Sailplane and Glider

The First Journal devoted to Soaring and Gliding

APRIL 1953

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Sailplane and Glider

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COVER PHOTO:
Summer Soaring at Muottas, the Engadine.
By T. Heimgartner.

Editorial

RECENTLY more and more voices have been raised on behalf of the small sailplane. They have stated their requirements, compromised the performance for the sake of cost and then suggested that manufacturers 'should' construct such sailplanes.

This subject is nearly as old as soaring, as will be seen from Platz's article written in 1924. What is it that the proponents of small sailplanes really want? Cheaper sailplanes or cheaper soaring or more soaring, or more cross-country mileage? What are their objections to the 'Olympia,' the 'Weihe' or the 'Sky'?

For cheaper, more and more interesting soaring, we welcome the advent of the most costly sailplane, the high performance two-seater with its own completely retractable propellor or jet air intake and efflux. The owners of such a sailplane will enjoy soaring EVERY weekend and during their vacation will be able to make true soaring tours round our shores and all over the continent, camping where they land every evening, taking off under their own power when thermal activity starts each morning. The world is theirs, they might even emulate Wilbur Sparrow, the hero of Lawrence Wright's film cartoon epic by soaring from Dunstable to Cape Town.

Their sailplane, even if it is a plastic mass production product will be more expensive than contemporary light aircraft but the cost per soaring hour or mile is bound to be much lower than that of an 'Olympia' private owner. Their wives, children and relations can also participate more directly in their enjoyment. They must, however, be able to land their sailplane safely in small and rough fields.

This is the one advantage of small span sailplanes, they can make sudden turns near the ground. But all sailplanes, whether midgets or giants, must be improved to allow them to land in smaller and rougher fields without damage. The astounding record of damage on landing during the International Competitions in Spain and the National Competitions in South Africa should make this absolutely clear. We must have even better dive-brakes or flaps, lower landing speeds and possibly retractable long travel skids or wheels.

Do the proponents of small sailplanes wish to become private owners? If so, we welcome the development of a small high performance sailplane such as Blessing's 'Kobold,' the 'Hutter 30' project, the 'LO-100,' or Sheibe's 'Spatz,' which, if mass produced, would open up the possibility of private ownership to thousands. But there is no need to choose a sailplane with a performance inferior to that of the 'Olympia.'

Widespread private or group ownership would not destroy the clubs, they would still have to train the ab initio's. Cycle, motor cycle, canoeing and sailing clubs all function perfectly well when each member owns his own vehicle or boat.

However, we would like to take Platz's and Blessing's arguments one stage further. We want an entirely new category of sailplanes, not to the exclusion of the expensive two-seater self-launching sailplane or the high performance single-seater (however inexpensive), but in addition to these categories.

It would be more like a magical flying suit which one can carry about rather than a sailplane into which one must clamber. We propose a development of the Japanese 'Tondokuro' and a certain 'Horten' project. Its minimum flying speed must be about 15 m.p.h. which will enable the prone position pilot to use his legs for spot landings when required.

The pilot will be able to launch himself by running over the edge of a cliff or down a slope, then retracting his legs. With a performance similar to that claimed for the 'Tondokuro' he will be able to soar over and even starting in the most inhospitable country. He will be able to explore the wildest sea cliffs and the most difficult alpine terrain. Whether he is on a rock-climbing holiday in Skye, skiing in the Alps or exiled to Tristan da Cunha he will be able to take his sailplane with him. If exiled in the Sahara, he will have some piano wire for camel-tow launches.

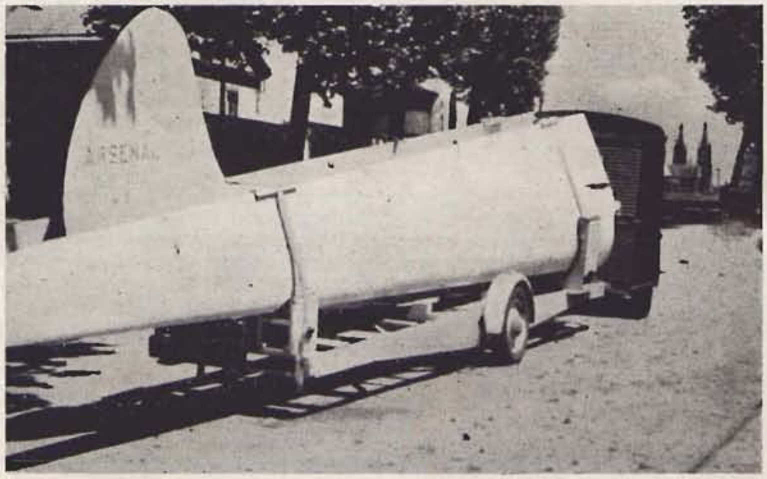
When derigged he will be able to carry his sailplane, store it anywhere and even transport it economically by air freight if exiled to an outpost of the Empire. It might incorporate pneumatic inflatable structural parts like an aircraft dinghy. This is not an idle pipe dream, it can be done. How many of our readers could use such a true miniature sailplane?

O.W.N.

SOARING IN FRANCE

400 kms. by Pure Thermals Without Compass

By GUY BORGÉ



At Moulins during retrieving from Le Grand Bourg. The trailer is an old German type modified at Pont St. Vincent to carry performance sailplanes Photo : *Borgé*

IN May 1952, nearly one year ago, I attended the training course of the French soaring team, arranged to choose the five pilots for the Madrid International Contest. I had been given a special 'Air 100,' an ideal machine for cross-country flights with a glorious history. This 'Air 100', the second one built, had endured all the official type tests, had gone to the Wichita Falls Contest in 1947, to the Samedan one in 1948, to Orebro in 1950 where Captain Fonteilles had classed it the first of the French team. U.S.A., Switzerland, Sweden, my 'Air 100' painted in a glorious orange colour was actually international. Its flight qualities were absolutely exceptional, excellent handling at any speed in total silence and its strength reassuring. Not one 'Air 100' built later was better than this one. But its disadvantage appeared only after landing as due to the absence of a wheel it became very difficult to move it on the ground. One day when storing it in a barn four of us found it painful to carry its 300 kgs. (660 lb.) 500 metres (550 yards). The local postman helped despite his lumbago. With this 'Air 100,' which became a faithful friend I covered nearly 1,200 km. (744 miles) around Pont Saint Vincent, in all weather, to Haguenau near the German border, Sarrebourg, Troyes, St. Dizier, and so on, and on several occasions I outclassed my team fellows.

At the end of the training course I had to give up the splendid 'Air 100' and take another one, an ordinary batch type. It had a wheel but no compass, and I was very dubious about the possibility of country flight, especially without compass. The weather improved and on the 21st May the good North East wind blew strongly; cumulus were forming at an early hour, and it seemed possible to enjoy excellent distance conditions. It was the last day of the course and the chief of the team decided upon a goal flight competition, each pilot choosing his own goal. After examination of meteorological conditions we secretly wrote our choice on a piece of paper. I took Cognac 575 km. (356 miles) from Pont St. Vincent. If I attained it, I could break two French records and get a diamond leg. But preparing the sailplanes, control and sealing of official barographs took much time and only at 11 hours local did I start the aerotow behind a 'Storch.'

At 200 metres (656 feet) I cast off and climbed under a nice cumulus to 1,200 metres (3,930 feet). I followed a road in the direction of Cognac and found a good cloud street under which any turn was unnecessary; effect of the street appears on the barogram under a straight line at 1,200 metres (3,930 feet). But at 30 km. (18 miles) from Pont the clouds completely disappeared and I came down to 450 metres (1,470 feet) before again finding a pure thermal. Chaumont, situated at 100 km. (62 miles) appeared exactly 55 minutes after the start and my average speed was 108 km./hour (67 miles/hour). Alas, from Chaumont, the average speed like altitude followed a descending slope. It was noon or 11 hours local sun time and the strong wind did not favour birth of pure thermals, which are weak at this early hour. The end seems near. 750 metres (2,460 feet); 450 metres (1,470 feet); 100 metres (320 feet), I have tried everything, any familiar point of formation of thermals like roofs of villages, lees of hills, borders of forests, I have not found one continuous thermal but only brief ups alternating with heavy downs. I chose a field and began the landing procedure at 50 metres (160 feet). But during the last turn the variometer needle hesitated and came again to 0. I closed the turn without losing precious altitude, made another one, a third before watching the needle in the comfortable up part. In fact I was extremely nervous because I found myself very far from the first field under a pronounced drift and because air near the ground is rough enough. I climbed to 400 metres (1,310 feet), 600 metres (1,960 feet), but in a great swing I lost lift and fell again to 400 metres (1,310 feet). But I felt the approximate position of the invisible column and after intensive search climbed to 1,250 metres or 4,100 feet. Never was life so nice and from this prodigious height I began again with the problems caused by navigation without compass and clouds. With much luck I could cover many new kilometres in approximative direction of Cognac. It is astonishing to observe that eight other pilots who started from Pont Saint Vincent were obliged to land in the same bad point, in a circle of a few kilometres. Sometimes like today a difference of a few metres is important enough to change 100 km. in 300, 400 or even 500 kilometres.

After this difficult pass, the remaining flight appeared much easier. Pure thermals became more and more intense and brought me several times to 1,550 metres (5,080 feet), or 2,000 metres (6,560 feet) above the sea. I flew over Chatillon sur Seine, Montbart, then Nevers in crossing the Loire river and the 300 kilometres mark. But I knew that I had lost too much time and that in any case it was impossible to reach Cognac or only to cover 500 kilometres. Navigation was not too difficult, I saw Montrond les Bains and on my right a big dark spot which was Bourges. By slow degrees the ground changes; little by little it climbs; its large fields are replaced by minute meadows surrounded by trees and hedges. I did not want to land in such a country where only helicopters might touch down without breakage and I searched for the best lift in front to leave this dangerous coin. I climbed to 1,000 metres (3,280 feet), came down to 500 (1,640 feet) several times near Montlucon. The 400 km. mark (248 miles) was passed but I asked myself how it will end. I flew at 200 metres (650 feet) and I did not know wind direction. No smoke, no steam engines, no chimneys—modern electric cooking stoves although very practical for housewives are

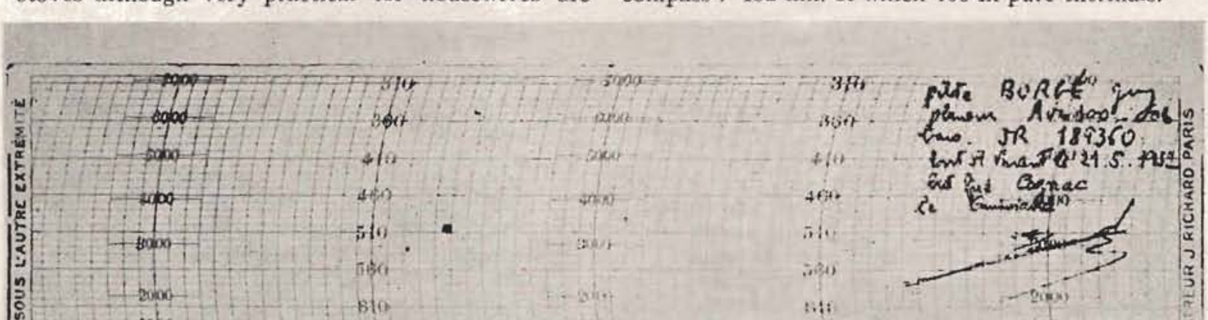
People from Le Grand Bourg pictured near the 'Air 100' *Photo: Borgé*

useless for soaring pilots. I made several turns searching for the direction of drift; the wind was always strong and I covered several nervous kilometres near the ground. Then I found an excellent place; a field of 50 metres by 30 metres (55 by 33 yards) surrounded by trees and a phone line but sloping up towards the wind direction. I opened the brakes and I stopped the 'Air 100' just at the far end of the field, near a farm where I stored the sailplane.

It was seven o'clock and in 8 hours of flight I had reached Grand Bourg in the Creuse district. I telephoned the Pont Saint Vincent authorities and learnt the day's results of the French team:

1st	Borgé ('Air 100')	432 Km. (268 miles)
2nd	Pierre ('CM 8-15')	400 Km. (248 miles)
3rd	Lassageas ('Air 100')	315 Km. (195 miles)
4th	Marbleu ('Air 100')	225 Km. (139 miles)
5th	Gasnier ('Ars 4111')	150 Km. (93 miles)

But it was a young pilot, an actual outsider since he had not been chosen in the French team, who was the hero of the day in covering 535 km. and obtaining his Diamond 'C.' The 500 km. were well in hand and my flight had been unsuccessful, so I was not chosen for Spain. But I do not regret anything because this flight was the most interesting and the longest without a compass: 432 km. of which 400 in pure thermals.



Progress in Two-Seater Sailplane Design

A Summary of Technical Development During the Past Thirty Years

Continued from the March Issue

By B. S. Shenstone, M.A.Sc., A.F.I.Ae.S., F.R.Ae.S.

We are indebted to "AIRCRAFT ENGINEERING" for their kindness in allowing us to reprint this article from the issue of January, 1953.

The British Gliding Association Design Competition 1947

The most important effort made since the war was in 1947 when the B.G.A. offered prizes for the best design for a two-seater. The main points of the specification were:

General

1. Suitable for cross-country soaring, and club and private-owner use.
2. Latest aerodynamic and structural ideas.
3. Small, light and cheap. Not over 60 ft. (18·3 m.) Span.

Particular

1. Room for two pilots 6 ft. tall (1·83 m.).
2. Good view for both pilots.
3. Built-in wheeled undercarriage.
4. Minimum sink not more than 2·4 f.p.s. (0·73 m./s.) at not over 40 m.p.h. (64·5 k.p.h.). Sinking speed not to exceed 10 f.p.s. (3·05 m./s.) at 80 m.p.h. (129 k.p.h.).
5. Crew weight to be 400 lb. (182 kg.).

