THE WORLD'S SAILPLANES
DIE SEGELFLUGZEUGE DER WELT
LES PLANEURS DANS LE MONDE

OSTIV

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Introduction

This book marks the climax of work begun in the winter of 1956. It is believed to be the most complete international directory of gliders that has been compiled to date. After the task of the past eighteen months it is understandable that such a directory has not appeared previously.

The reader will note that a number of sailplanes are not included. With perhaps a few isolated exceptions these omissions are not due to oversight on the part of the Publication Committee. Each National Aero Club was requested to send a list of gliders constructed in their country since 1945. Forms were sent to all manufacturers and designers known to the Committee.

Because it would have been impossible to include information on all designs it was decided to select the following:

post-war production gliders,

"one-off" designs of high performance and/or of special interest,

well-known pre-war gliders that are still actively flying.

In order to publish as complete and accurate information as possible we attempted to obtain the data directly from either the designer or manufacturer. If this failed information was obtained, when possible, from the government licensing agency. The returned forms were then checked by the OSTIV Technical Editorial Committee. In many cases it was necessary to return the forms two or three times for correction and additional information. By adhering to this policy it is felt that the enclosed is as accurate as is humanly possible. Brief mention however, should be made concerning performance figures. These have been supplied by the manufacturer and the majority are computed; few sailplanes have been accurately flight tested.

Each month data on new sailplanes and others which are not included here will be published in the OSTIV Section of the "Swiss Aero Revue". When the need and demand arises a second edition of "The World's Sailplanes" will be printed. It is hoped that those designing and constructing sailplanes will contact us so that details of their gliders may be included.

It is realised that the completion of data forms is a large and tedious task and that considerable time must be spent by the designer or manufacturer. I would therefore like to thank all of those who gave so generously of their time so that information on their gliders could be made available to all.

I am also indebted to K. G. Wilkinson, B. S. Shenstone and Peter W. Brooks of the Editorial Committee for the many hours they spent collecting and checking information; to Ann Welch for supplying the plate of the sailplane on the cover; but especially to the "Swiss Aero Revue" and its Editor, Alex Stirnemann, for their assistance and for publishing the information initially in their journal.

Betsy Woodward

Present State of Sailplane Design

by B. S. Shenstone

1. General Trends

It is thirtyseven years since the first real sailplane, the Vampyr, was flown and gave a hint of the future. With a span of 12.6 m, it could be called small. Spans increased greatly during the following few years, the years of concentration on sinking speed, the years of high camber and low penetration which lasted into the 1930's.

During the last half of the 1930's the idea of good penetration gained many adherents. This meant that a wide, useful speed range became more important than minimum sinking speed. Instead of striving for, say, a minimum sink of 0.7 m/sec the trend was more like striving for the highest possible forward speed at a sinking speed of, say, 3 m/sec. Of course that is an oversimplification, and the rate of sink usable in thermals could not be lost sight of.

These requirements resulted in the use of lower cambered wings, but care in detail drag reductions saved most of the loss in minimum sink inherent in lower camber. However, the sink/speed curve was greatly improved at the higher speeds, giving much improved range capabilities.

Apart from these aerodynamic trends, great structural developments took place, and fairly realistic strength requirements were laid down by some countries. This was necessary because of a number of structural failures in the early years. There are signs of a slight trend toward metal instead of wood.

The third major development trend was a gradual improvement in stability and controllability standards combined with an improvement in cockpit layouts toward pilot comfort and efficiency. The early sailplanes were difficult to fly and usually suffered from inadequate lateral control and longitudinal stability. The necessity to use thermals made more positive controllability essential. Glide and dive control by airbrakes was also a major improvement.

The sailplanes described in OSTIV's data sheets are mostly post-war designs, and they therefore incorporate the latest thinking on desirable or necessary characteristics. If anything, good penetration is receiving even more attention. This is reflected in some slight reduction in the optimum span. On the other hand, the trend toward series production has also led toward smaller spans for cost reasons.

The main post-war trends are attempts at achieving laminar flow over wings and the use of light alloy structures. The first of these trends is the next natural step forward in improving penetration. It involves not only the use of special wing sections, but can affect the wing plan form and the wing structure. The special sections permitting a considerable degree of laminar boundary layer conditions only permit this and the resulting lower drag under very particular conditions. The wing chord must not be too small, and the wing surface must be of a certain standard of smoothness and waviness. Practically all pre-war sailplanes, although their wings were often highly polished, were far too wavy to permit much laminar flow, particulary the wing upper surface when in flight. Therefore, the use of laminar flow sections has led to the development of much firmer wing surfaces, typified by those using thin plywood backed by balsa wood or foam plastics, or by the use of lighter but more bulky softwood plywoods for wing surfaces. The necessity for avoiding lower Reynolds Numbers (small chords at low speeds) has been to some extent met by less span, less taper and higher cruising speeds. However, lack of precise measurements in flight on most sailplanes results in no fully consistent trends in this respect. There is, for instance, no consistency between different designers on section thickness/chord ratio.

