill lift, I flew out westwards to meet the formation finding continuous lift of about 5 f.p.s. Within 10/12 minutes cloud base was reached at a little over 3,000 feet.

I continued to fly up wind parallel with the cloud, still westwards, moving course to the south-west to avoid going into cloud, and to the north-west to collect more height. This went on for half-an-hour with the average ceiling increasing a few hundred feet as I became more venturesome flying through bits of cloud that were ' hanging down.'

Now Halton Aerodrome at Wendover was beneath, and then the edge of the cloud was less well defined. A small amount of rain was encountered which all this time could be seen falling to the north, apparently only a few hundred yards away.

It was then that I thought of returning back down the cloud. I estimated that even if the lift failed, I could reach the Club down wind from 3,000 feet. Facing east it was clear Dunstable was well and truly in the rain and I remembered that Southend had been declared the Task Flight for the day.

LIFT AT 80 M.P.H.

In reverse the cloud worked exactly the same. North of east yielded lift and a southerly course ran out of it. In a trice Bovingdon Aerodrome was to starboard as I flew over Ralph Slazenger's estate. It was then I tried flying fast to cancel out lift which could be achieved at 80 m.p.h.

Another aerodrome came up beneath the starboard wing. I jumped to the conclusion it was Leavesden and with a rain storm to the left and a built-up area to the right, I thought I had better be careful not to be caught out. Another look and I realized it was Hatfield and presently Panshanger Aerodrome was beneath and then Hertford town.

I had by now been three-quarters-of-an-hour driving my glider like a tram, always at plus or minus 3,000 feet. Here again the edge of the cloud became obscure. For twenty minutes I searched about to regain the huge area of lift, gradually losing height, and expected to have to land at North Weald R.A.F. Station, which was now a mile or two up-wind.

Pushing along towards sunlit North Weald took me straight for an isolated cloud from which rain could be seen falling from its up-wind side. Presently I ran into the same type of lift I had previously encountered and went up with the green ball at 15 f.p.s.

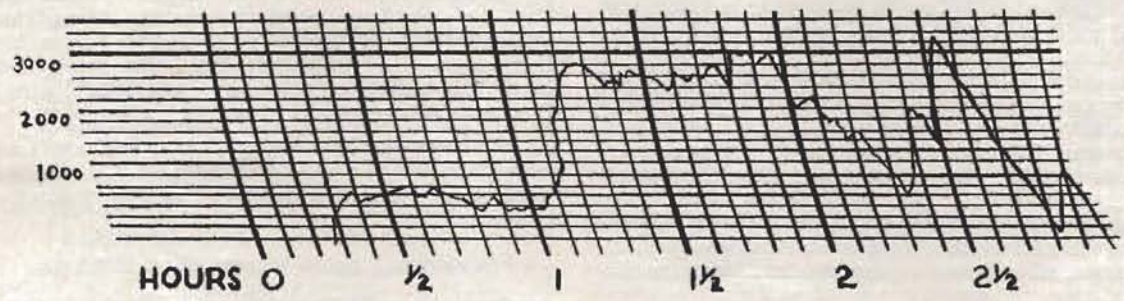
Turning southerly I flew the length of the cloud, then lost the area of rapid climb, but eventually found it again and went up to 4,000 A.S.L., the best height of the day and drifted east of Stapleford Tawny's grass aerodrome.

Southend did not seem far, and although the sky was mostly clear, the sun was shining on the intervening space, so I set off, somewhat across wind. Sixteen minutes went by with no joy over Billericay, so I made for the creek and marsh land at Leigh-on-Sea.

The marsh meadows promised a safe landing and I am a firm believer in looking for thermal lift to the lea of water. Down to 400 feet, and a suitable field selected beside another and better one upon which a cricket match was in progress.

ROCHFORD AIRPORT

My manoeuvring for the landing approach over the players somewhat interfered with play, but when I clicked a thermal and circled madly, that caused a complete stop, so it was as well the climb gave me enough height to get away and cross over to Rochford Airport where I arrived at 1,500 feet and landed at 5.5 p.m., having been airborne 2 hours, 50 minutes.