There was a very good response to this specification, and although many were amateurs who had never made a design before, a number of useful designs were put forward. Altogether over fifty applications were made and twenty designs actually entered. Places were given to the six best. The writer has been able to examine the first six and three others considered to have special merit by the adjudicators. These designs are discussed below because they show interesting lines of thought. In the writer's opinion they also show some indecision due to difficulty in deciding what was really wanted from the specification. They were torn between something advanced which might be too experimental and something straightforward to build and aerodynamically unquestionable. It was probably realized that funds for building would be limited and the result was a rather restrained group of submissions. As a matter of fact, it was not until 1950 that funds became available to build the prizewinner, and it had not been completed early in 1952.

General arrangements of those given the first six places are shown in FIGS. 12 to 17. In TABLE IV are given the general data for these six machines and for three others in the contest.

The requirements involving a very low sinking speed were clearly pointed toward Western European and Eastern U.S.A. conditions rather than Mid-Continental conditions met in Russia, Texas and in the Argentine. With the limit of 60 ft. on the span, the wing loadings all came out quite light, something like 4·5 lb./sq. ft. (22 kg./sq. cm.) on an average, and the aspect ratios varied from 15 to 18. The concentration on low minimum sink at the low forward speed given certainly tended toward rather lower penetration than might have been desired.

In working to the specification it was difficult for the contestant to know what was really wanted. A club machine with the latest aerodynamic and structural ideas might clearly be impossible if the latest ideas involved mechanisms such as Fowler flaps and a retractable wheel and variable sweep. But it was also to be cheap which threw one back into the club and threw out the amusing developments. Many sound structural ideas are only useful for large production, but of course large production was unlikely, so that here was a clear limitation.

Winner

The winner was Hugh Kendall's Design 30, called the Crabpot because his mocked-up cockpit looked like one. This is a side-by-side machine rather like a larger and more modern Goevier and has much in common with Hütter's Hi-21. Kendall made the maximum use of simple shapes and straight lines. He follows the modern tentency toward rather square tips on wings and control surfaces, which although not so attractive to many as the rounded tips, has a firm basis of wind tunnel tests to back it up. Kendall uses single-curvature surfaces throughout the Crabpot except forward of the wing. Perhaps his most interesting aerodynamic feature is the use of an anti-balance tab on an all-moving tailplane. All earlier sailplanes used all-moving tailplanes which

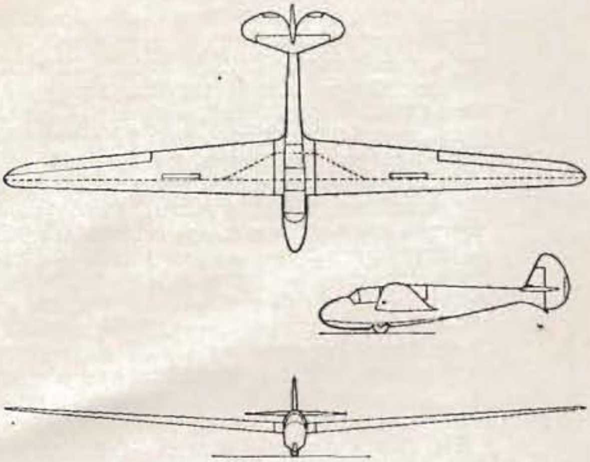


Fig. 9.—TG-4A: general arrangement

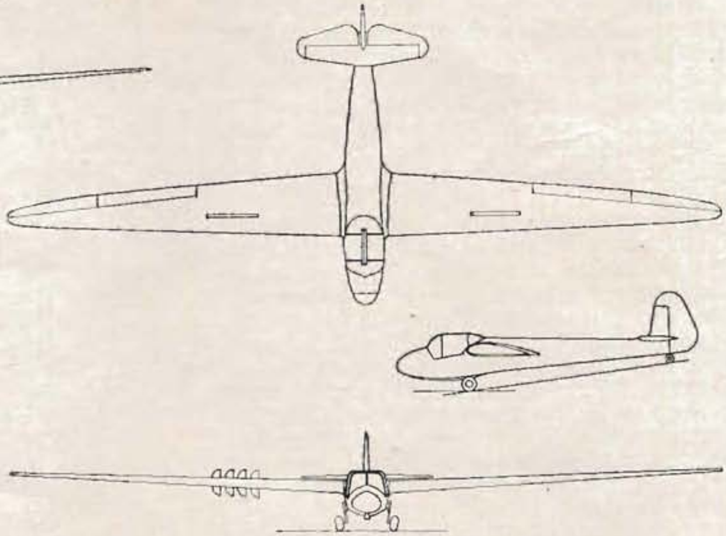


Fig. 10.—Hi 21: general arrangement

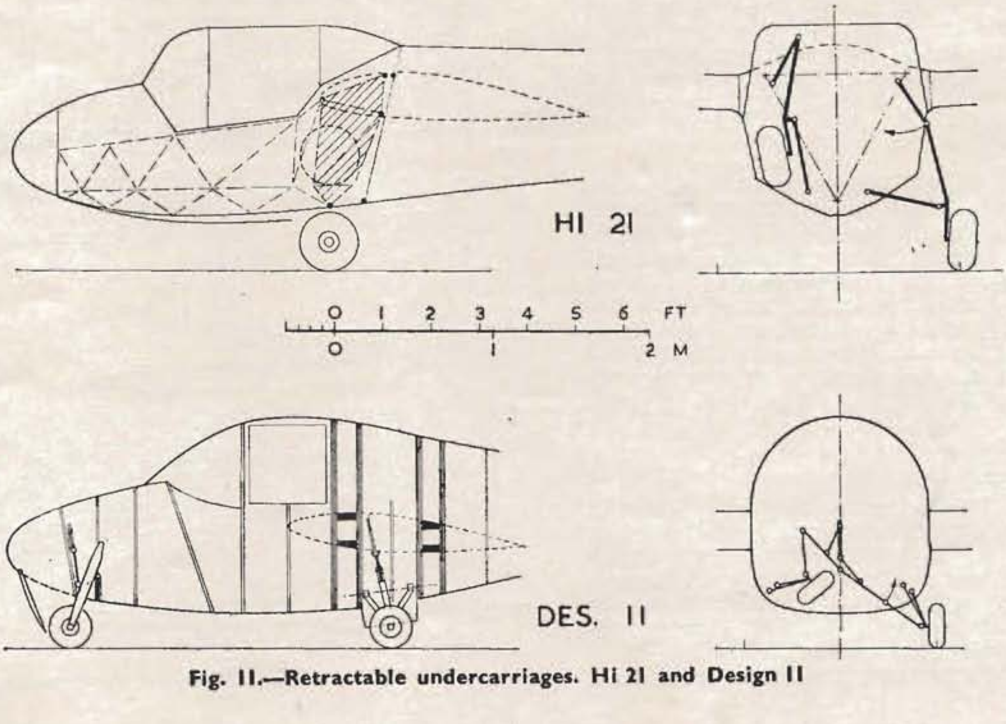


Fig. 11.—Retractable undercarriages. Hi 21 and Design 11

had at times rather difficult characteristics of overbalance and lack of stick-free stability. The use of the anti-balance tab should cure such troubles. This scheme was first used successfully on the PWS-102, as far as the writer knows.

Kendall used a higher aspect ratio than other entrants which was probably the right thing to do and doubtless helped him to win.

Kendall's structure was normal frame and plywood for the fuselage, but his wing was most unusual when you looked inside. There were several spanwise webs and few ribs. The flanges of the spars were wide spruce planks 16 in. wide (41 cm.) at the root and tapering in plan toward the tip. The planks were of constant thickness of 0·6 in. (15 mm.) at the top surface and 0·5 in. (13 mm.) on the bottom surface. The ribs were from 3 to 4 ft. (90 cm. to 12 cm.) apart. The nose plywood was supported by these ribs and by spanwise stringers to that the unsupported surfaces were about 36 in. by 6 in. (90 cm. by 15 cm.). The wings were joined together at the centre-line by four vertical pins.

It is not worth while to describe or comment on this structure further, as it has been discarded for an asbestos reinforced low pressure thermo setting plastic structure. Contributions from the Kemsley Trust and the Ministry of Supply have made it possible for work on this plastic prototype to proceed. The type of structure was devised by the R.A.E. Farnborough and is being applied to the Crabpot by Miles Aircraft. The method which involves heated concrete moulds and tailored felts cannot be described here, but it is hoped that the technique will be published in detail elsewhere.

In the spring of 1952 the prototype Crabpot had not been completed. The machine being built differs aerodynamically from that shown in FIG. 12 by having slightly less span (18 m.), a butterfly tail, long narrow full span ailerons, and no wing twist, tip section being 53015A.

Second Place

Farrar and McFarlane's Design 39 was second in the B.G.A. competition. This is also a 60-footer side-by-side two-seater. The main dimensions are given in TABLE IV and a general arrangement plan in FIG. 13. This sailplane is characterized by a thick wing, 18 per cent thick from root to tip, but of laminar flow section, 64, 2-418. The wing structure features a double skin with spanwise stringers, the plywood covering being $\frac{3}{32}$ in. for the first 20 ft. of span and thereafter $\frac{1}{16}$ in.

Third Place

Third in this competition was Mattocks' Design 51 Nimbus shown in FIG. 1(*c*) and described in TABLE IV. The Nimbus had actually been built at Short Brothers before the competition took place and considering the rule of anonymity might well have been scratched. However, the judges decided otherwise. The Nimbus has a wing with a root section of 16 per cent (G.535), tapering to 10 per cent Clark Y which might be called a good old-fashioned wing. It was of 62 ft. span, which was 2 ft. more than the maximum allowed. The fact that Nimbus is much heavier than any other design is at least partly due to the fact that it had been built whereas the others had only paper weights. However, a low wing on a glider like this may well be heavy. Its lower surface near the fuselage must be unusually robust to avoid damage from rough ground. The kink in the wing must also cost weight. In addition, the high fuselage necessitated by seating the crew on top of the wing must also be heavy. Perhaps the greatest latent disadvantage is the sensitivity of the low wing type near the stall. The fuselage-wing juncture would have to be kept very smooth to avoid early stall and a drastic increase of minimum sinking speed.

The Nimbus construction is largely normal, the wings have a D-nose and single spar with

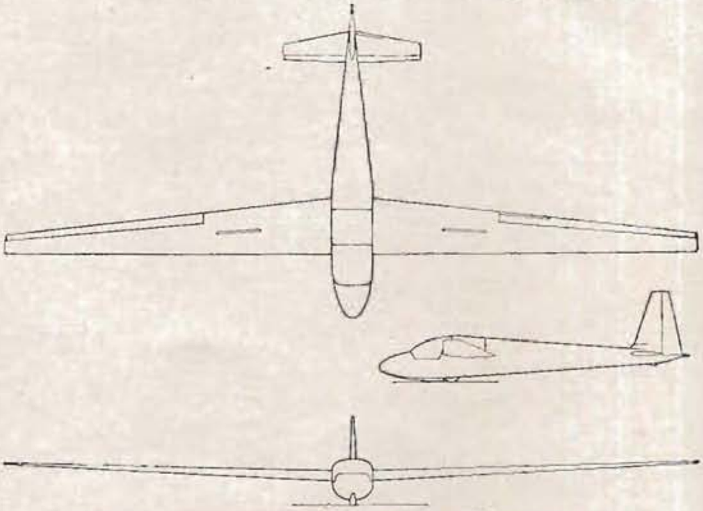


Fig. 12.—Crabpot I—Design 30: general arrangement

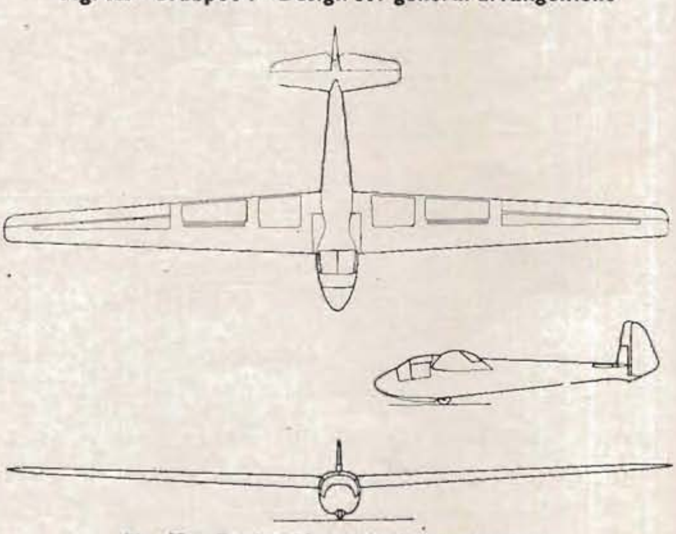


Fig. 13.—Design 39: general arrangement

diagonal drag spar. The wing roots are built into the fuselage, projecting 28 in. each side. The centre section spar booms are laminated and bent to form the dihedral. The outer wing spar booms are of spruce, but not laminated, the spar being of I form.

The main wing fittings are drawn out as for steel in three laminations and bolted to the spar. The female fittings on the centre section are in two separate pieces, clasping the spar. Most of the fitting design for the Nimbus is very good although complicated in the best aircraft style. As was to be expected, the Nimbus drawings are more detailed and complete than any of the other competitors. In fact, they were far more elaborate than necessary for the building of a prototype.

Fourth Place

Brown's and Reussner's Design 22 won fourth place. This is also a side-by-side job, but with a higher wing than Kendall's, the top surface being coincident with the top of the fuselage. See FIG. 15 and TABLE IV.