The use of metal for wing surfaces has been consistently followed only by the American Schweizer products, and so far they have not used laminar flow sections. Cijan, in his metal development of his Orao, the Meteor, has perhaps used metal most effectively, but in a more costly fashion than Schweizer. The earlier French SO-P1 and the somewhat later Hungarian Györ 2 must also not be forgotten. The gauges of metal required for the covering of sailplane wings are so thin that it is doubtful whether it is possible to achieve sufficient freedom from waviness when rivets are used, no matter how carefully countersunk, to permit much laminar flow. However, the other advantages of metal may often outweigh this.

2. Lines of Development

There have always been, except for the first eight to ten years, two parallel lines of development: The first is the ultimate (for the date considered) that can be done regardless of money or effort, the special one-off job which is never repeated. The second developmental line is the machine designed for series production. Both these trends are clearly represented in the OSTIV data sheets.

An additional line of development as far as high performance sailplanes are concerned is that of the two-seater. A few were built before 1939, but now there are many more.

3. Particular Designs

When describing particular designs, it is not the writer's intention to refer to all the sailplanes described in the data sheets, but to illustrate developments and trends by quoting certain designs. Designs not mentioned are not necessarily to be considered less worthy.

a) Ultimate Designs

In this class we have the American RJ-5, the German HKS-1, the Italian Spillo, the Swiss Elfe series, the Jugoslav Orao.

Such machines are not intended for production, not only because they are too expensive, but also because they attempt to reach too far in some particular direction in a way unacceptable for ordinary competition work. However, the very fact that they explore the unknown in one way or another tends to give answers to problems which are later applied to less ambitious production projects. It is therefore worth while to study these ultimate aircraft so we can see some of the paths ahead and also some of the dead-ends.

Let us take the RJ-5. As originally built, it was a good normal sailplane. What made it outstanding was Raspet's taking of infinite pains to reduce the drag. This he did by every detailed refinement known, with the result that with a span of only 16.8 m, it achieved a gliding angle of 1 in 41. This is the classical case of ultimate detail care which no normal sailplane owner can afford. But Raspet has shown beyond doubt what simple refinement can do, and that is enough guidance for the future.

Kensche in his HKS-1 two-seater was inspired by Raspet's success with the RJ-5, and he decided to go further with refinement than anyone else hitherto. To keep the wing drag a minimum, he used a modern laminar flow section, 14 % thick, and a structure specially designed to retain the section shape. The wing skin on the forward part of the wing consists of a 6 mm layer of Polystyrol foam plastic between two sheets of plywood. The plastic acted only as a stabilizing agent so that normal air loading caused no skin wrinkles whatever. In fact, on a test specimen the failure was in pure shear without previous buckling. This thick skin was supported by closely spaced ribs.

In order to avoid all normal causes of parasitic wing drag, it was decided to omit ailerons, flaps and airbrakes from the wing. The airbrake was in the form of a tail parachute, and ailerons and flaps were replaced by an ingenious warping arrangement.

The fuselage, of simple form, was also most carefully shaped, and the tail was of butterfly form to reduce drag.

The use of a high wing loading was permissible because of the low drag, but the resulting high operating speed was found to be embarrassing when circling with normal slower aircraft, and a single-seat development, the HKS-3, with a more normal wing loading is the latest version of this theme.

Kensche has given details of his development in «Zeitschrift für Flugwissenschaften», Jan. 1954, and in OSTIV Publication III, Page 79.

The Elfe II and Orao are more normal as far as controls go. The Elfe II wing construction is not known to the writer, but Orao has a special two-layer wooden wing skin consisting of an inner 6 mm layer partially cut through spanwise so that it can be bent to fit the profile, and a thinner outer skin glued to it.

Both Elfe II and Orao demonstrate one technique for reducing fuselage drag. It may be called spindling or podding. Aft of the cockpit, the fuselage diameter is reduced as much as possible to reduce skin area and therefore the drag. This is not new if one remembers the Austria, the Darmstadt D-30, and some Bowlus types. But in the Elfe and Orao the tapering-off is done much more gradually and skillfully, and in addition even the cockpit is of minimum size.

The Italian Spillo which appeared a few years ago is mentioned here mainly because of its high wing aspect ratio of 30 with only a 15 % root thickness ratio. It would be useful to know what sort of flow occurs on the small tip chord of such a wing during circling.

In the OSTIV data sheets only a very few ultimate sailplanes are described, and in dealing with new types, one cannot be sure that they are indeed ultimate types and that they won't become ordinary production types in a few years.