GERMANY GLIDES AGAIN—(*Contd. from page* 227)

There were other gliders at the Wasserkuppe with a similar history, for instance one which was the product of a group of 20 enthusiasts who completed it in three months by working all night and every week-end. Each member did his ordinary job in the day and worked on the glider alternate nights thus getting one night's sleep in two.

A new Rüder winch made its first appearance and appears to be a very decent job. It is fitted with a 130-h.p. G.M.C. engine and gave the 'Kranich' a speed of 80 kms. per hour on a C. of G. launch which indicates that it is well up to its job.

BROADCASTS BY A.F.N.

During the meeting three broadcasts were done from the air, by the American Forces Network, the Nordwesdeutscher Rundfunk and the Hessische Rundfunk. These were made possible by the 'Kranich' as the other two-seaters were not capable of accommodating the small transmitting set.

On Saturday night a meeting was arranged in the Gersfeld Turnhalle which is capable of accommodating 800 people. Over a thousand crowded in, there were 800 more in the street by the time it was decided to call the party off. There is no doubt that the enthusiasm and size of the attendance really surprised the organisers. On Sunday a wreath was laid on the Flyers Memorial by Wolf Hirth, as president of the Aero Club and one of the Pioneers of Gliding in Germany and at the Wasserkuppe. His speech was a most encouraging indication of the attitude of the German Gliding Movement stressing, as it did, the International Comradeship of gliding and the determination of the present generation of glider pilots to maintain gliding as a pure sport, an attitude which was repeated, with every evidence of sincerity, again and again by individuals whom one met throughout the two days.

PRESIDENT'S MESSAGE

Wolf Hirth spoke of the many friends in Britain and other countries he had made in Gliding in the years before the war and told how those friendships had survived the war so that he received letters and parcels and good wishes from all over the world as soon as hostilities ceased. He gave a motto to German gliding : 'By your own work shall you fly.'

It was sad to see that Wolf Hirth was a sick man and to view his disappointment when he was grounded by the doctors. The two days must have been a great strain for him as he could not walk five yards without being greeted by some old friends or accosted by some young admirer so that he was usually surrounded by a group of twenty or thirty people.

Fritz Stämer who managed the Wasserkuppe centre before the war is now the Secretary-General of the Aero Club and handled all the preliminary organization. He took the air again in the 'Zögling' before the doctors caught him too.

Seff Kunz, the Chairman of the Segelflug Kommission of the Aero Club is taking much of the load off the shoulders of Wolf Hirth and helped greatly to make the meeting a success.

The British and American High Commissioners sent representatives as they were unable to be

present in person through the change of date. The C.-in-C. B.A.F.O. was represented by Air Commodore L. R. S. Freestone, O.B.E., the Chairman of the Association of B.A.F.O. Gliding Clubs.

The impression gained is that German Gliding has moved off to a flying start and the enthusiastic support it can rely on from all classes of society seems certain to put Germany into the leading position within twelve months.

We may wish the German Gliding Movement good luck and prosperity since their success will be clear gain to the International movement and the contribution which we may confidently expect from them cannot be over estimated, especially if their plans work out for a big international Gliding centre at which all glider pilots will be welcome.

LATEST NEWS

FLIGHT-LIEUTENANT A. W. BEDFORD, A.F.C., holder of four British records has left the R.A.F. and become a Test Pilot to the De Havilland Aircraft Company.

Contrary to our announcement last month, F/L Bedford wishes to point out that his 'Olympia' was not 'wrecked' when he crashed at Woking, Surrey, on August 13th.

NEW ARGENTINE RECORD

WE hear that Joe Ortner has established a new Argentine Sailflying Record from Merlo to Pehuaja. In 5 hours 45 minutes he flew 307 km. Joe, who was a very popular competitor at the British National Competitions two years ago, is President of the Club Planeadores Albatros and also holds, with a flight of 427 kilos, the Absolute Distance Record in the Argentine.

T.S.A. RECORDS AND ATTEMPTS

THIS year, the Texas Soaring Association sponsored a get-together at Odessa for the purpose of encouraging the establishment of new National and International records.