Design 22 is characterized by a fabric-covered rear fuselage and a welded steel centre section. Aft of the rear main fuselage frame, the fuselage is octagonal in section, the frames (average spacing 15 in.) being crossbraced to one another in the vertical and horizontal planes which are also the planes of the four main longerons. The four secondary longerons are secondary structure. In the writer's opinion, such a structure would be far more difficult to build than the more normal curved laminated frame structure covered with plywood. The fuselage is considerably tadpoled. Whether the reduction in wetted surface can compensate for increase in form drag cannot be known. Extreme tadpoling has certainly no advantages, because of the difficulty of distributing loads into the boom and the problem of boom flexibility, and in such cases the form drag increase can easily be very serious.

The metal wing centre section, which is a built-in jig, has certain attractions. The use of such a scheme enables the wing pick-up points to be easily and accurately positioned.

Fifth Place

Czerwinski's and Shenstone's Design 50 is shown in FIG. 16 and TABLE IV. It should be noted that since the writer of this article had a share in the design, he is doubtless unduly influenced in its favour. Design 50 or Harbinger is a tandem-seated high-wing type with the rear seat at the centre of gravity so that it can be flown single-seated unballasted. The sweep forward of the inner part of the wing enables the man in the rear seat to have a good view, his eye being ahead of the root wing leading edge. This kink in plan means either a kinked spar or a straight spar and a bracing strut. The designers chose the latter and made the wing as thin as they dared (10 per cent at root, 13 per cent at strut, 9 per cent at tip).

As in Design 22, the Harbinger has a metal main frame, but in this case it is vertical, picking up the main spar and the struts. The rear spar fitting is not attached to this frame. One other feature worth mention is that instead of using a wooden diagonal spar, a metal tripod is used which has advantages if a welder is easily available.

Apart from many other interesting details which the writer has no space to expand upon, perhaps the most interesting point about the fuselage is its shape. It is not of an arbitrary shape. It is elliptical in section throughout and the longitudinal shape was worked out carefully to follow the pattern of airflow in the neighbourhood of the wing root at a speed near that for L/D max. It is a cambered shape so formed that it meets the upwash at the right incidence and conforms with the downwash.

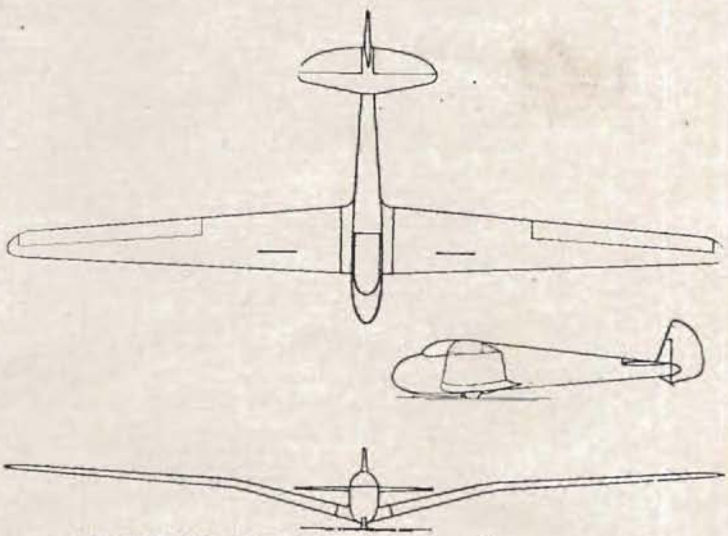


Fig. 14.—Nimbus, Design 51: general arrangement

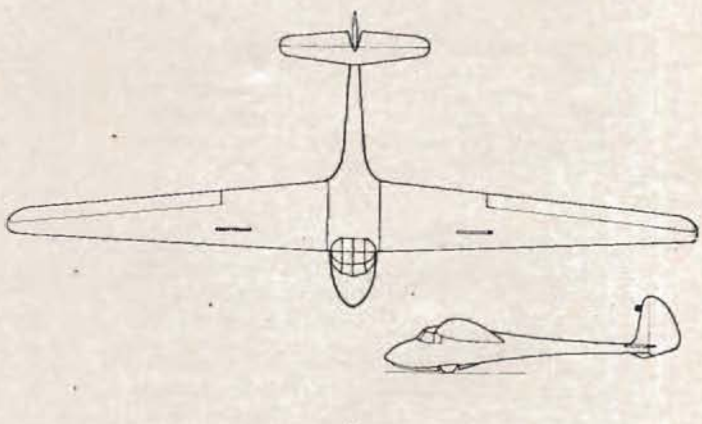


Fig. 15.—Design 22: general arrangement

TABLE IV

DESIGN		30		39		51		22		50		53		47		11		6	
NAME		Crabpot		—		Nimbus		—		Harbinger		—		Cu-Nim		—		—	
Designer		H. Kendall		D. J. Farrar, L. G. McFarlane		A. O. Mallocks		T. A. Brown, J. C. Reussner		W. Czerwinski, B. Shenstone		C. J. Godwin		C. W. Prower		F. H. Robertson		R. Turner, D. Wijewardene	
Seating		SS		SS		Tandem		SS		Tandem		SS		Staggered		SS		Tandem	
Span	ft. m	60	18·3	60	18·3	62	18·9	60	18·3	60	18·3	60	18·3	60	18·3	60	18·3	59	18
Length	ft. m	27	8·24	25·6	8·1	26·83	8·2	25·67	8·13	25	7·62	25	7·62	26·67	8·15	24	7·31	30·4	9·27
Wing Area	ft² m²	200	18·7	240	22·4	252	23·5	240	22·4	240	22·4	223·4	20·8	234·2	21·9	225	21	239	22·3
Aspect Ratio		18		15		15·3		15		15		16·1		15·35		16		14·6	
Wing Section	Root	43018		64,2-418,2-4		G 535		2 R, 15		4410		23015		4417		BR-11		65_3-816	
"	Tip	43012·A		"		Clark Y		2 R, 09		4409		23012		4413		"		$2R_2$-12	
Thickness/Chord	Root	18		18		16		15		10 [13 at strut]		15		17		15		16	
	Tip	12		18		10		9		9		12		13		12		12	
Twist °		-3		-5		-6 "		-2		0		-2·3		-4·81		-5		-3	
Wing $C_{D_{min}}$		0·0084		0·0063		—		0·0082		0·0085		0·007		—		0·007		0·007	
Wing C_D at L/D max		0·021						0·0185		0·022		0·021				0·022		0·021	
L/D max		27		26·8		25·8		26·8		25·9		29·5		23·9		26·2		33·5	
at V	mph, kph	49	77	42	68	45	72·5	50	80·5	46	74	46	74	44	71			50	80·5
Min. Sink	fps, m/s	2·28	0·7	2·3	0·7	2·2	0·67	2·36	0·72	2·32	0·71	2	0·61	2·51	0·765	2·5	0·76	2	0·61
at V	mph, kph	41	66	40	64·5	30	48·3	40	64·5	37·5	60·5	37	59·5	39·5	63·7	42	68	40	64·5
Sink at 80mph	fps, m/s	7·6	2·32	8·2	2·5	7·75	2·36	7·35	2·24	8·75	2·67	6·6	2·01	9·1	2·77	7·3	2·2	6	1·83
at Wt.	lb. kg	860	391	952	433	1204	546	982	447	840	382	948	431	1030	468	942	428	1008	458
Wing Load.	lb/ft² kg/m²	4·3	21	3·97	19·35	4·8	23·2	4·09	19·9	3·5	17·1	4·25	20·7	4·4	21·4	4·18	20·4	4·2	20·5
Span² Load	"	0·24	1·12	0·26	1·29	0·31	1·52	0·27	1·33	0·23	1·14	0·26	1·28	0·29	1·40	0·26	1·28	0·29	1·41
Fus. Beam	in, m	42	1·07	45	1·14	29·5	0·75	44	1·12	24	0·61	44	1·12	36	0·92	43·5	1·10	23·8	0·60
Fus. Xsect	ft², m²	10·2	0·95	12·3	1·13	8·9	0·83	11	1·02	6·4	0·6	11·5	1·07	9·7	0·9	13	1·21	7·2	0·67
Fus. Skin Area	"	182	16·9	174	16·2	181	16·8	140	13	148	13·9	155	14·4	181	16·8	154	14·3	160	14·9
WEIGHTS	lb. kg																		
Wing		311	141	300	136·5	345	157	341	155·2	222	101	271	123	365	166	271	123	388	176·7
Ailerons						32	14·6					21	9·5	24	10·9	20	9·1		
Fuselage		173	78·8	120	54·5	303	138	204	93	112	51	124	56·4	123	55·8	95	43·2	187	85·2
Coupé		in Fus.		15	6·8	23	10·5	in Fus		18	8·2	20	9·1	22	10	14	6·3	in Fus	
Fin		6·1	2·8	9	4·1	in Fus		"		in Fus		8	3·6	6	2·7	8	3·6	"	
Rudder		6·2	2·9	in Fin		9	4·1	7	3·2	} 30	13·6	6	2·7	5	2·3	6	2·7	"	
Hor. Tail Unit		15·3	7·	20	9·1	41	18·6	22	10			25	11·4	24	10·9	24	10·9	23	10·5
Chassis Wheel		in Fus		25	11·4	20	9·1	in Fus		11	5	14	6·4	14	6·4	55	25	in Fus	
Skids		"		15	6·8	in Fus		"		15	6·8	7	3·2	12	5·4			"	
Controls		"		30	13·6					14	6·3	29	13·2	36	16·3	28	12·7		
Instruments		"		8	3·6			8	3·6	8	3·6	8	3·6	10	4·6	9	4·1	8	3·6
Seats		"		10	4·6	31	14·1			8	3·6	2	0·9	16	7·3	12	5·4		
Hooks		"								2	0·9	3	1·4	3	1·4				
Contingency												10	4·6						
EQUIPPED WT.		511·6	232·5	552	251	804	364	582	265	440	200	548	249	660	300	542	246	606	276
LOAD		400	182	400	182	400	182	400	182	400	182	400	182	400	182	400	182	400	182
ALL-UP WT.		911·6	414·5	952	433	1204	546	982	447	840	382	948	431	1060	482	942	428	1006	458
Alternate Load										510	232								
Alternate All-Up										950	432								

The competition judges did not like the use of a bracing strut and were somewhat doubtful about the sweep. The judges also did not like the initial weight estimate which was, in the opinion of many, low. Prototypes of this design are being built in England and in Canada.

Sixth Place

Godwin's Design 53 was the last to be placed. This design has perhaps more style to it than any of the others (FIG. 17). Again a side-by-side seater, it has a wide area of transparency and an excellent view. Wing and fuselage are of normal plywood construction, the wing being entirely ply covered except for the trailing edge portion inboard of the ailerons. There is a rear spar which is pin jointed at the root and no diagonal spar. The airbrakes are of an unusual semi-split construction. Part of the wing trailing edge hinges upwards and a paddle-like balance moves down under the wing. This scheme has its attractions, but the effect of brake operation on trim would need checking.

Unplaced Entrants

Mention is made of a few unplaced entrants which have some specially interesting aspects. It is not meant to imply that other unmentioned designs did not also have much of interest.

Prower's Design 47 (Cu-Nim)

The particular interest of this design is the staggered seating, the feet of the man seated aft being beside the front seat, thus achieving a fuselage beam of 36 in. and improving the balance with one crew.

Robertson's Design 11

This design features a retractable tricycle undercarriage of considerable ingenuity which is shown diagrammatically in FIG. 11 on the same scale as

Huetter's Hi-21. He claims a weight of 55 lb. (25 kg.) for this which is probably optimistic considering that Huetter's cost him 70·5 lb. (32 k.g.) Such an undercarriage would have many attractions for quick ground handling, although its weight, maintenance and vulnerability disadvantages are obvious. An excellent set of small scale detailed drawings accompanied this entrant. They were a model of good pencil tracing work.

Turner's and Wijewardene's Design 6

This design shares the thinking behind Design 50 in that the seats are in tandem with the wing swept forward to improve the view from the rear seat. The wing is cantilever and the spar centreline sweep is 4 deg.

The above inadequate sketch of the designs is all that space allows. Interesting comparisons on wing sections, plan forms, fuselage shapes, fitting design, materials, controls, view and many other aspects could be made and would be instructive.

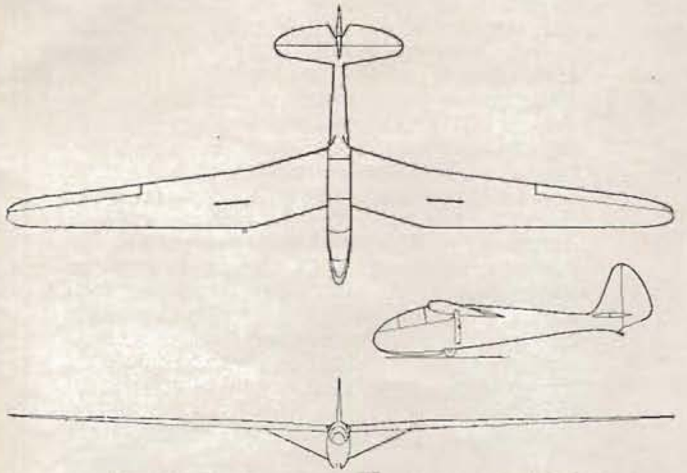


Fig. 16.—Harbinger, Design 50: general arrangement

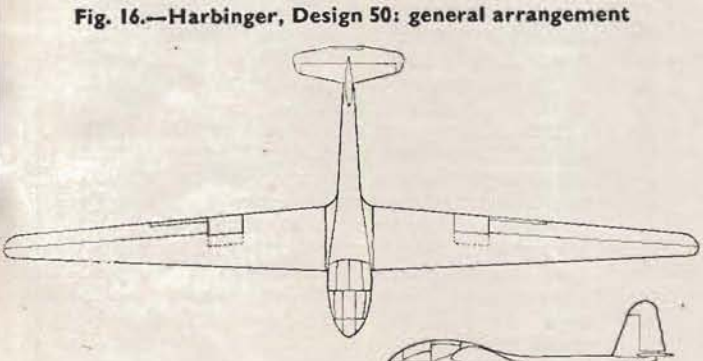


Fig. 17.—Design 53: general arrangement

A few data on some of these points are given in TABLE IV.