Let us consider the Darmstadt D-34B. It is in general size and proportions not unusual. But we find that it is quite a small machine (12.65 m span—just about the same as Vampyr) with a high wing loading (29.4 kg/m^2) and yet it apparently has a gliding angle of the order of 36 and a low minimum sinking speed. This it has achieved not only by using a modern laminar wing section, but by most careful and detailed construction and aerodynamics. Compared with Hans Jacob's Reiher of twenty years ago, the D-34B has been able to achieve more than the Reiher was able to achieve with 19 m span.

In the same general class is the Morelli Brothers' CVT-2 Veltro, although its span (15 m) is somewhat greater. Here a laminar flow wing section is also used, but instead of the 21 % thick wing of the D-34B, the Veltro wing varies from 15 % to 12 %. The Veltro has an even smaller rate of sink than the D-34B and almost as good a gliding angle (35). It may be seen that the Morellis have kept their fuselage size as small as possible, and to retain an acceptable wing to ground clearance and incidence have used a high retractable undercarriage.

These aircraft must certainly be very expensive but they do show what great performance can be attained nowadays even with limited span if sufficient care is taken.

b) Metal Sailplanes (Light Alloy)

Here again we have a mixture of special individual efforts and production runs. There have often been sailplanes with light alloy fuselages which are relatively easy to design, but the techniques for metal wings are of greater interest and a quick survey of the present position should be made.

The only metal wing production sailplanes are and have been those designed by the Schweizer Brothers in the USA. In seven years, five types plus some special marks were produced for sale in a country where there is no government assistance of any kind for gliding. In a few years they produced 115 metal-winged sailplanes. The design emphasis has been on simplicity, the use of standard materials and processes requiring the cheapest of tooling. The first of the series, the

1–21, had partial fabric covering and, although technically successful, was too expensive. The shorter span 1–23 was much cheaper and therefore saleable. Various increases in span improved its performance up to and better than that of the 1–21. An even simpler and smaller 1–26, for home–building by kit, has been most successful.

None of the Schweizer sailplanes claims very high performance, the L/D varying from 23 to 30, and laminar wings are not used, the NACA 43012A being the favourite.

This series of Schweizer sailplanes has shown that all-metal sailplanes need not be too expensive if top performance is not demanded and ingenious construction techniques are employed.

Cijan's masterpiece, the Meteor, is in another category and shows the present ultimate in metal sailplane design.

The use of light alloy spar booms is another development which has been used off and on over twenty years. One may mention the Darmstadt D-30, Orao and HKS-3. The modern adhesives which can cement light alloys to wood have made such composite wing spars quite attractive.

c) Two-Seaters

During the last twelve years, there has been a great increase of interest in two-seaters. Before the war, the only types produced in quantity were the Goevier and the Kranich II. During the war a group of American two-seaters were rapidly designed and built for training purposes, the most generally successful being the 15 m Laister-Kauffman TG4A. Since the war a great deal of effort has been put into both training and high performance two-seaters. Particular attention has been given to the view of the second pilot in tandem arrangements. The use of a swept-forward inner wing is one solution, but more often the entire wing has been swept forward a few degrees, thus allowing the second pilot to sit on the centre of gravity and be forward to the wing root. Other solutions have been the use of a low wing as in the Short Nimbus and the Musger 19.

Other two-seaters have been developed out of single-seaters, such as the Mü 13 and Condor.

Perhaps the most interesting point is that it has been found possible by refinement to make high performance two-seaters with spans no greater than pre-war single-seaters.

d) Small-Span Sailplanes

There have always been attractions for the small-span sailplane, small being considered to be of the order of 10 metres. In the present collection there are only trainers with spans of this order, and it may be because the small sailplane is very difficult to design. Since the crew always weighs the same, no matter what size the sailplane is, the small sailplane carries a proportionately larger load and tends to have a high wing loading and a high induced drag. Special care can be taken to devise a very light structure, but this is very tedious and expensive, often more expensive than a larger sailplane with the same performance. In general, therefore, the small sailplane does not have a very good performance. In the special case of the Continental climate where thermals are very frequent and performance not so critical, the small sailplane is useful, typified by the American Tiny Mite and Screamin' Wiener of some years ago. When small sailplanes are built, it is often found that by a slight span increase, greater performance is obtainable. One may quote several series developed in this way, the Swiss Elfe series in five steps from 9 m to 17.5 m, the British Skylark in several steps from less than 14 m to over 18 m, the American 1–23 in several steps from 13.4 m to 15.3 m and higher in special versions.

The above remarks refer to the very small sailplane and are not at variance with the general trends in design toward smaller span sailplanes without loss of performance.

e) Specials

These are sailplanes outside the main stream of development. Since nobody knows which way this stream will turn, these specials require careful study. One of them may be the start of tomorrow's development trend.