Here are the results to August 7th :—

Texas record attempts and accomplishments :— Johnson, 420 miles distance, July 27th, 1951 ; **545 miles International Distance Record, August 5th, 1951.** Charles, 350 miles distance, August 3rd, completion Diamond 'C,2' ; Klitgord, 217 miles, goal, August 2nd ; 340 miles distance, August 4th ; Irvine, 290 miles distance, August 3rd ; Malloy, 220 miles, goal, August 3rd, 350 distance, August 5th ; Wiberg, 220 miles goal, August 4th. **335 miles goal, National Goal Record, August 5th** ; Elliot, 200 miles, goal, August 4th ; Yerian, 190 miles distance, August 4th.

Nine pilots participated and no cross-country flight was less than 200 miles—a great accomplishment.

'MISS POLLY' (80) PLANS LAST JUMP

FRAU L. SCHLEIFER who, as 'Miss Polly,' was in 1892 the first woman to make a parachute jump, is planning to make one last jump 'before I get too old.' She is 80.

'Miss Polly' started her air career at 17 in a balloon over Berlin. At the moment she is encountering two snags to her plans. No insurance company will have anything to do with her, and her doctor—'He's a stuffy old man, anyway'—has forbidden her to jump.

LITTLE FLYING FOR WORLD-CHAMPION BILLY NILSSON

BILLY NILSSON who won the F.A.I. Competitions at Orebro (Sweden), in July, 1950, and became the first official World Soaring Champion, has not had much opportunity to fly since. The winter prevented any launch for him in the 'Nafk' at Ornsköldsvik. There was snow every Sunday, and the ice was too thin for launching. The weather did not improve until Easter, and then Billy soared for 35 minutes on waves. The club at Ornsköldsvik has only two 'SG-38's' and one 'Baby' available.

Billy got married recently and has found a home after a hard struggle. His employer owns a 'Cessna-140' which Billy Nilsson is allowed to fly as well. The last flight took him to Storlien near the border in 2½-hours. In the summer, however, Billy Nilsson hopes to fly again without power over his home country.

ARMY GLIDING CLUB

ALTHOUGH we have had some very indifferent weather recently, there have been several notable cross-countries. The C.F.I. managed an out-and-return to Dunstable, and Colin Bennett, on the same day, took the 'Blue Grunau' into a splendid cloud and came out at Hurn with a Silver 'C' height and distance to his credit.

Negotiations for another tow-car are proceeding, and we hope soon to employ it (alternating with the present one), on the long runway, which has been undergoing extensive repairs.

The Club-house is developing rapidly, due mainly to the ability and energy of the Surrey Club, and it should be a place of pride and joy during the winter and in years to come.

R.L.P.

BRISTOL GLIDING CLUB

DESPITE unserviceability of many vehicles and uncooperative weather, quite a lot of good soaring has been done at Lulsgate and Roundway during the last few months.

Before the National Comps., J. D. Jones did a 32-mile and D. A. Colvin a 45-mile qualifying flight. At Bradwell Edge the club team, C. Stafforth and J. D. Jones came 9th in the Team Championship in spite of being delayed by a succession of breakdowns on the way up. J. D. Jones completed his Silver 'C' as did A. F. Gotch and D. A. Colvin who were flying a privately entered 'Olympia.'

An unusual flight was made from Lulsgate on August 4th by A. O. Sutcliffe who ferried the 'Grunau' from Lulsgate to Roundway. Shortage of lift on the way forced him to land at Colerne Airfield. After lunch a winch launch, kindly provided by the A.T.C., enabled him to complete the journey.

The best flight during the Bank Holiday camp at Roundway was a 60-mile cross-country by J. R. Allen in the 'Olympia' to Windsor thus qualifying him for Silver 'C' height and distance. A party of R.N.G. & S.A. members from Portsmouth also camped at Roundway and made themselves at home in true naval style. We hope to have more such visits in the future.

Another camp held at Roundway from 18th to 25th August was attended by about a dozen members. A. O. Sutcliffe succeeded in doing his 5 hours in the 'Tutor' before it was landed upside down in the hedge by a visiting pilot.

FOR SALE

'GULL I' SAILPLANE, Modified nose and cockpit cover. Trailer. Current C. of A.—£375. Apply Derbyshire & Lancashire Gliding Club, Camphill, Great Hucklow, Derbyshire.