SOME ANALYSIS OF TWO-SEATER PERFORMANCE

The weights and performances of a number of two-seaters have been collected by K. G. Wilkinson*. FIGS. 18 and 19 are reproduced from his article.

The main thing we learn from these curves is that most two-seaters to date have been too conservative. They have carried too much wing for a given span or been too heavy. These curves show, for instance, that a 60-footer with $A=15$ would give a minimum sinking speed of 2·4 f.p.s. at 35 m.p.h., fulfilling the B.G.A. specification. Most of the entrants had these dimensions. However, FIG. 18 shows that had the aspect ratio been increased to 21 at the same span, the sinking speed would be 2·25 f.p.s. at 40 m.p.h., which also fulfils the specification. Referring to FIG. 19, the same tendencies are shown with regard to best L/D conditions and sink at 80 m.p.h. (130 k.p.h.).

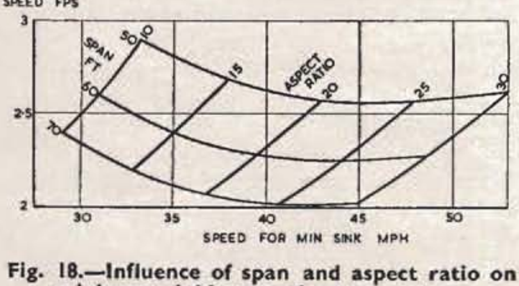


Fig. 18.—Influence of span and aspect ratio on minimum sinking speeds—two-seaters

Since Wilkinson's study did not assume optimum figures, but only averages, he cannot be considered to reflect anything more than what has often in fact been achieved. Why, then, are the B.G.A. Design Competition entrants so conservative? The reasons may have been:

Lack of statistical data.

Lack of realization of actual performance trends depending on sailplane geometry.

Lack of knowledge of the features likely to be attractive to the judges of the competition.

The first and third reasons are clear enough, but the second may need some explanation. Reference is made to Wilkinson's conclusion that for a given span the high aspect ratio sailplane is lighter and has a better performance within reason, compared to one with a lower aspect ratio. It has been argued for years that a high aspect ratio wing is heavy and so it is if the span is increased. However, for a given span the wing, regardless of aspect ratio, has the same load to carry and if it is possible to keep the same spar depth, the spar cannot change in weight. To do this, the root

* "The Design of Sailplanes for High Performance." K. G. Wilkinson. AIRCRAFT ENGINEERING, Vol. XXIII, September 1951, pp. 263-271.

TABLE V

TYPE	Equipped Wt.		Ratio	L/D max		Min. Sink		Sink at 80mph	
	Given or Actual	From Equation	Actual / Equation	Given or Actual	Figure 19	Given or Actual	Figure 18	Given or Actual	Figure 19
30	512	510	1·0	27	26·3	2·28	2·3	7·6	7·5
39	552	590	0·94	26·8	24·2	2·3	2·4	8·2	8·4
51	804	612	1·31	25·8	24·5	2·2	2·35	7·75	8·3
22	582	590	0·99	26·8	24·2	2·4	2·4	7·4	8·4
50	440 (550)	590	0·75 (0·93)	25·9	24·2	2·3	2·4	8·8	8·4
53	548	560	0·98	29·5	25	2·	2·35	6·6	8·2
Kranich	564	590	0·96	22·8	23·6	2·52	2·45	8·95	9·
TG-4A	511 (461)	430	1·19 (1·07)	22	23·6	3·5	2·7	8·7	8
Goevier	472	480	0·99	19·3	20·8	3·02	2·9	13	10
Hi-21	665	630	1·06	25·1	24·8	2·23	2·3	7·65	8·8
Units	lb.					ft/sec		ft/sec	

thickness/chord ratio must be changed, but not so much as one might think. For instance, for a wing of 60 ft. span and 3:1 taper and a root spar depth of 9 in., the root section would vary as follows with aspect ratio:

A	12	15	18	21
Root $\frac{\text{Thickness}}{\text{Chord}}$ per cent	10	12·5	15	17·5

The higher aspect ratio wing has less area, shorter ribs, etc., and therefore should be lighter. The rear fuselage and tail unit will also be shorter and lighter so that one comes out with a smaller and lighter sailplane. Whether this is sufficiently light to counteract or neutralize the greater rate of sink one would calculate for the smaller wing is the doubtful point. Lack of dependable weight data would make one cautious and one needs an analysis such as Wilkinson has made to clarify the shape of the variables.

It may be instructive to apply FIG. 18 and FIG. 19 to the types detailed in TABLE IV and TABLE II. The results are shown in TABLE V. Assuming that Wilkinson is right, the worst showings on weight are for the Nimbus (Design 51) which is actually 31 per cent high and Harbinger (Design 50) which is 25 per cent low on calculation. Revised calculation is shown in brackets. It is notable that the winner is right on the mark and that all the others are within 6 per cent of the calculated weights. The bracketed figures for TG.4A allow for a reduction of 50 lb. in the large allowance of 87 lb. for fixed equipment.

As for performance, the given gliding angles are all better than given by FIG. 19 except for Kranich, TG.4A and Goevier, for which the real performance is pretty well known, and which show up rather worse than FIG. 19 says they should. Here we see the usual designer's optimism, particularly in Design 53. The sinking speeds agree much better with FIG. 18, except that TG-4A shows up badly. However, as mentioned above, cleaning up this type has made remarkable improvement, even improving on FIGS. 18 and 19. It is also to be noted that Goevier appears to have a worse high speed performance than FIG. 19 would allow.

Special reference should be made to TABLE II. This contains all the actual detail weights and performances available to the author. It is not a great deal, there is no consistency in it. One should be grateful to Jacobs, Laister, Huetter, Castello and Mauboussin for making weight data available in spite of the fact that some of the weights are very high. As for performance measurements, all that are available were published before the war on Kranich and after the war on TG-4A. All other performances given are calculated or based on evidence or comparison but not on precise measurements. If more actual data could be made available, development could be much more rapid, and the author appeals to designers to weigh detail parts and publish the weights and make efforts to measure performance under precise and technically acceptable conditions. The greater the volume of precise data, the less would be the necessity for inexact discussions and descriptions and guesses of which this present paper consists.

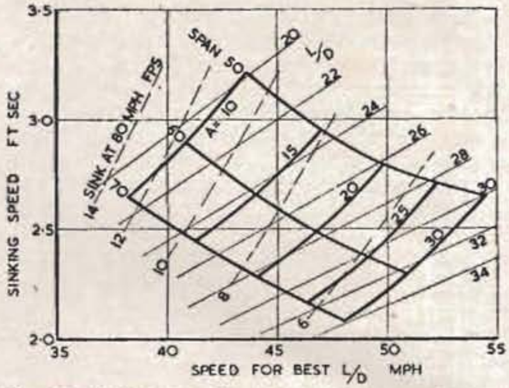


Fig. 19.—Influence of span and aspect-ratio on L/D and high speed performance—two-seaters

FUTURE TRENDS IN TWO-SEATERS

In the above discussion and descriptions, there is no obvious design trend to be observed The state of development is still too tentative for the essentials to be generally obvious. What the author believes these essentials to be (as he writes in 1952) are described below.

Design effort must be directed toward obviating the basic disadvantages of the two-seater. These are: too great a size, too much weight and bad view for second pilot.

We should like to have two-seaters which are, *for a given performance*, no larger and no heavier than the single-seater. The second pilot should have as good a view as the first pilot, if he is to enjoy the flight and make his contribution towards its success.

To cut down size certainly means reducing span below the optimum. The problem is then by other means to bring the chosen restricted span as close as possible to the optimum. This means that the profile and friction drags must be made as low as possible, and the aspect ratio as high as practicable. Following this idea gives us the conclusion that it will be more important to make the two-seater aerodynamically cleaner than the single-seater, which is in any event of manageable size. It should be more worth while in a two-seater to give careful attention to the cabin enclosure regarding shape, flush fitting of panels and to air leaks. It might be worth while retracting the chassis and suppressing all small external details, such as openings through which air might leak, knobs such as control horns and control surface gaps. If it is possible to attain a greater measure of laminar flow over sailplane wings by suitable section shapes, it would be well worth while. The value of extremely thin wings must be considered but this conflicts with the second requirement of low weight.

Low weight must be attempted. The crew of two should be able to manhandle their two-seater on the ground and remove the wings. Weights of present-day 60 ft. wings are about 150 lb. (68 kg.) each. As shown above, it is essential, quite apart from this, for the weight to be kept low for the sake of performance. The combination of high aspect ratio and low drag camber flaps is likely to be essential. The design complication is increased thereby but will have to be accepted.

View and comfort are of great importance and are not indivisible. A good view in itself is comforting if not comfortable. In a single-seater a considerable degree of comfort is necessary if a long flight is to be bearable. The pilot cannot rest because the flight depends on his constant watchfulness. In a two-seater, comfort is not quite as essential, because the pilots can fly in turn and rest when off duty. This argument gives the designer some leeway. He can make quite a constricted accommodation for each pilot as long as the pilots are able to change the position of their limbs when not piloting. This means that the fuselage cross-section for a high performance two-seater need be no greater than for a single-seater and possibly even slightly less although, considering the cramped seating of some sailplanes, let us hope not.

THE ANSWER TO Mr. FLETCHER'S PRAYER?

THE 'LO-100' ZWERGREIHER ('DWARF HERON')

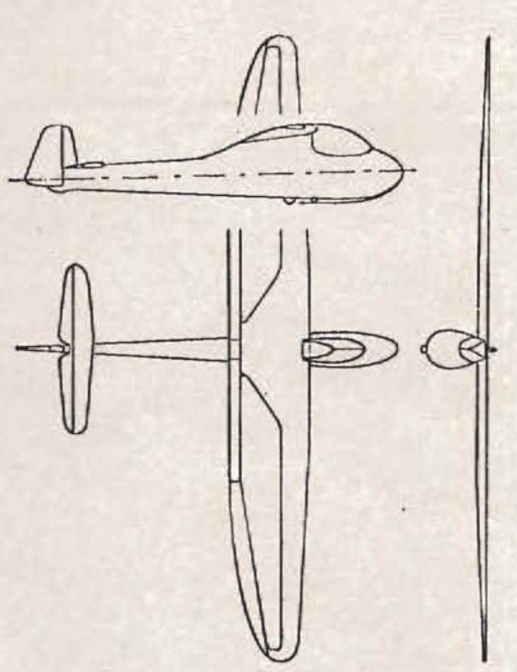
Designer: Ing Alfred Vogt.

Wings: Cantilever shoulder wing in wood, uninterrupted spar, plywood D nose, Profile thickness 11 6%, greatest chord 1.30 m., differential ailerons

can be lowered up to 15° during final approach or to increase lift. Flaps up to 45°.

Fuselage: Wood, oval section, skid and single wheel, large cabin, suspended and adjustable rudder pedals.

Tail: Cantilever, wood, elevator in front of rudder, elevator trim.



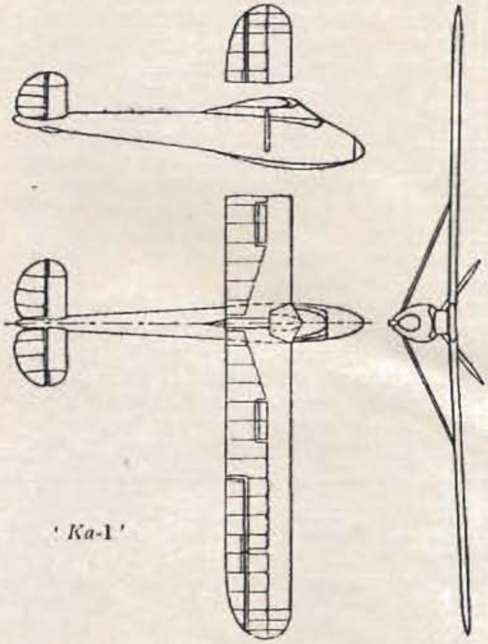
Span	10,00 m.
Length	6.15 m.
Height	1.47 m.
Wing Area	10.90 m².
Aspect ratio	10.9.
Empty weight	110 kg.
Max. weight	235 kg.
Min. sink	0.78 m./sec. at 70 km./h.
Min. speed with flaps	60 km./h.
Min. landing speed	48 km./h.
Best gliding angle	in excess of 1:25.
Safety factor	13

Export model costs DM 7,500 (=£680).
And building kits cost DM 250 (=£23).