Typical of specials were the pre-war Horten tailless designs, and at present the Fauvel 1- and 2-seaters are in this category. There are not many new "specials" in the OSTIV collection, possibly because they tend to be made not by firms but by persons. We know about firms and can ask them for data. We cannot know all the enthusiasts, the individualists, who are doing new things. We wish we did and it is hoped that they will all write in for data sheets and will also fill them up completely at the first attempt, which is something that some organized manufacturers do not find easy to do.

4. Conclusion

The OSTIV Data Book refers to about one hundred and forty different sailplanes. Ignoring the training types, they are characterized by short span and high wing loadings compared to pre-war sailplanes. Two thirds of the present list have wing loadings over 20 kg/m² whereas looking at the last German pre-war "Flugzeugtypenbuch" only 6 % had wing loadings over 20 kg/m².

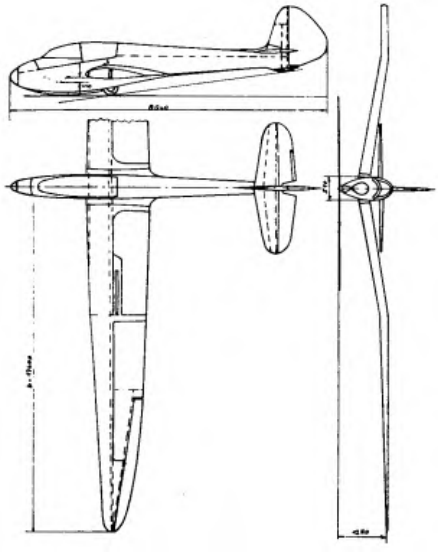
This trend, leading to higher cruising speeds, could not have occurred without drastic drag reductions over earlier sailplane types to enable an acceptable sinking speed to be retained. These have been mentioned above when discussing ultimate aircraft, but they are worth repeating:

1. Laminar flow wing sections.
2. Stiff wing surface with a fine finish.
3. Precise wing shape to definite tolerances.
4. Minimum wing-fuselage and tail-fuselage interference.
5. Reduction of air leaks in wing and fuselage.
6. Removal of all possible parasite drag items such as:
   - control horns
   - mass balance (external)
   - gaps between wing and fuselage and wing and control surfaces including airbrakes
   - windscreen discontinuities
   - skid and wheel drag
   - external parts of instruments
   - high drag ventilation of cockpit
   - aerials
   - any roughness or discontinuity on any surface.

Summarizing finally, the present position in sailplane design is smaller sailplanes with higher wing loadings and higher span loadings, but with improved wing and detail aerodynamic design. Specific structure weights are tending to rise with these aerodynamic improvements, and there is scope for considerable structural development. The overall result is that these modern sailplanes have minimum rates of sink as good as in the past and their high speed cruising performance and manœuvrability is far better than earlier designs.

Austria - Österreich - Autriche

Manufacturer:
Josef Oberlerchner, Holzindustrie
Spittal/Drau



Musger 19a

Musger Mg 19a/b

These sailplanes are tandem two-seaters, of low wing type. The only difference between them is that the Mg 19a has a gull wing, whereas the Mg 19b has a straight wing.

These aircraft are of a normal wooden construction, the wing being a two-piece cantilever elliptical single-spar type. The plywood covering extends only as far aft as the spar, the rest of the wing and the ailerons being fabric-covered.

The spar is a box-type laminated spruce boom, stiffened in the region of the main fittings with layers of compressed wood (TvBu). The fuselage is of normal plywood construction of oval cross section. The undercarriage consists of a fixed wheel half buried in the fuselage and a skid with pneumatic shock absorption.

Musger Mg 19a/b

Tandem-Zweisitzer, Tiefdecker. Der einzige Unterschied zwischen den beiden Typen besteht darin, daß der Mg 19a einen Knickflügel, der Mg 19b einen geraden Flügel aufweist.

Beide Flugzeuge sind in normaler Holzkonstruktion gebaut; der Flügel ist zweiteilig, freitragend, elliptisch und einholmig, bis zum Holm mit Sperrholz beplankt, dahinter einschließlich der Querruder mit Stoff bespannt.

Kastenartiger Holm aus bearbeitetem Rottannenholz, an der Stelle der Beschläge mit Schichten aus gepreßtem Holz verstärkt (TvBu). Rumpf in normaler Sperrholzkonstruktion mit ovalem Querschnitt. Das Fahrwerk besteht in einem festen Rad, das halb im Rumpf versenkt ist, und einer Kufe mit pneumatischer Stoßdämpfung.

Musger 19b

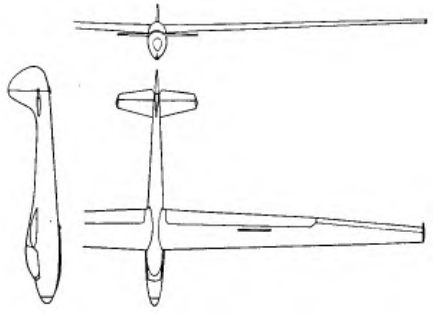
Musger Mg 19a/b

Biplace avec sièges en tandem, planeur à ailes surbaissées. La seule différence entre les deux types, c'est que l'aile du Mg 19a est coudée, tandis que celle du Mg 19b est droite.