ULTRA LIGHT PIPER CUB—12 months' C. of A. New Standard 40-h.p. engine fitted. Perfect aeroplane. Offers—Pyle, 4, Timberscombe Walk, Bristol, 4.

WANTED

BAROGRAPH required. Fuess or similar. H. Priestley, 24, Banksome Close, Eaton, Norwich.

ROYAL AERO CLUB CERTIFICATES

(Issued under delegation by the B.G.A.) AUGUST, 1951

CERTIFICATES "A" .. 222 (13483 to 13704 inclusive)
"B" .. 119
"C" .. 45
Silver 'C' 14

"B" CERTIFICATES

No.	*Name*	*A.T.C. School or Gliding Club*	*Date taken*
392	Frederick Smith	Bristol G.C.	8. 7.51
2720	David P. Watt	No. 125 G.S.	20. 8.51
5756	Peter Thakray	Surrey G.C.	1. 6.51
3850	Patrick L. J. Pottinger	No. 123 G.S.	9. 7.50
5983	Alan Cantley	Aberdeen G.C.	19. 8.51
7594	Kenneth H. Price	No. 166 G.S.	22. 7.51
7641	Wilfred J. W. Oliver	No. 104 G.S.	2. 7.50
8465	Paul F. Chubb	B.A.F.O.	29. 7.51
8907	Terence C. Bayes	R.A.F. Bridgnorth	1. 8.51
10371	Frederick J. May	No. 166 G.S.	25. 7.51
10502	Ralph F. Bennett	No. 64 G.S.	14. 8.51
10519	Guy E. Churchill	London G.C.	14. 8.51
10663	John A. Oliver	No. 168 G.S.	22. 4.51
10715	John A. Kilby	Bristol G.C.	25. 8.51
10750	Anthony G. F. Chaplin	No. 105 G.S.	19. 8.51
10782	Alexander G. Murray	S.G.U.	27. 7.51
12089	Roy Gilbert	No. 122 G.S.	13. 8.51
12222	Edward R. Davison	No. 66 G.S.	15. 8.51
12328	Alexander J. Milne	Aberdeen G.C.	19. 8.51
12375	Owen James Murrell	Bristol G.C.	9. 8.51
12443	Griffith A. G. Thomas	Deeside G.A.	29. 7.51
12822	William S. Skinner	No. 2 G.S.	3. 6.51
12865	Arthur G. Cotton	No. 104 G.S.	29. 4.51
12969	Stanley Loynes	No. 31 G.S.	23. 7.51
13077	John Ellis	No. 42 G.S.	15. 7.51
13093	Ian M. Williams	Halton Apps.	29. 7.51
13213	William J. Crump	No. 166 G.S.	28. 7.51
13305	Dennis Bates	No. 41 G.S.	1. 8.51
13431	Charles D. Philip	No. 2 G.S.	21. 7.51
13481	David J. D. Overton	R.E.G.C.	3. 6.51
13486	Hormoz Hedayat	Colerne	1. 8.51
13488	William Appleby	No. 27 G.S.	10. 9.50
13489	Anthony J. Donadel	No. 92 G.S.	21. 7.51
13490	John D. Light	Portsmouth N.G.C.	24. 7.51
13491	Erick Broadbent	No. 68 G.S.	22. 7.51
13492	Timothy J. G. Hyde	No. 125 G.S.	29. 7.51
13494	Peter D. Evershed	Southdown G.C.	14. 7.51
13495	John Hellewell	No. 2 G.S.	21. 7.51
13496	Bruce M. Henderson	No. 2 G.S.	21.7.51
13497	John H. Ansley	Halton Apps.	3. 6.51
13501	Hamer G. Jacob	Halton Apps.	29. 7.51
13503	Robert H. McKinlay	No. 5 G.S.	27. 7.51
13506	Edmund Miller	Bristol G.C.	27. 7.51
13507	Edward B. Bywater	No. 102 G.S.	3. 6.51
13508	Alfred M. Eckel	Halton Apps.	14. 7.51
13509	James F. G. Stonham	No. 203 G.S.	25. 4.51
13514	Geoffrey W. Horn	Halton Apps.	18. 7.51
13515	David C. Lemin	No. 82 G.S.	29. 7.51
13519	Gordon B. Osborn	Midland G.C.	20. 5.51
13520	Iain D. McKillip	No. 82 G.S.	5. 8.51
13526	Graham C. Davies	Scottish G.U.	5. 8.51
13527	Peter H. Mitchell	Bristol G.C.	1. 8.51
13532	Vivian Warrington	No. 92 G.S.	1. 8.51
13538	John A. P. Annett	No. 125 G.S.	5. 8.51
13542	Kenneth L. Dunford	No. 23 G.S.	15. 7.51
13544	Ian T. C. Wilson	R.E.F.C. G. Flight	24. 6.51
13546	Ronald G. Bowie	No. 5 G.S.	11. 8.51
13548	Robert D. Robindon	No. 1 G.S.	22. 5.51
13549	Gwenith R. A. Howard	Luneberg	27. 8.49
13550	Brian C. Kemp	Channel G.C.	30. 7.50
13551	Richard J. Snell	Home Command	3. 7.51
13554	Ronald Watkinson	Derby & Lancs	4. 8.51
13556	Robert N. Newby	No. 27 G.S.	6. 8.51
13560	Ronald S. Colenso	Bristol G.C.	14. 7.51
13561	Robert W. Pembleton	Scottish G.U.	26. 7.51
13562	Michael J. Mullaney	No. 84 G.S.	29. 7.51
13572	David P. B. Short	Scottish G.U.	28. 6.51
13574	John E. Gordon	No. 5 G.S.	20. 7.51
13580	Joseph G. Hossack	B.A.F.O.	8. 7.48
13581	Anthony J. V. Shepherd	R.E. G.C.	18. 3.51
13582	Alan J. Goodale	No. 22 G.S.	1. 7.51
13586	Anthony M. Murphy	Luneberg	14. 5.51
13587	Michael J. Gardener	Midland G.C.	6. 8.51
13588	Ernest H. L. Banks	No. 5 G.S.	27. 7.51
13589	John R. Hall	Dyce	3. 8.51
13596	William F. Moore	No. 5 G.S.	24. 7.51
13597	Rouald G. Scott	Dyce	3. 8.51
13598	Leslie W. Rayner	Condor	28. 7.51
13601	John R. Wall	No. 123 G.S.	28. 7.51
13611	Joseph Cunninghant	No. 5 G.S.	16. 8.51
13612	Gerald S. Clark	Bristol G.C.	17. 8.51
13613	Cyril J. Coward	Bristol G.C.	10. 8.51
13614	Albert C. M. Kellett	Bristol G.C.	17. 8.51
13615	David M. Nelson	No. 166 G.S.	18. 8.51
13616	Brian R. Packer	Portsmouth N.G.C.	19. 8.51
13628	John F. Jefferys	Surrey G.C.	12. 8.51