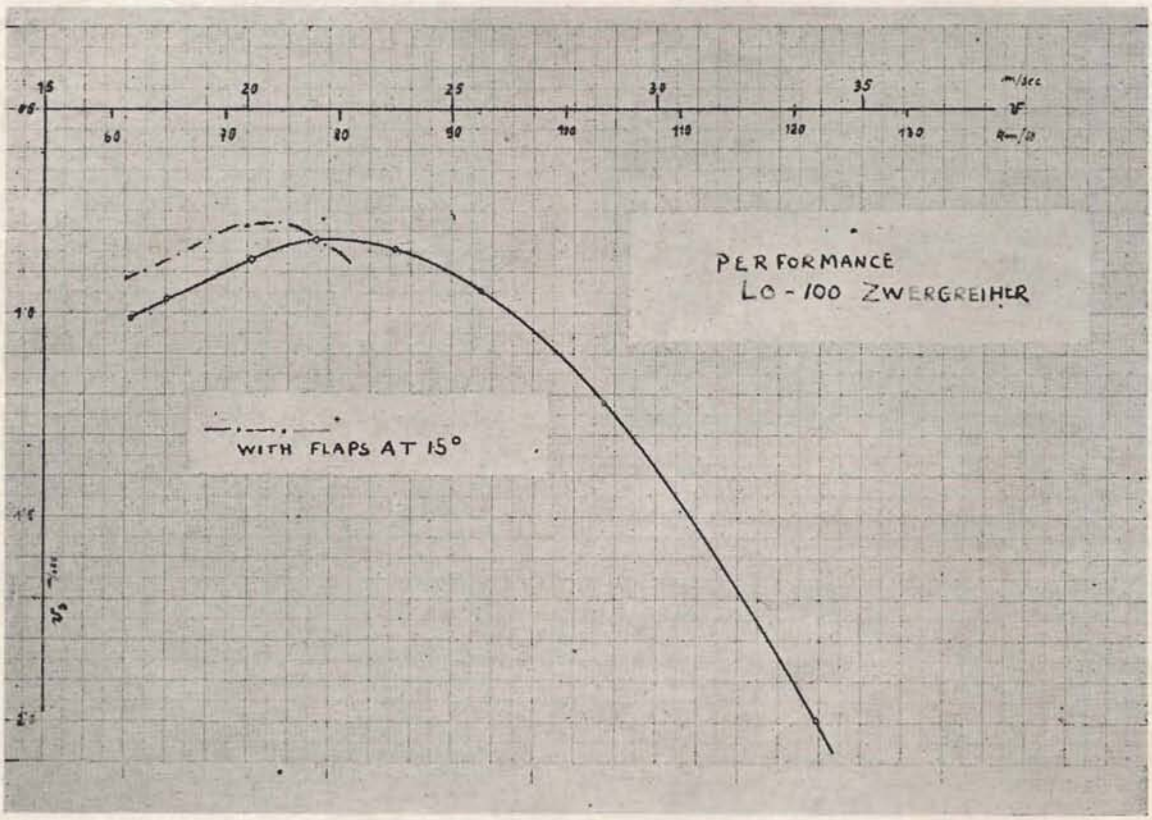
'KAISER Ka-1.'

Wing Profile, Gö-549. 16%.

Span	10 m.
Length	5.5 m.
Wing area	9.9 m².
Max. width, fuselage	0.6 m.
Weight empty	95 kg.
Weight flying (with dive brakes.) ..	180 kg.
Gliding angle	1:20.
Min. sink	0.95 m./sec.
Min. speed	45 km./h.
Max. Perm. speed	200 km./h.
Aero-Tow	100 km./h.



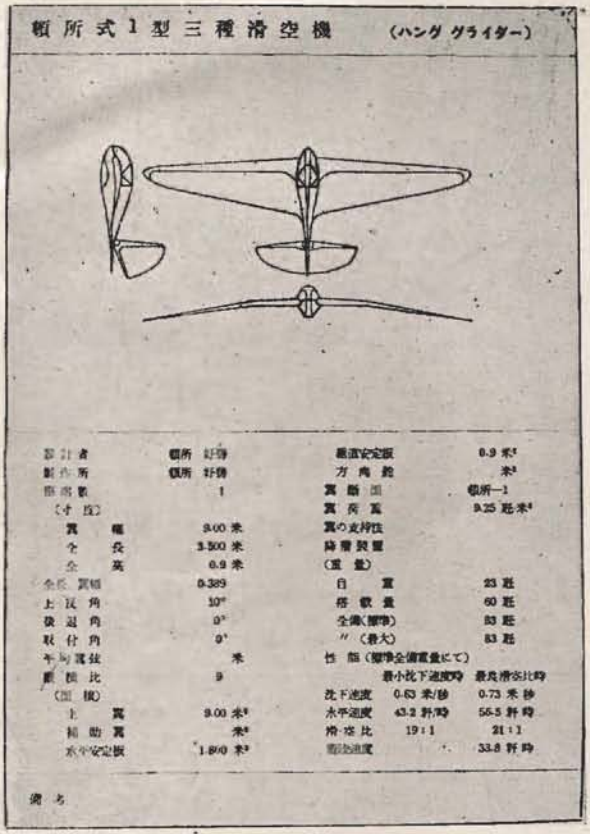
'Ka-1'



'TONDO KURO III,' 1937

High Performance Hanging Glider.

Span	9 m.
Length	3.5 m.
Wing area	9 m².
Wing loading	9.25 kg/m².
Weight empty	23 kg.
Weight flying	83 kg.
Min. sink	0.63 m./s. at 43.2 km./h. with a gliding angle 1:19.
Sink	0.73 m./s. at 56.5 km./h. at best gliding angle 1:21.
Min. speed	33.8 km./h. (18 m.p.h.).



Take-off and landings are performed using the pilot's feet instead of an artificial under-carriage. Feet and head were then fully retracted into the fuselage. The head-on view is of course inverted, as common Japanese space saving habit. There are no signs of ailerons on the plan views although they appear on a photograph too dense for reproduction.

THE 'KOBOLD'

Constructed by G. Blessing in 1944.

(compiled from *Thermik*, Jan., 1950).

TRUE soaring usually begins where most pilots have to stop flying because the high performance sailplane, trailer, motor-car and driver necessary for cross-country soaring are too expensive.

So long as a motor car and trailer are necessary there is little to choose between a miniature sailplane and a 17 m. span, both need expensive cars and trailers.

An entirely new approach is required, not necessarily theoretical but practical, to develop a sailplane as 'sports gear' which the pilot can transport, assemble and store as easily as a pair of skis, a foldboat or a camping tent.

In 1944 G. Blessing constructed his 'Kobold' on these principles. As no steel tubing was available, it was constructed in wood. Its performance approximated that of the 'Rhön Bussard.'

On landing, after a cross-country, it could be dismantled by two men. The rear fuselage folded forwards over the front fuselage. The outer wing sections folded under the inner wing sections, and both folded along the fuselage.

The landing wheel was then displaced to the side of the fuselage and an additional landing wheel, carried in the locker, was placed on the other side of the fuselage to give a wheel track of 80 cm. A cover with inflatable sections is then drawn over the complete sailplane which protects it during transport.

The pilot can then pull his sailplane by hand to the nearest railway station, or hire a bicycle or a motor bicycle to tow it home.

Its dimensions when dismantled are: length 3 m., width 1.05 m., height 1.35 m., total weight 125 kg. Of this the 'transport' parts (spare wheel, cover, transport attachments weigh only 10 kg.).

It is thus possible to store it in any room, cellar or attic. It can be taken to the launching field by hand as it is nothing more than a two-wheeled wheelbarrow, or towed by a bicycle, or if it is very far away, a motor cycle can be hired to tow it.

It is ideal for private or group ownership. After all, soaring is above all an individual experience, private owners usually look after their own property more carefully than club members and it would be desirable to have more private owners in all clubs. Gliding clubs could well emulate motor cycle clubs in this respect where all members own their own machines.

When soaring in the 'Kobold' one is freed from the worries of organizing costly retrieves, when one lands, one can find one's way home with one's sailplane by utilizing public transport, if necessary.

It would also free its owners from geographical bondage to fixed soaring sites and would allow them

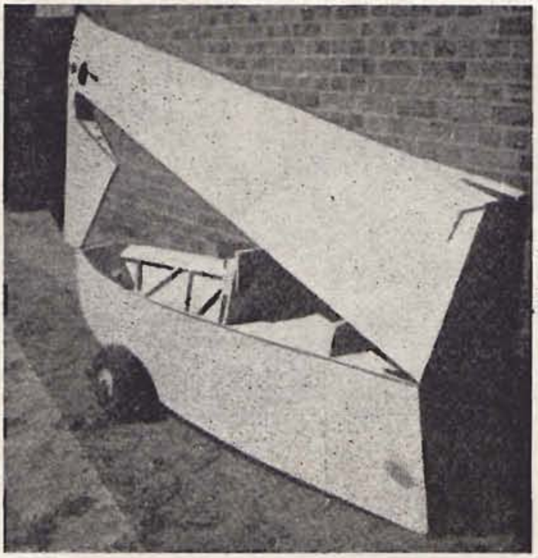


Fig. I

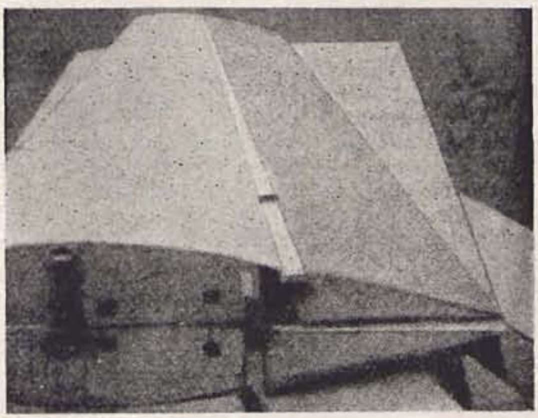


Fig. II

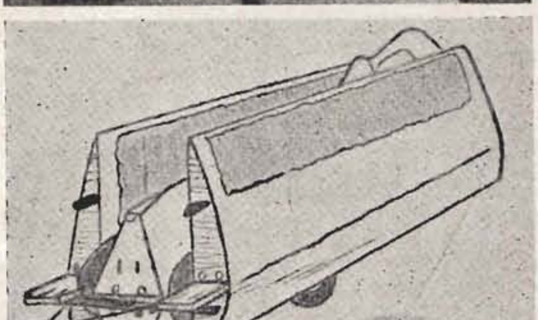


Fig. III

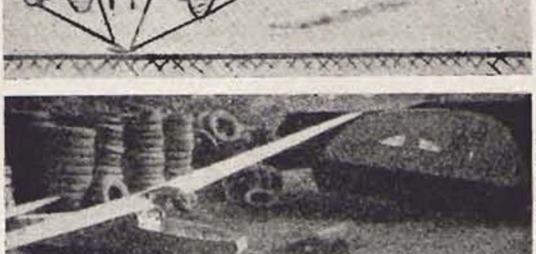
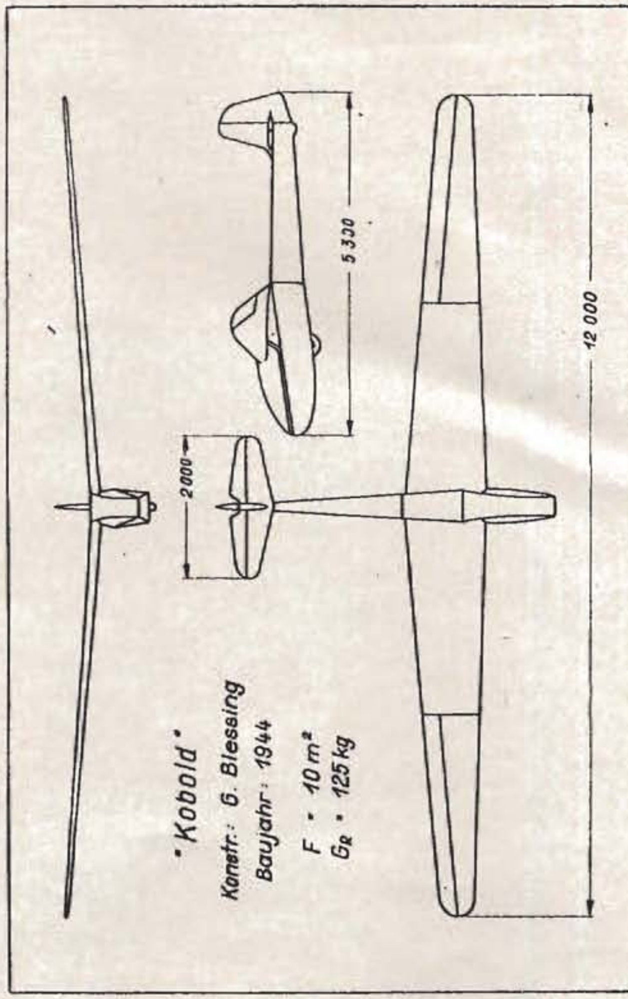


Fig. IV



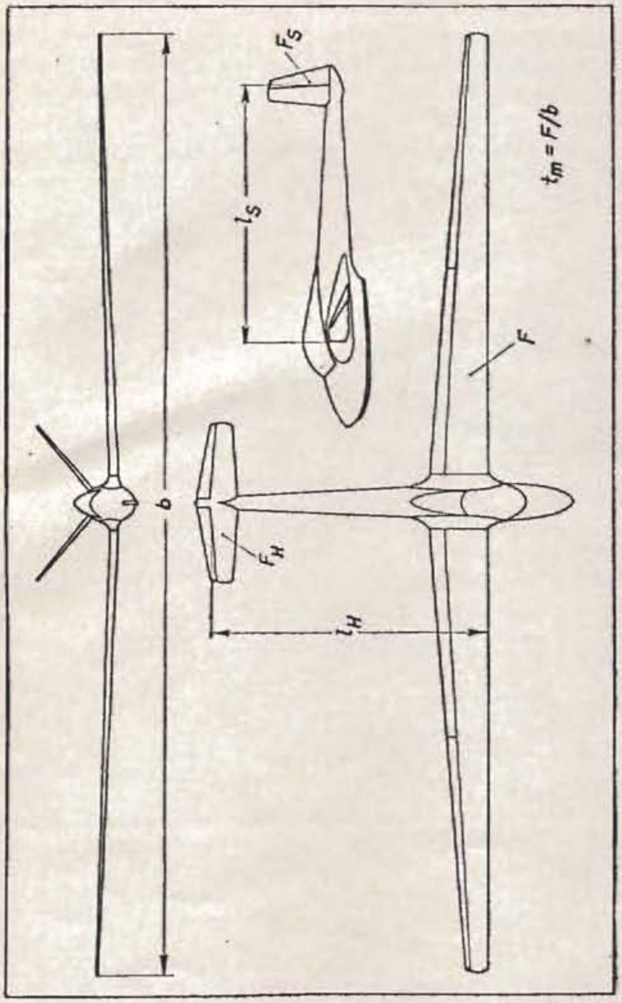
to prospect new soaring sites in hitherto unapproachable districts. For instance, it could be taken up in ski lifts and furniculars to explore new alpine sites. Mr. Blessing also built a small caravan (seen in figure 4) into which the sailplane fitted. When the sailplane was taken out his family could live in it and thus could accompany him during his soaring week-ends. Blessing has also designed a further development of these ideas in which the pilot's cabin is turned into a motor scooter on which he can retrieve himself towing the rest of his fuselage and folded wings.