L'un et l'autre sont des constructions normales en bois, aile cantilever en deux parties, elliptique et à un seul longeron. Jusqu'au longeron, revêtement de contreplaqué; au-delà, entoilage, y compris les ailerons.

Longeron en caisson en sapin rouge travaillé, renforcé à l'endroit des ferrures

par des couches de bois comprimé. Fuselage de construction normale en contreplaqué, section ovale. Le train se compose d'une roue fixe à demi enfoncée dans le fuselage et d'un patin avec amortisseur pneumatique.



Musger Mg 23

The Mg 23 is developed from the Mg 19 series. It is a single-seat high performance sailplane with a rather higher wing than the Mg 19. It is of normal plywood construction, but a great effort has been made to achieve a good consistent and accurate wing surface by the simplest means.

Experience with the Mg 19 wing has been used and in this case the main spar has been placed as far back as possible, and at the root the spar is at 45 % of the chord.

A close rib spacing is used (125 mm or 5 in.) and the wing forward of the spar is covered by thick plywood with the outer lamination parallel with the spar. This results in a very smooth wing of acceptable stiffness. The wing tips are squared off with small end-plates.

Musger Mg 23

Entwickelt aus der Mg 19-Serie. Einsitziges Hochleistungsflugzeug mit einem eher höheren Flügel als der Mg 19. Normale Sperrholzkonstruktion; es wurde der Versuch unternommen, mit einfachsten Mitteln eine feste, einwandfreie Oberfläche zu erhalten.

Die mit dem Mg 19 gemachten Erfahrungen wurden ausgewertet und im vorliegenden Falle der Hauptholm so weit als möglich zurückversetzt; an der Flügelwurzel befindet er sich in 45 % der Flügeltiefe.

Die Rippen sind in kleinem Abstand (125 mm oder 5 in.) angebracht; vor dem Holm ist der Flügel mit dickem Sperrholz beplankt, dessen äußere Schichtung mit dem Holm parallel verläuft. Daraus ergibt sich ein sehr glatter Flügel mit annehmbarer Steifheit. Die Flügelenden sind mit kleinen Endscheiben abgeschlossen.

Musger Mg 23

Provient de la série des Mg 19. Monoplace de haute performance à aile plutôt plus élevée que sur le Mg 19. Construction normale en contreplaqué; on a tenté d'obtenir une superficie impeccable par des moyens très simples.

Les expériences faites avec le Mg 19 ont été considérées, et sur le Mg 23 le longeron principal a été reporté en arrière le plus possible; à la racine de l'aile, il se trouve à 45 % de la profondeur.

Les nervures sont peu espacées (125 mm ou 5 pouces anglais); devant le longeron, l'aile est revêtue de contreplaqué épais dont la couche extérieure est parallèle au longeron. Il en résulte une aile très lisse, de rigidité acceptable. Les bouts d'aile sont bornés par de petits disques terminaux.

Type designation		Mg 19a	Mg 19b	Mg 23
Designer		Ing. Erwin Musger		
Date of first flight of prototype		20 March 1955	15 June 1954	25 June 1955
Number produced		30	8	7
Wings				
Span	m	17.600	17.600	16.400
Area	m^2	21.000	21.000	14.207
Aspect ratio		14.23	14.23	18.54
Wing root chord	m	1.620	1.620	1.228
Wing tip chord	m	0.500	0.500	0.450
Mean aerodynamic chord (m.a.c.)	m	1.195	1.195	0.868
Wing section, root		Gö 549	Gö 549	NACA 63,015
Wing section, mid		Gö 549	Gö 549	NACA 63,015
Wing section, tip		Gö 676	Gö 676	NACA 63,015
Dihedral	deg.	10/2	5	2° 30′
¼ chord sweep	deg.	+1/+1° 30′/0	+1/+1° 30′/0	+1/+30′
Aero. twist root/tip	deg.	6° 20′	6° 20′	3°
Ailerons				
Type		plain	plain	inset hinge
Span	m	3.470	3.470	3.250
Area	m^2	2.240	2.240	1.250
Mean chord	m	0.340	0.340	0.210
Max. deflection up	deg.	30	30	30
Max. deflection down	deg.	12	I2	12
Mass balance degree		20	20	20
Mass balance method		along nose	along nose	along nose
Horizontal tail				
Span	m	3.400	3.400	2.726
Area of elevator and fixed tail	m^2	2.860	2.860	1.530
Area of elevator	m^2	1.290	1.290	0.590
Max. deflection up	deg.	16	18° 40′	23
Max. deflection down	deg.	22° 30′	22° 30′	23
Aerofoil section		Gö 409	Gö 409	NACA 64.012
Mass balance method		along nose	along nose	along nose
Tail arm (form ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.170	4.170	3.940
Elevator aerodynamic balance method		nil	nil	nil
Elevator trimming method		tab	tab	tab