"B" CERTIFICATES (contd.)

No.	Name	A.T.C. School or Gliding Club	Date taken
13631	Christopher P. Wills	Surrey G.C.	17. 8.51
13632	Robin E. Savage	No. 89 G.S.	6. 8.51
13633	Denis C. Dyer	No. 89 G.S.	8. 8.51
13636	Michael G. Adams	No. 89 G.S.	7. 8.51
13637	John M. Anstey	Midland G.C.	12. 5.51
13638	Walter C. Currie	No. 66 G.S.	15. 8.51
13639	Alan D. C. Adams	Portsmouth G.C.	17. 8.51
13640	Thomas R. C. Berrett	Shorts G.C.	4. 8.51
13645	Dennis G. Stafford	R.A.F. Bridgnorth	15. 4.51
13649	Oswald G. J. Stirling	Deeside G.C.	18. 8.51
13650	Peter J. Ralph	No. 89 G.S.	4. 8.51
13651	Ronald J. Beasey	No. 166 G.S.	15. 8.51
13652	E. M. Joannides	Midland G.C.	6. 8.51
13653	Patrick J. Reed	Bristol G.C.	17. 8.51
13654	Ian C. Seaman	Halton Apps.	15. 7.50
13655	Christopher J. Abbott	No. 42 G.S.	7. 8.51
13658	Hendrika J. Harwood	Wahnerheide G.C.	19. 8.51
13659	Howard J. Taylor	London G.C.	13. 7.51
13662	Gerard M. Halliwell	No. 125 G.S.	29. 7.51
13670	John L. Harris	Cambridge G.C.	27. 5.51
13671	Hugh McNeill	No. 2 G.S.	4.12.48
13672	John Balmforth	No. 130 G.S.	14. 7.51
13673	Lincoln Lindley	No. 122 G.S.	19. 8.51
13674	Dugald Campbell	No. 66 G.S.	16. 8.51
13675	Eric Davies	Halton Apps.	30. 6.51
13685	Thomas Sanderson	Bristol G.C.	25. 8.51
13686	Brian C. Forrest	No. 168 G.S.	29. 7.51
13687	Margaret L. Marriott	Gloucestershire G.C.	4. 8.51
13688	Kenneth R. Powell	Bristol G.C.	25. 8.51
13689	Michael K. Stratton-Brown	No. 168 G.S.	25. 8.51
13698	Gerald H. Bridger	No. 168 G.S.	15. 7.51
13699	John B. Monro	No. 168 G.S.	25. 8.51
13584	E. E. Pollard	No. 125 G.S.	22. 4.51