HUTTER-30 PROJECT

(*with acknowledgment to 'Schweizer Aero Revue Thermik'*).

Designed by Wolfgang Hutter.

Span .. .. 13.60 m.
Wing Area .. .. 8.30 m²
Aspect ratio 22.3
Dihedral .. .. 2.5°—4°
(most favourable dihedral to be determined by flight tests).
Length .. .. 5.44 m.



	Aerobatics	Normal	Specially Equipped
Weight empty	75 kg.	75 kg.	75 kg.
Pilot & equip.	85 kg.	95 kg.	115 kg.
Weight flying	160 kg.	170 kg.	190 kg.
Wing loading	19.3 kg/m²	20.5 kg/m²	23.0 kg/m²

Estimated performance at a wingloading of 20.5 kg/m²

	Speed	Sink	Gliding Angle
Slow flight	54 km/h.	0.80 m/s.	18
Flight for min. sink	62 km/h.	0.65 m/s.	27
Flight for max. L/D	80 km/h.	0.72 m/s.	30
	100 km/h.	1.00 m/s.	28
	120 km/h.	1.45 m/s.	23
Terminal velocity with air brakes	250 km/h.		

The wing has a laminar flow profile developed from that of the 'Mustang' wing and 'G-600.' It will take advantage of sandwich or shell construction although a prototype with traditional structure might first be built. Dive brakes will not spoil the wing surfaces but will be operated as umbrellas from the fuselage.

(This is the most attractive project which we have seen. It should be remembered that it was first published in the *Schweizer Aero Revue* in March, 1949, and we have no doubt that Wolfgang Hütter would be able to give it an even better performance were he to build it today. As it is designed for plastic sandwich construction there is yet hope that a pneumatic press might one day mass produce ten thousand versions of this sailplane which might bring down the cost to about £150—£200 per sailplane. This costing is of course only a blind guess on my part. O.W.N.).

'SPATZ'

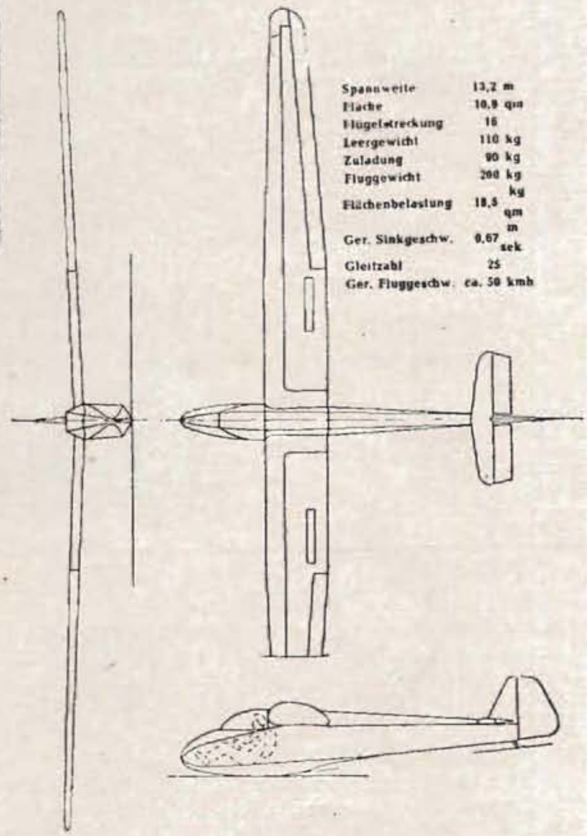
By E. SCHEIBE.

(acknowledgments to 'Weltluftfahrt')

Span	13.2 m.
Wing area	10.9 m²
A.R.	16
Weight empty	110 kg.
Weight flying	200 kg
Wing loading	18.5 kg/m²
Min. sink	0.67 m/s.
Gliding ratio	1:26–28
Min. speed	50 km/h.

Price about £580.

Construction: fuselage steel tubing, covered with fabric.



'FAUVEL AV-36'

Span	.. ..	12 m.
Length	... ..	13.10 m.
Wing area	..	14.20 m²
A/R	.. ..	10
Weight empty	..	110 kg.
Weight flying	..	190 kg.

First estimated performances :

Min. sink	- ..	0.85 m/s.
Gliding ratio	..	1.20

have been superceded by comparative flight tests with 'Castel 311' and 'Nord 2000 Olympias' wherein at all speeds the 'F.36' remained above its competitors. On several occasions it stayed on the same level with 'Weihes' and 'Air 100.' It has also been responsible for some remarkable flights during 1952 (460 km. inter alia) and we look forward to hearing accurate particulars of performance after proper flight tests. It would seem safe, however, to repeat that the performance of the prototype is superior in all respects to that of the 'Olympia.'

A NOVEL SAILPLANE

By R. Platz

THE following article was written by Reinhold Platz, Technical Director and Chief Engineer, Fokker Aircraft works, from 1913-1932 and was published in *Zeitschrift fuer Flugtechnik und Motorluftschiff-fahrt* edited by G. Krupp, Prof. Prandtl and Dr. Ing. W. Hoff, on 26 Jan., 1924.

The present popular interest in gliding and soaring have induced me to build a sailplane which in spite of the present financial situation would open up the possibility of soaring to all sporting enthusiasts. The requirements are :—

1. A very low initial cost which should not exceed that of a good pedal bicycle.
2. Capable of dismantling into very small parts in order to permit transport per passenger train. (*Ed.—as with skis and foldboat canoes*).
3. Insensitive to rough man-handling and shocks at all and any points.
4. Rapid and easy assembly.
5. Simple and cheap replacement of all parts.
6. The sailplane must be capable of being carried by a single man.

None of these requirements have been fulfilled by any sailplanes built at present. A new way is therefore described.

The fundamental concept was born by a recollection of a trip in a sloop rigged sailing boat, where, with the correct setting of the sails and the coincidence of the centre of pressure of the sails with the lateral centre of pressure of the hull, it becomes possible to sail for long periods without the use of rudder, the sails are in fact 'stable.' A boat so trimmed can be steered within certain limits without the use of rudder by tightening or loosening the jib sail.

If one takes two such sails (two jibs and two mainsails) the second being the mirror image of the first in plan and regards the pilot's weight as the lateral centre of gravity (pressure ?) and turns the whole

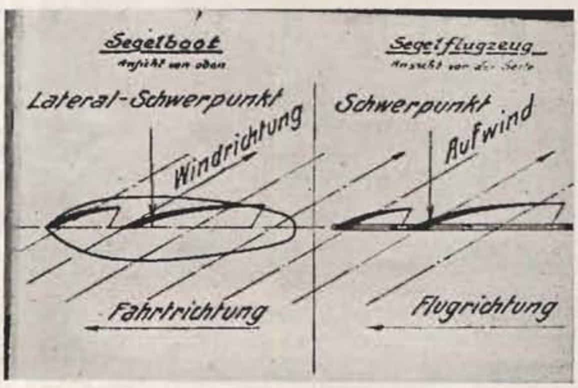


Fig. I.—Showing the analogy between the forces acting on the jib and main sail of a sailing boat and the split or double winged ' sail ' plane

assembly 90° through its fore and aft axis, one would then have, as can be seen from figure 1, a sailplane with which one can fly straight and whose vertical flight path can be controlled by the setting of the jib sail.

In view of the over-riding importance of simplicity and low initial cost it was necessary to attempt to avoid introducing additional control surfaces and apparatus. Therefore it was attempted to provide adequate control with this simple layout. Lateral stability could be achieved by adequate dihedral of the spars (or masts, to keep to the sailing boat analogy). It still lacked rudder controls. This function could be undertaken by (' aileron ') jibs.

A paper model, shown in figure 2, weighted with a paper clip, served as a prototype test model. Lateral

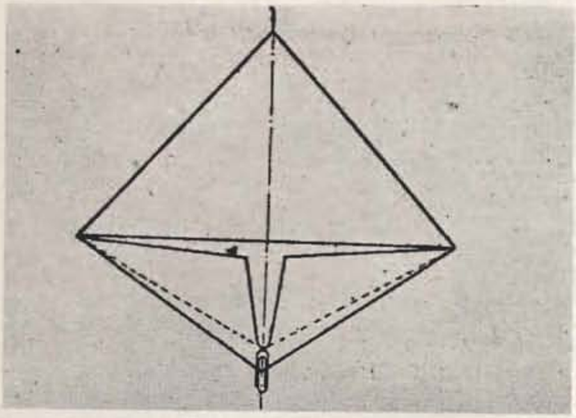


Fig. II.—Prototype free flight paper model weighted by a paper clip

stability is good with appropriate dihedral. The Elevator control provided by the fore wing (or jib) is very effective.

With differential use of the fore wings fully satisfactory rudder control was achieved even when the model was released in a stalled condition. (*Ed.—According to modern two-seaters instruction terminology we would prefer to word this differently and talk of aileron control rather than rudder control, but the result is sound.*)

The final form was now found and in four working hours a model of 1.3 m. span and 0.4 m.² wing area was completed. The first trials took place on some sand dunes 6-8 m. high in early Nov., 1922. The calm on the first day was unsuitable for soaring but proved very useful for the exact setting of the fore sail and the correct location for the load, which consisted of a workshop vice.

On the next flying day the first success was recorded. The model ' soared ' with a wing loading of 2½ kg. m.² in a light wind. It gained height repeatedly and moved, head into wind, along the crest of the dunes without losing height for some time in the same way as gulls have been observed to soar, which has often been described.

From this model it was already evident that all the requirements mentioned at the head of this article were capable of solution. In the full scale plane difficulties due to the flexibility of the wing (in particular the changeable profile) could still occur.

To study this question a further model of 2.5 m. span and 1.3 m.² wing area was now constructed in a few hours. Trials proved that there was no noticeable difference between the large and small models. After these experiments a full scale sailplane of 16 m.² wing area was built in a few days.

It consists of a curved keel of steel tubing in whose rear end a solid wooden mast is inserted (this is the fuselage member) it has two cups welded on each side into which the wings spars (solid wooden masts) are inserted. Other main parts are the two sewn-together 'mainsails' and the jibs, the means of attachment and three tin fittings.

The 'moving' parts consist of only one screw which holds the jibs together while allowing them to rotate up and down.

The whole sailplane can be dismantled in 10 minutes into a portable pack of 3.3 × 0.35 × 0.25 m. and weighs 40 kg.

The sailplane can be assembled ready for soaring by one man in 15 minutes.

The trials were mainly carried out, as with the small models, in light winds with light loads. The curvature or bending of the sails, control and landings were good as with the small models.

Further trials in the next few days occurred in a strong wind. At sand dunes 25 m. high the sailplane was flown with (*Ed.* '*by*') 75 kgs. of sand ballast. About 50 flights were made without a pilot with pre-set controls, the sailplane often landed in the sea or behind the dunes without any damage at all.

The next trials were conducted with a pilot in 'captive' flight, starting with a one weighing 55 kgs. but followed by other sporting enthusiasts of up to 100 kgs. weight. They all noted the ease of operation of the elevators (fore wings—jibs). The sailplane was held by four lines to tail, wing tips and nose as it was too risky to indulge in free flight at this precipitous point of the dunes without further practise.

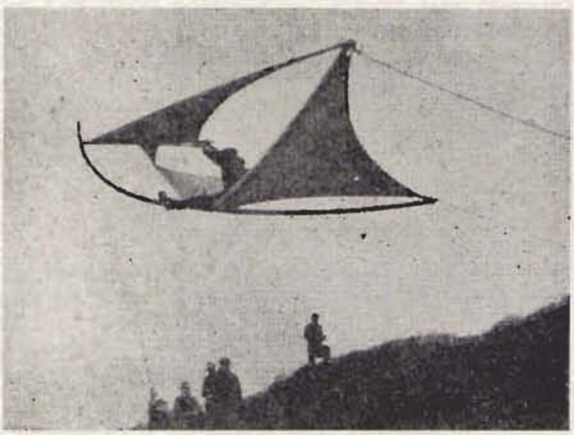


Fig. IV.—The sailplane stability and controls flight tested in captive flight in slope lift

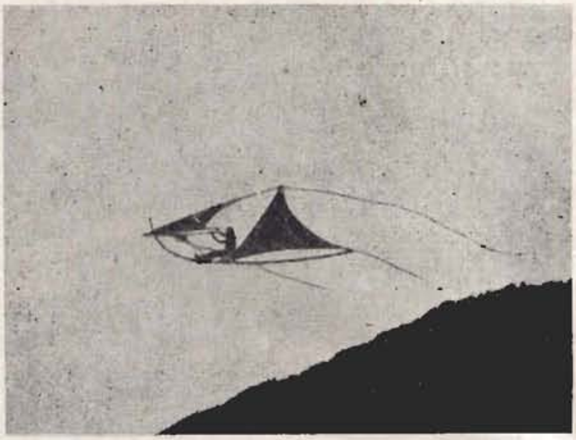


Fig. V.—Free flight in slope lift

The first human 'free' flight occurred on the next flying day in Feb., 1923 with a moderate wind from a 10-12 m. high dune.

Soaring along the dunes which are not very suitable for this is to be tried next after which the experiment can be regarded as closed.