Type designation		Mg 19a	Mg19b	Mg 23
Horizontal tail volume coefficient		0.476	0.476	0.489
Vertical tail				
Area of fin and rudder	m^2	1.61	1.61	1.483
Area of rudder	m^2	1.100	1.100	0.708
Tail arm	m	4.780	4.780	4.200
Max. deflection	deg.	28° 30′	28° 30′	27
Aerofoil section		Gö 409	Gö 409	NACA 64.012
Mass balance degree		5	5	5
Mass balance type		along nose	along nose	along nose
Aerodynamic balance		nil	nil	nil
Fuselage				
Max. width	m	0.570	0.570	0.590
Overall length	m	8.040	8.040	7.110
Number seats and arrangement		2 tandem	2 tandem	1
Undercarriage type		skid and wheel with brake	skid and wheel with brake	skid and wheel with brake
Wheel diameter	cm	38	38	31
Lift increasing devices				
Type		none	none	none
Drag producing devices				
Type		wing-airbrakes Schemp-Hirth type	wing-airbrakes Schemp-Hirth type	wing-airbrakes Schemp-Hirth type
Span	m	1.075	1.075	0.982
Area	m^2	0.516	0.516	0.471
% of span		32	32	40
Location, % of chord		44	44	49
Weights				
Wings[1]	kg	157	157	141
Fuselage[2]	kg	129	129	88
Tailplane and elevator	kg	12	12	11
Empty weight[3]	kg	298	298	240
Instruments	kg	3	3	2.50
Equipped weight	kg	301	301	
Removable ballast	kg	nil	nil	nil
Max. load	kg	179	179	117.50
Max. permissible flying weight	kg	480	480	360

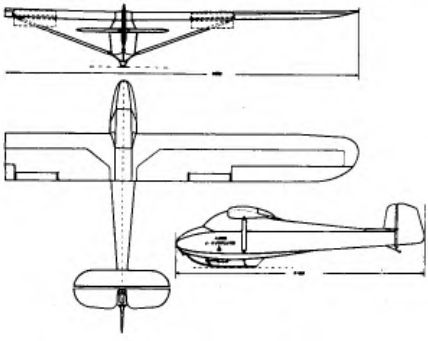
[1] With struts, controls, flaps and brakes.
[2] Complete with rudder and fin, less instruments and equipment.
[3] To include any fixed ballast.

Type designation		Mg 19a		Mg 19b		Mg 23	
Wing loading	kg/m²	22.9		22.9		25.3	
Design standards							
Airworthiness requirements to which aircraft has been built		BVS		BVS		BVS	
Date of issue of these requirements		1957		1957		1957	
Design flight envelope		V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor
Manoeuvre loads							
Point A		125	4	125	4	126	4
Point B		218	4	218	4	216	4
Point D		152	2	152	4	162	2
Factor of safety		2		2		2	
Gust loads		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A		130	3.94	130	3.94	130	4.09
Point D		130	1.94	130	1.94	130	2.09
Limiting flight conditions							
Placard airspeed smooth conditions	km/h	180		180		180	
Placard airspeed gusty conditions	km/h	130		130		130	
Aero-towing speed	km/h	130		130		130	
Winch launching speed	km/h	80		80		80	
Cloud flying permitted		yes		yes		yes	
Permitted aerobatic manoeuvres		no		no		no	
Spinning permitted		yes		yes		yes	
Straight flight performance							
at flying weight of	kg	480		480		360	
No flap or brake		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		62	0.65	62	0.65	68	0.66
V for max. L/D		67	0.69	67	0.69	79	0.73
		75	0.77	82.5	0.90	90	0.86
		87.5	0.96	96.5	1.15	105	1.15
		100	1.30	110	1.70	120	1.6
Stalling speed	km/h	50		55		60	
Max. L/D		27.8		27.8		~32	

Austria - Österreich - Autriche

Designers:
Ulrich and Wolfgang Hütter

Manufacturer:
Homebuilt



Hütter H17b

This training machine has been in production in one form or another for over twenty years and it is well-known trough-out the world. It is designed for home construction and approximately 200 H 17's and 10 H 17b's have been produced. The protoype first flew Sept. 1934; the H 17b Feb. 1953.