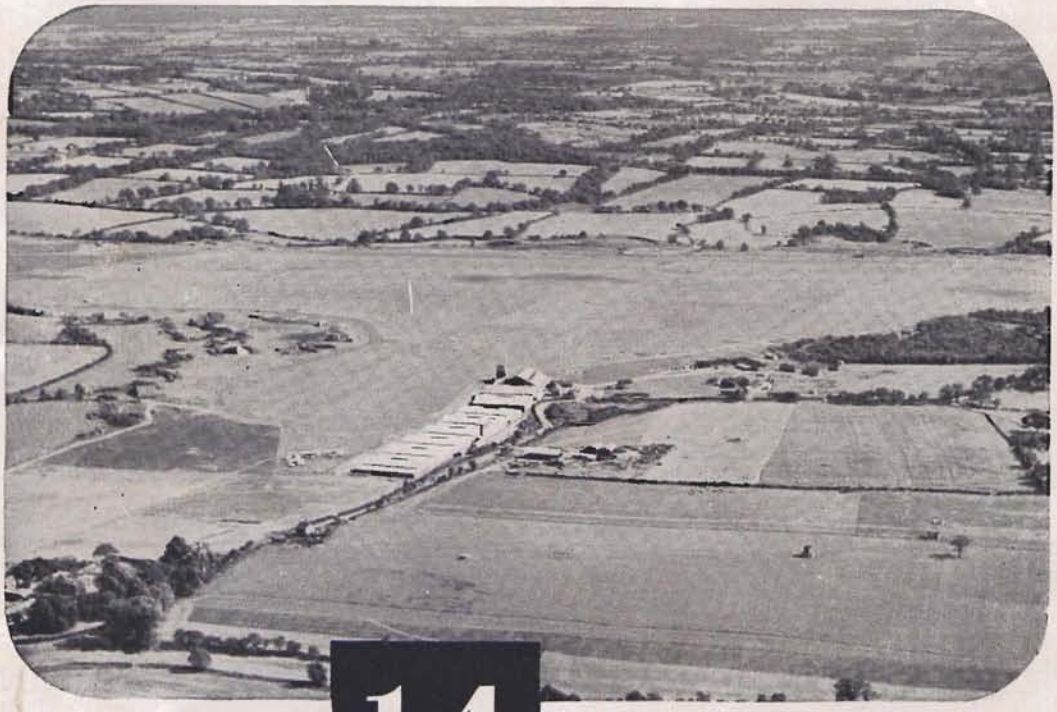
"C" CERTIFICATES

2720	David P. Watt	No. 125 G.S.	23. 8.51
3850	Patrick L. J. Pottinger	No. 123 G.S.	9. 7.50
7235	Richard M. Ruttle	No. 45 G.S.	24. 8.51
7641	Wilfred J. W. Oliver	No. 104 G.S.	2. 7.50
8464	Michael C. Usherwood	No. 23 G.S.	19. 8.51
8465	Paul F. Clubb	Luneburg	29. 7.51
8853	John H. L. Bishop	Imperial College	17. 7.51
8944	Marion J. Grindley	Hereford G.C.	22. 8.51
9397	David S. Doggett	London G.C.	8. 7.51
9658	Norris J. S. Jurdon	Gloucestershire G.C.	29. 7.51
9662	James N. Houghton	No. 166 G.S.	21. 8.51
10491	E. Wallington	No. 64 G.S.	22. 8.51
10502	Ralph F. Beunett	No. 64 G.S.	15. 8.51
11043	Geoffrey R. Thirsk	No. 23 G.S.	19. 8.51
11380	Andrew Davies	No. 22 G.S.	29. 7.51
11679	Marston E. Tickell	R.E. F.C.	8. 7.51
11881	Colin Plaskitt	No. 64 G.S.	19. 8.51
12112	Brian G. Brown	No. 64 G.S.	22. 8.51
12138	Eric C. Kitson	No. 104 G.S.	27. 8.50
12151	Harold D. Senior	Wahnerheide	15. 4.51
12547	James Rae	Scottish G.C.	10. 6.51
12656	Geoffrey Benson	Hereford G.C.	22. 8.51
12890	Nigel O. Roberts	No. 125 G.S.	26. 8.51
13072	Edward M. Slingsby	No. 64 G.S.	8. 8.51
13123	Peter J. Ford	No. 166 G.S.	20. 8.51
13180	William Allsop	Derby & Lancs.	15. 6.51
13220	Basil F. Baldock	No. 122 G.S.	15. 8.51
13273	Rodney S. Sneath	Derby & Lancs.	24. 7.51
13365	Barry V. Smith	Southdown G.C.	4. 8.51
13389	Alexander W. Watson	Southdown G.C.	19. 8.51
13491	Erick Broadbent	No. 68 G.S.	29. 7.51
13548	Robert D. Robinson	No. 1 G.S.	25. 5.51
13549	Gwenith R. A. Howard	Luneburg	19. 2.50
13551	Richard J. Snell	Home Command	3. 7.51
13554	Ronald Watkinson	Derby & Lancs.	4. 8.51