Even if the aerodynamic qualities of such a sailplane cannot compare with those of a 'performance' sailplane the advantages listed as our requirements at the beginning of this article should be very great for beginners.

It will be interesting to hear the views and comments of men of science and soaring pilots to this problem and to this first attempt to find a solution.

AUSTRALIAN NEWS

By F. D. Hoinville.

BUSINESS kept me out of the National Championships, which finished on the 20th January. I had tipped either Bob Krick or Bob Muller, of the Hinkler Soaring Club, to win, but Bob Muller entered for the Matrimonial Stakes (and drew a winner) and had to scratch from the gliding events.

Bob Krick justified my faith in him, and included in his winning score a flight of 220 miles, the longest of the contest. Although he had previously done Gold height, his barograph had failed on the earlier occasion, so he must do the height again before he gets his Gold 'C.'

Merv Waghorn did a flight of 200 miles, his best effort in twenty years of gliding, to complete his Gold 'C' (No. 5). Other members of the Sydney Soaring Club did good flights, notably Sel Owen, National Goal Record 206 miles, Sel also needs height to complete the Gold 'C.'

In Western Australia, Ric New proved the quality of his 'Laister-Kauffman' two-seater (and himself as a pilot) with a National Record Out-and-Back flight totalling 144 miles (solo) also two-seater Height Record of 10,000 feet and Out-and-Back 65 miles accompanied by G. R. Higginson.

The West Australians have the best location of any club in Australia for distance flying, and now that they have really got their teeth into the records, it shouldn't be long before their's is the Premier State. Up to now they have lacked good sailplanes, but the 'LK' is changing all that, as it is better than an 'Olympia,' and is no doubt the best in Australia today. My cleaned-up 'Schweizer TG3' should be flying soon, and should prove a worthy rival for the 'LK.' if and when we can find time to take it inland. Distance or altitude flying is not impossible here on the east coast, but favourable days are extremely rare. Mostly we get low inversions and westerly winds.

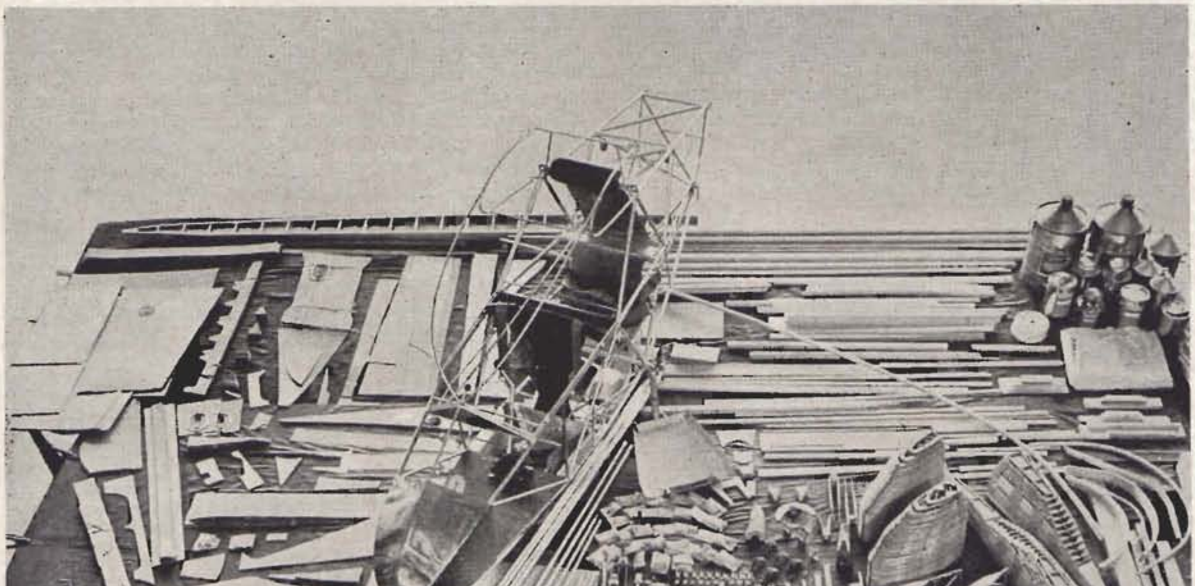
I forgot to mention that Ric New has now achieved West Australia's first Silver 'C.' Here's hoping that the Gold 'C' follows quickly.

The placings in the Australian Championships were :

1.	Bob Krick	237 points.
2.	Ric New	209 ,,
3.	Merv Waghorn	147 ,,
4.	Ray Baird	128 ,,
5.	Ray Ash	127 ,,
6.	L. Schultz	121 ,,
7.	M. Warner	76 ,,
8.	K. Colyer	37 points.
9.	L. Anderson	35 ,,
10.	S. Owen	32 ,,
11.	N. Wynne	28 ,,

Several members of the Sydney Soaring Club made flights which did not comply with contest rules for various reasons, and these were not counted. If they had been allowable, Len Schultz would have been very close to Bob Krick's score, Merv Waghorn would have been a little higher up the list, probably third.

It is greatly to Bob Krick's credit that he out-flew all the pilots who had many years' experience on the occasion when they did their best flights ever, while Bob was only on his second tour, and is comparatively a beginner. In addition to the many qualities and skills that go to make up a good glider pilot, Bob has the rare quality of determination. I have long predicted that he would become a leader in Australian gliding circles. Bob Muller is another of the same quality, and it is only a question of whether he gets enough opportunities. If he stays in gliding, he will rise to the top. Alas, he has now gone to a job in Geelong, where he will have little or no immediate chance. (Geelong, in the extreme south of Victoria and of Australia, has no gliders).



DEAR MR. BLUNT,

We enclose the latest photo taken in our workshops where we are manufacturing the two-seater sailplane 'Doppelraab.'

It shows a complete assembly kit of this sailplane. As far as we know a picture like this has not yet appeared in any aircraft magazine. It might be interesting for the public to see of how many different parts a sailplane consists. This assembly kit contains not only the ready welded steel tube fuselage, the struts, the ribs, the spars and all the other wooden parts, but also the fabric, the glue, the varnish in cans, the bolts and nuts and a great number of small items.

The picture might be described : 'The knocked down sailplane for the amateur workshop'; or 'Instead of a ready to fly sailplane the gliding club can now purchase a perfect assembly kit.'

Yours sincerely,
WOLF HIRTH.

Dunstable to Colchester, 28th July, 1951

By JOHN JEFFRIES

(By kind permission of the London Gliding Club *Gazette* we are delighted to reproduce an article from the *Gazette*, Vol. III, No. 9. In it, Mr. Jeffries describes a 65-mile cross-country goal flight from Dunstable to the coast at Colchester, performed in a miniature light-wind sailplane, the 'Scud II,' which will soon be twenty years old. It should be noted that although Mr. Jeffries was airborne for 5¼ hours, two hours were spent in hill lift before the cross-country flight commenced. This gives an average ground speed of at least 23 m.p.h. without deducting about half-an-hour which was wasted by flying up wind to Great Dunmow and also by a sight-seeing tour along the coast. According to Mr. Jeffries the w/v at the start of the flight was certainly not more than 10 knots dropping to practically nothing towards the end of his flight which makes his average speed even more creditable.)

I arrived at the Club on Saturday morning and was delighted to see that a fresh Westerly wind had been laid on. The sky was more or less clear except for a few wisps of early morning cumulus giving promise of unstable conditions which should develop later in the day.

It was not until 10 o'clock that sufficient people had turned up to operate and the first launch was made at about half past eleven. As far as slope soaring was concerned, however, the best part of the day had then gone, the wind having decreased and backed 20 degrees or more. The cumulus clouds appeared to be building up steadily giving indications of strong convectional activity. Unfortunately a thick and vast expanse of alto stratus cloud had drifted in from the West and now lay somewhat to the North of the site, with a similar cloud blanket some distance away to the South West. It therefore seemed a good policy to get launched as soon as possible in order to try and leave the site before the high cloud stopped thermal activity. I was on the cable in the 'Scud II' ready to go just before 12 o'clock. As the cable tightened Scarborough shouted 'Colchester, Jeff,' in reply to my request for a goal made at least an hour previously.

After a good launch I slowly sank to the level of the common herd some 50 feet above the hilltop. During the first hour this level remained about the limit except for a few fragments of thermal lift on the edges of cloud shadows in which I manoeuvred frantically but without much success. Soon after 1 o'clock thermal activity increased a little and the bowl end of the ridge became uncomfortably congested again, so I decided to stay between the power wires and the bastion where a steady stream of weak thermal activity kept the altimeter solvent most of the time. On two or three occasions the enormous altitude of 600 feet was attained after furious circling but the height to drift ratio did not prove sufficiently attractive to lure me far from the site.

After a bit more dicing in the hill lift I decided to land before I broke something, but on turning away from the power wires I was surprised to see the 'Tutor' and 'Grunau' rising rapidly in front of the golf club. On arrival at the spot at hilltop height the green ball shot up the tube finally settling at a steady 5 feet per second. Shortly afterwards this increased to 10 feet per second by which time the old 'Scud' was winding round in ever decreasing circles in an effort to outclimb the 'Tutor.' The lift improved rapidly and I was soon centreing to a better 15 feet per second, the variometer finally reaching the limit at about 2,500 feet with the green ball jammed fast against the top. This worried me somewhat as cloud base appeared to be fairly close and before I had thrown more than a couple more circles the 'Grunau' had disappeared above and it appeared that I was to be a close second if some action was not taken quickly. I dropped the stick into the front of the cockpit and held it there as the first wisps of mist whipped past, and with the 'Scud' screaming along at 65 miles per hour in a fruitless attempt to neutralise the variometer, the ground bid farewell and disappeared. I froze on the controls fascinated by the green ball which remained halfway up the tube until I popped suddenly into the sunlight over the outskirts of Luton with the horizon on a more or less even keel. Pulling the stick back to ease off the surplus speed I groped about to find a 1/500,000 'flying saucer' map, opened it out with some difficulty and located my nominated goal of Colchester. The detail on the map on the proposed flightpath was practically non-existent so I pushed it unfolded into the front of the cockpit out of sight and pulled a Sheet 12, quarter of an inch to a mile, map from my pocket. I took hold of the controls before the 'Scud' got completely out of hand before attempting to map-read again, and after a quick perusal of the sheet decided to fly between Luton aerodrome and some woods to the South of Stevenage with an eye to obtaining a compass heading. Flying on a heading of 090 degrees I struck lift over Luton Town Hall and immediately started circling in good lift of 10 feet per second which took me to cloudbase, now at 3,500 feet. This time 60 miles per hour indicated was sufficient to keep the vario balls in equilibrium, where they remained for some minutes.

The alto stratus now lay approximately parallel to the Luton-Colchester track and between 5 and 10 miles to the North with dark ragged-looking cumulus pushing slowly upwards beneath it and fusing their tops with the upper layers. However, as there was a considerable expanse of clear air ahead, I made a 90 degrees detour from my track and headed for the nearest cloud. Before reaching it I contacted broken lift in the region of 3 feet per second which gave me a difficult ride from 2,300 feet to cloudbase at 4,000 feet. The lift at cloudbase suddenly increased to 10 feet per second which caught me off my guard and once more the ground disappeared from view.

By the time I had emerged the clear patch ahead had become covered in neatly spaced cumulus, and as my Silver 'C' distance was now in the bag I increased speed to 40 miles per hour between thermals in the hope of reaching the coast before the lift got any weaker. It was 4 o'clock when the next thermal was struck, and this took me to cloudbase at 4,500 feet.

I made another attempt to map-read by means of the ¼ inch map, but with the numerous aerodromes dotted about the countryside and only a vague idea of the distance covered, this sheet quickly joined the 1/500,000 on the floor of the cockpit. After more dabbling in very weak lift, fatigue soon conquered enthusiasm and I decided to land at Andrews Field aerodrome, which lay more or less downwind, reaching it at 2,000 feet indicated. The runways were marked with white crosses, and although the place appeared uninhabited I suspected occupation by squatters. So, heading upwind, blundering through patches of lift, I flew towards Great Dunmow which had aircraft on the tarmac and which looked less likely to be infested by souvenir hunters. But at 1,000 feet indicated, on the outskirts of the airfield I struck more lift and started circling again for no apparent reason. Andrews Field drifted far below at the height at which I left it, and with Earlscolne airfield just within range I left the thermal and pressed off down-wind. Before covering half the distance, however, I spotted some gulls and a sparrowhawk floating around in lift and arriving at the spot we circled together for five minutes or more. I felt sure that I could smell the briny and on scanning the horizon spotted a reservoir near Layer de la Haye with the sea behind it. Leaving the lift I flew towards the reservoir but with the altimeter slowly unwinding I realized that I should be unable to make it so flew dolefully for Rivenhall arriving at 1,000 feet indicated. But, as luck would have it, I ran into reasonable lift to the North of Witham on the approach 'circuit' eventually reaching 4,000 feet indicated midway between the reservoir and Colchester.

The sea was now within easy reach and so it was duly graced by a visit, followed by a round tour of Mersey Island, and a return over Shinglehead Point at 3,000 feet indicated. I assumed that owing to the small loss in altitude I must have been flying in a sea breeze effect, so I flew inland towards the reservoir in the hope of finding the best position. The red ball slowly descended the tube reaching the bottom at a point slightly to the South of the reservoir, where I made a turn towards Colchester, flying at just over 30 miles per hour at an indicated height of 2,000 feet. Arriving at the centre of the town at this height we showed our paces with a few circles over some tennis courts, the reward for which was an overdose of red ball.

An approach was now imminent. I was somewhat puzzled as to what was expected of me in my choice of a landing place at my goal, but I figured that the recreation ground in the centre of the town should be near enough. One look at it however, convinced me that discretion was the better part of valour so I made for what appeared to be a common two or three miles away. Crossing the boundary at —500 feet indicated I was horrified to see that a landing in front of a line of shooting butts was about to take place. With fingers crossed I made a rapid approach touching down at 5.15 p.m. after just over five and a quarter hours' flying.