Wings: span 9.96 m; area 9.47 m²; aspect ratio 10.5; m. a. c. 0.95 m; root section Gö 535; tip section NACA M 6; dihedral 1.25°

Ailerons (slotted): span 2.6 m; area 1.36 m²; deflection up 26°; deflection down 21°

Horizontal tail: span 2.0 m; total area 1.0 m²; area of elevator 0.61 m²; tail arm 3.74 m; symmetrical section

Vertical tail: area of rudder 0.38 m²; tail arm 4.2 m

Fuselage: length 5.18 m; width 0.78 m

Airbrakes (on trailing edge of wing beneath ailerons): span 0.9 m; total area 0.82 m²

Weights: wings 50 kg; fuselage 55 kg; tail-plane and elevator 5 kg; empty weight 110 kg; max. load 100 kg; max. permissible flying weight 210 kg; wing loading 22.2 kg/m²

Limiting flight conditions: placard air-speed smooth conditions 160 km/h; aero-towing speed 100 km/h; winch launching speed 80 km/h; spinning permitted; cloud flying not permitted; foremost and aftmost c. g. positions 28.5 % and 34.5 %

Hütter H17b

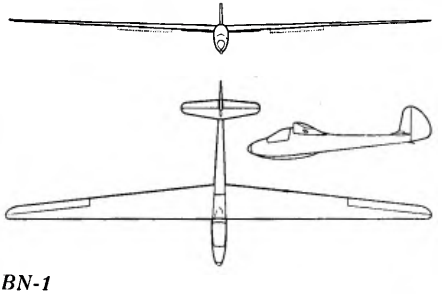
Schulungsflugzeug, während mehr als 20 Jahren in verschiedenen Formen gebaut, und auf der ganzen Welt bekannt. Aus einem Selbstbaumodell entstanden; es wurden annähernd 200 H17 und 10 H17b konstruiert. Erstflug des Prototyps H17 im September 1934, des H17b im Februar 1953.

Hütter H17b

Planeur d'école, fabriqué sous différentes formes pendant plus de vingt ans et connu dans le monde entier. Provient d'un modèle d'amateur. On a fabriqué à peu près 200 H17 et 10 H17b. Premier vol du prototype H17 en septembre 1934, du H17b en février 1953.

Brazil - Brasilien - Brésil

Manufacturer:
Sociedade Construtora
Aeronáutica Neiva Ltda.
Rua Nossa Senhora de Fátima, 360
Caixa Postal No. 10
Botucatu, São Paulo



BN-1

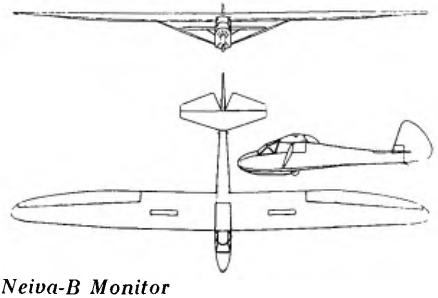
The BN-1 is a high performance single-seater of wooden construction with a cantilever wing. The national distance record has been established in the machine and it was flown by the Brazilian team in the 1956 World Gliding Competitions.

BN-1

Einsitziges Hochleistungs-Segelflugzeug in Holzkonstruktion mit freitragendem Flügel. Hält den nationalen Streckenrekord; wurde von der brasilianischen Mannschaft an den Weltmeisterschaften 1956 geflogen.

BN-1

Monoplace de haute performance en bois, ailes cantilever. Détient le record national de distance. Employé par l'équipe brésilienne aux championnats mondiaux de 1956.



Neiva-B Monitor

The Neiva-B Monitor is a two-seat medium performance sailplane of wooden construction with strut-braced wing. It is used in the Brazilian Flying Clubs for basic training.

Neiva-B Monitor

Zweisitziges Segelflugzeug in Holzkonstruktion mit abgestrebtem Flügel, für mittlere Leistung. Wird in den brasilianischen Klubs für die Anfängerschulung verwendet.

Neiva-B Monitor

Biplace en bois, à ailes haubanées, pour performances moyennes. Employé dans les clubs brésiliens pour la formation des débutants.

Type designation		BN-1	Neiva-B Monitor
Designers		José Carlos de Barros Neiva	J. C. Barros Neiva A. A. Barros
Date of first flight of prototype		1953	1945
Number produced		4	15
Wings			
Span	m	16.00	15.86
Area	m^2	13.47	18.40
Aspect ratio		19.00	13.67
Wing root chord	m	1.28	1.38
Wing tip chord	m	0.40	
Mean aerodynamic chord (m.a.c.)	m	0.92	1.343
Wing section, root		NACA 4415	Gö 535
Wing section, mid		NACA 4412	
Wing section, tip		NACA 2 R 1 12	NACA 0009
Dihedral	deg.	2.5	0° 30′
¼ chord sweep	deg.	1.5	1.5
Aero. twist root/tip	deg.	—4.2	—1I
Ailerons			
Type		upper surface hinge	plain
Span	m	3.20	4.40
Area	m^2	1.63	3.124
Mean chord	m		0.355
Max. deflection up	deg.	30	25
Max. deflection down	deg.	10	25
Mass balance degree		nil	nil
Mass balance method		—	—
Horizontal tail			
Span	m	3.00	3.32
Area of elevator and fixed tail	m^2	1.60	3.00
Area of elevator	m^2	0.72	1.30
Max. deflection up	deg.	30	30
Max. deflection down	deg.	30	30
Aerofoil section			NACA 0009
Mass balance degree			nil
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m		3.58
Elevator aerodynamic balance method		nil	nil
Elevator trimming method			tab