13580	Joseph G. Hossack	B.A.F.O.	14. 7.48
13581	Anthony J. V. Shepherd	R.E. Gliding Club	18. 3.51
13586	Anthony M. Murphy	Luneburg	5. 8.51
13587	Michael J. Gardener	Midland G.C.	8. 8.51
13637	John M. Austey	Midland G.C.	10. 6.51
13652	E. M. Joannides	Midland G.C.	12. 8.51
13659	Howard J. Taylor	London G.C.	28. 7.51
13670	John L. Harris	Cambridge G.C.	18. 8.51
13671	Hugh McNeill	No. 2 G.S.	24. 7.51
13584	E. E. Pollard	No. 125 G.S.	5. 8.51

SILVER "C's"

339	D. A. S. Colvin	Bristol G.C.	28. 7.51
340	J. M. Hahn	Southdown G.C.	1. 8.51
341	P. A. Lang	London G.C.	17. 6.51
342	F. J. Slater	B.A.F.O.	26. 7.51
343	R. H. A. Pelling	Derby & Lancs.	28. 7.51
344	F. Kinder	Surrey G.C.	2. 8.51
345	J. R. Jeffries	London G.C.	28. 7.51
346	A. W. Doughty	London G.C.	2. 8.51
347	D. G. Banks	B.A.F.O.	3. 8.51
348	J. H. Holder	Midland G.C.	12. 8.51
349	G. V. E. House	B.A.F.O.	3. 8.51
350	B. Radley	R.A.F.G.S.A.	19. 8.51
351	K. Hammer	B.A.F.O.	6. 7.51
352	H. G. How	No. 168 G.S.	20. 8.51

Do you know your airfields?



14

Recognize this airfield? It's No. 14 in this series of puzzle photographs. You'll find the answer below on the right. ★

It's no coincidence that almost all the British charter companies place implicit trust in the efficiency of the Shell and BP Aviation Service. For they know—as do many international airlines and private owners—that the familiar Shell and BP Aircraft Servicing Vehicles can always be relied upon for swift, friendly attention to their needs.

Shell and BP Aviation Service

Shell-Mex and B.P. Ltd., Shell-Mex House, Strand, London, W.C.2. Distributors in the U.K. for the Shell and Anglo-Iranian Oil Groups.

★ Redhill