CORRESPONDENCE

7, Brittany Road,
Hove 3,
Sussex.

DEAR SIR,

If this is one of the results of competition, then let us have more of it. For with the advent of a rival magazine within these shores, *Sailplane* has been transformed from a limp and rather uninteresting one-and-sixpence-worth to a well presented interest-packed production well worth its new price of two shillings. Well done—and more power to your elbow !

Yours faithfully,
B. V. SMITH.

MINIATURE SAILPLANES

DEAR SIR,

I had a letter from Gus Raspet today. I had asked for his opinion about the feasibility of a light 25-foot span glider. His reply is most encouraging. He calculates that a glide angle of 20 is possible with sink of less than 2 f.p.s. at 26 m.p.h. Empty weight of 100 lb. with a one-piece wing. Four foot chord. He assumes a wing with really smooth surface, which would not be difficult in such a small area.

He also tells me that the Farrar Wing has not been test flown yet, so we cannot get any more dope on that for a while. He also drew my attention to the 'Fauvel AV36,' which you have written up in *Sailplane*, and there is no doubt that the 'AV-36' has confounded a lot of 'experts.'

I am getting around to the idea of a glider along the lines of the 'AV-36' but of the dimensions of the 25-footer. It should be almost ideal, for cheap and practical gliding with car rooftop retrieving.—**Fred Hoinville.**

DUBLIN GLIDING CLUB

Dublin Gliding Club Dance, Dublin Airport. Left to right: Freddie Heinzl, John Quinn, Col. Fitzmaurice, Dr. Gatti, Ken Mellor, C.F.I.

THE 'CADET' we obtained from the Royal Engineers continued to fly up until Christmas. We then brought it to the city for display at the Model Aeronautics Exhibition in the Mansion House where it was the star attraction. The Minister in charge of Civil Aviation who opened the Exhibition was very interested and astonished to learn of the feats of sailplanes in height, distance and duration.

We held our first Annual Dance at Dublin Airport recently and despite the forebodings of one Jeremiah (initials W.F.) it was a great success financially and socially. It was very well supported by the Diplomatic Corps—our generous patron being Dr. V. P. Gatti, Consul of Brazil. The guest of honour was Col. Fitzmaurice who it will be remembered took part in the first east-west crossing of the Atlantic with Capt. Koehl and Baron Huenefeld in April 1928. The credit for the success of the dance must go to Pascal Barré. We are also deeply indebted to Messrs. Swears & Wells who gave a generous contribution and sold the tickets from their Grafton Street showrooms.

Fritz Trost is building for us the Swedish standard trailer described in the July *Sailplane*. He also converted for us a recently acquired 30 h.p. V.8 and the 21 h.p. Hillman which is now u./s. with a cracked block. Any one interested in the parts?

Our relations with the F.A.I. are not yet straightened out (through no fault of ours) but we have hopes of developments soon. In the meantime we continue to receive valuable assistance from British clubs and particularly from Lady Kinlock of the B.G.A. who cannot do too much for us.

The airfield at Leixly is situated to the lee of a reservoir and the result of this good thermal contrast is a 'standing thermal', which only the rooks and sea-gulls have used so far. Our instructors have hit the bump several times on circuits but not high enough or strong enough to soar in the 'Cadet.' Capt. Kennedy has obtained a tow-hook for the 'Tiger' at the request of J. J. Buckley of London who is bringing over an 'Olympia' in July. Another Irish exile who has also become an overseas member is S. C. O'Grady of Newcastle who threatens (as we say here) to visit us soon.

We have asked Aer Lingus to make the 'Grunau' airworthy but if it looks like taking too long Ken Mellor and Freddie Heinzl are threatening (what, again!) to do the work with expert advice. This partnership of R.A.F. and Luftwaffe worked well before and we are confident of a good job.

When you read these notes Ireland will be holding open house, and if you come over don't fail to look us up at Leixly or, as we hope, Baldonnel.

W. F.

BREVITIES

THE two-seater powered sailplane designed and constructed by M. Jarlaud for the S.A.L.S. has now been completed. Span 16.5 m., aspect ratio 13, weight empty 300 kg., weight flying 540 kg., wing area 21 m², wing loading 25.7 kg/m². Motor 40 h.p. 4-cylinder two-stroke Lutetia. Full details will be published as soon as possible.

THE winning entry of the two-seater design competition, Hugh Kendal's 'Crabpot,' which has been under construction at Redhill for about four years might be completed. It was to have had plastic wings which caused considerable difficulties in construction. Elliot's Ltd. of Newbury are now building a pair of wings of orthodox construction.

THE editorial of the latest issue of *Weather* points out that if the 'AirMet' broadcasts (discontinued four years ago due to the P.M.G.'s refusal to allocate a wave-band) had still been in operation, it would have provided a ready-made and efficient warning system which might have saved a great number of lives during the recent flood disaster.

THE Dutch designer Hoekstra has completed the design of a high performance miniature sailplane, the 'H-3.' Span 10 m., wing area 5 m², weight empty 80 kg. Estimated performance: sink 0.80 m/s. at 100 km/h., and 1.70 m/s. at 150 km/h., with a best gliding angle of 1:35 at 100 km/h.

Royal Aero Club Certificates

(Issued under delegation by the B.G.A.) **FEBRUARY, 1953**

CERTIFICATES 'A'	..	59 (15932-15990)
'B'	..	61
'C'	..	10
Silver 'C'		1
Gold 'C'		—

'B' CERTIFICATES

No.	Name.	A.T.C. School or Gliding Club.	Date taken
2444	M. A. Boyce	Coventry G.C.	22. 2.53
3141	W. E. Jones	No. 92 G.S.	15. 2.53
4961	H. Parker	No. 188 G.S.	14.12.52
8763	W. McMillan	No. 203 G.S.	9. 7.52
11903	H. R. Hill	No. 2 G.S.	8. 2.53
12161	A. W. Jennings	No. 7 G.S.	25. 1.53
12668	W. C. Edwards	No. 68 G.S.	15. 2.53
13392	C. D. Souter	No. 87 G.S.	27. 7.52
14124	M. Lewis	No. 126 G.S.	25. 1.53
14125	D. R. Sadler	No. 126 G.S.	18. 1.53
14306	L. A. T. Morgan	No. 68 G.S.	25. 1.53
15461	D. G. Faulke	No. 168 G.S.	24.12.52
14599	B. Jones	London G.C.	19. 2.53
15932	B. Pike	No. 22 G.S.	3. 6.52
15933	M. W. Latchford	No. 168 G.S.	4. 1.53
15934	C. F. North	No. 104 G.S.	11. 1.53
15935	B. D. Vincent	R.N.A.S., St. Merryn	25. 1.53
15936	D. H. C. Clarke	No. 125 G.S.	25. 1.53
15937	W. E. Earps	No. 186 G.S.	25. 1.53
15938	J. Curran	No. 31 G.S.	23. 8.52
15939	T. G. Thomas	No. 68 G.S.	1. 2.53
15940	R. A. Wallis	Salisbury G.C.	14. 7.52
15941	G. T. S. Done	No. 122 G.S.	18. 1.53
15942	M. S. Pike	Salisbury G.C.	26.12.52
15943	C. E. Pollard	No. 82 G.S.	1. 2.53
15944	P. A. Willcocks	No. 168 G.S.	1. 2.53
15945	K. R. Coombs	No. 92 G.S.	25. 1.53
15946	C. H. Gill	No. 80 G.S.	26. 6.52
15947	J. S. White	No. 168 G.S.	1. 2.53
15948	H. Paterson	Deeside G.C.	28.10.51
15949	Joan Oxenham	R.A.F. Fassberg	12. 3.52
15950	A. Hissey	No. 68 G.S.	6. 2.53
15954	D. C. Potten	No. 146 G.S.	23. 8.52
15955	G. J. Shrimpton	No. 48 G.S.	4. 1.53
15957	P. G. Hardie-Bick	Cambridge U. G.C.	3. 6.51
15958	S. F. Inward	H.C.G.I.S.	15. 8.52
15960	D. W. P. Brownrigg	No. 125 G.S.	15. 2.53
15962	P. W. Swindlehurst	No. 186 G.S.	4. 1.53
15964	D. C. Bull	No. 82 G.S.	25. 1.53
15965	D. G. Chown	No. 126 G.S.	15. 2.53
15966	J. B. Marsden	No. 24 G.S.	18. 1.53
15967	I. F. Simms	No. 89 G.S.	24. 1.53
15968	S. Crayden	Scharfoldendorf G.C.	5. 6.52
15970	J. R. Clifton	No. 7 G.S.	25. 1.53
15972	D. E. Weerasinghe	Army G.C.	23. 7.52
15973	R. Cooper	No. 45 G.S.	17. 8.52
15974	N. R. Read	No. 125 G.S.	15. 2.53
15975	A. K. Knox	London G.C.	5.10.52
15976	D. J. Kirkland	No. 126 G.S.	22. 2.53
15977	B. A. Philpott	No. 123 G.S.	22. 2.53
15978	T. E. Webb	No. 143 G.S.	22. 2.53
15979	B. L. Nash	No. 168 G.S.	22. 2.53
15980	R. K. Taylor	No. 125 G.S.	18. 1.53
15981	D. T. Ward	No. 168 G.S.	22. 2.53
15982	E. C. Salthouse	No. 203 G.S.	22. 2.53
15983	W. Heanan	No. 31 G.S.	22. 2.53
15985	R. Stangle	No. 2 G.S.	25. 5.52
15986	T. F. Hardy	No. 141 G.S.	18. 1.53
15987	A. G. Rimmer	No. 186 G.S.	18. 1.53
15988	P. E. Wareham	No. 168 G.S.	1. 2.53
15989	S. R. S. Sobot	No. 22 G.S.	18. 1.53

'C' CERTIFICATES

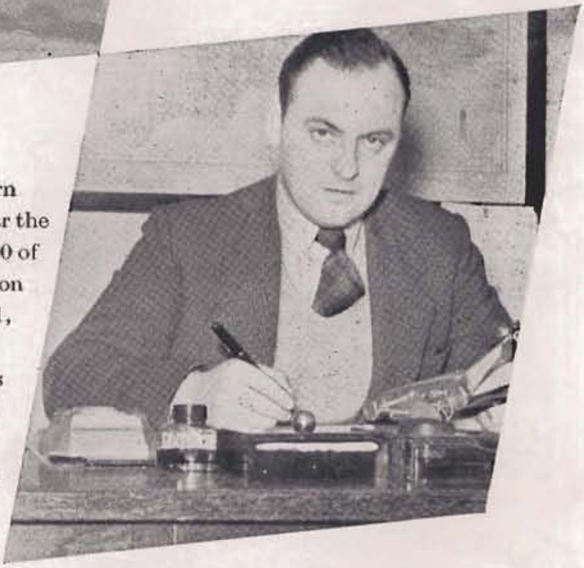
6380	W. J. W. Shorten	No. 203 G.S.	28.12.52
8763	W. McMillan	No. 203 G.S.	30.11.52
10817	A. H. Wallace	Surrey G.C.	12. 9.52
14831	P. Temple	No. 89 G.S.	28. 8.52
15940	R. A. Wallis	Salisbury G.C.	15. 7.52
15946	C. H. Gill	No. 80 G.S.	1. 9.52
15949	Joan Oxenham	R.A.F. Fassberg	2. 8.52
15957	P. G. Hardie-Bick	Cambridge U. G.C.	9. 6.51
15968	S. Crayden	Scharfoldendorf G.C.	26. 8.52
15975	A. K. Knox	London G.C.	22. 2.53

SILVER 'C'

408	James R. Court	Auckland G.C.	7. 2.53

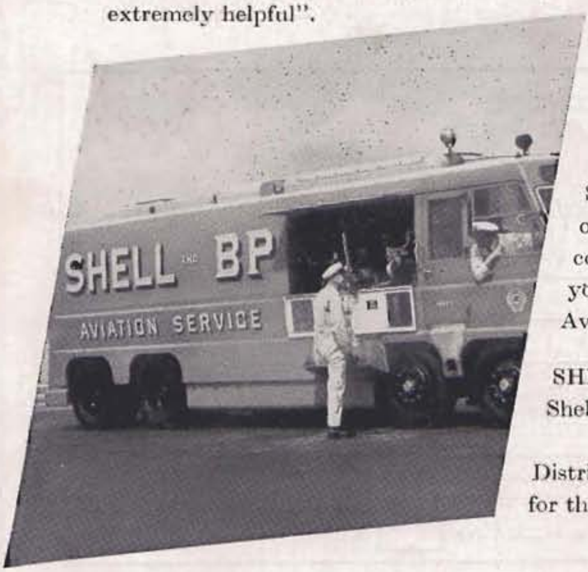
The aeroplane

The Boulton Paul P.111. A highly unconventional delta-wing machine designed for research into the effects of the mysterious 'sound barrier'. Rolls-Royce Nene turbo-jet engine. Span : 33′ 6″, length : 26′ 1″. Boulton Paul used fuel supplied by Shell-Mex and B.P. Ltd. and AeroShell lubricants for the P.111's experimental flights.



the pilot

At only just 29 years old, Glasgow-born Alexander Gunn of Boulton Paul is by far the youngest chief British test pilot. Over 900 of his 1,500 flying hours have been clocked on tests—a good many of them in the P.111, which he considers his special 'pigeon'. Joined R.A.F. from school in 1942, Wings 1943, active service in fighters for next two years. Is very modest about his successes over Belgium and Holland during this period. With Boulton Paul since 1949. Says he finds Shell and BP Aviation Service is "always extremely helpful".



SHELL and BP Aviation Service

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