Type designation	BN-1		Neiva-B Monitor	
Vertical tail				
Area of fin and rudder .. m^2	1.22		1.71	
Area of rudder ..... m^2	0.51		1.31	
Aspect ratio			1.40	
Max. deflection ..... deg.	30		45	
Aerofoil section			NACA 0009	
Mass balance degree	nil		nil	
Mass balance type				
Aerodynamic balance ...	nil		horn	
Fuselage				
Max. width ..... m	0.58		0.694	
Overall length ..... m	6.9		7.10	
Max. cross section ..... m^2			0.78	
Number seats and arrangement	1		2 tandem	
Undercarriage type	skid and jettisonable wheel		skid and fixed wheel	
Wheel diameter ..... cm			36.9	
Lift increasing devices				
Type	none		none	
Drag producing devices				
Type	spoiler on top of wing in the 2 first models; DFS type on the others		spoiler	
General location			top of wing	
Span ..... m				
Area ..... m^2			0.315	
Weights				
Equipped weight ..... kg	180		215	
Removable ballast ..... kg				
Max. load ..... kg	90		160	
Max. permissible flying weight ..... kg	270		375	
Wing loading ..... kg/m^2	20.0		20.3	
Design flight envelope Manoeuvre loads	V km/h	n	V km/h	n
Point A	114	5	102	5.18
Point B	150	5.3	145	5.33
Point C	150	—3.33	145	—3.31
Point D	107	—2.67	103	—2.67
Factor of safety (ultimate load/proof load)	1.5		1.5	

Type designation	BN-1		Neiva-B Monitor	
Gust loads	V km/h	v m/s	V km/h	v m/s
Point A	100	10	83	10
Point B	240	5	235	5
Point C	120	— 5	202	— 5
Point D	90	—10	63	—10
Limiting flight conditions				
Placard airspeed ..... km/h	220		235	
Straight flight performance *No flap or brake*	V km/h	v m/s	V km/h	v m/s
V for min. sink	~62	0.6	55	0.78
V for max. L/D	~78	0.7	67	0.85
Stalling speed ..... km/h	~48		52	
Max. L/D	~30		21	

Denmark - Dänemark - Danemark

Manufacturer:
Dansk Aero's Verksted
Christoffers Allee 81–83, Søborg

Designers:
Knud Høgslund and F. T. Olsen

2 G

The 2 G is an open primary two-seat trainer of wooden construction. It was first flown in 1946 and eight have been built. Wings: Span 12,5 m; area 12,2 m²
Equipped weight 160 kg; Max. load 190 kg.
Min. sink 1,15 m/sec; max. L/D 13 : 1

2 G

Der 2 G ist ein offener Zweisitzer für Anfängerschulung, in Holzkonstruktion. Er wurde erstmals 1946 geflogen; insgesamt wurden 8 Exemplare gebaut.

2 G

Biplace d'écolage ouvert, construction en bois. Les premières expériences en vol datent de 1946. Huit exemplaires en furent construits.

Finland - Finnland - Finlande

Manufacturer:

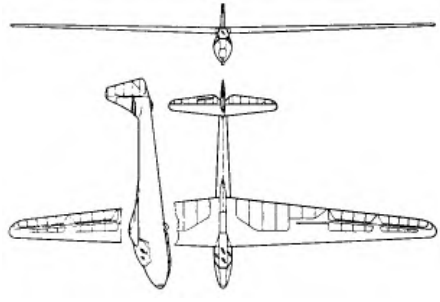
Jämi Flying School (Finnish Aeronautical Society) and flying clubs in Finland

PIK-3

The PIK-3 is a medium performance high-wing sailplane of simple construction, specially designed for club construction; all existing models have been either partly or completely club built. Fuselage is of wooden construction with diagonal ply covering. The wing has a single spar with a diagonal ply covered nose; it is in two sections joined at the fuselage centreline with two horizontal bolts. Aft of the spar is fabric covered. Tailplane and fin are single spar, ply covered structures and the control surfaces are D-nosed with fabric covering aft. Finnish pine and birch ply is used throughout the structure. Control circuits are of cable except for short push-pull links, at breakpoints, to facilitate assembly. Fittings are of Cr-Mo Steel. This sailplane type holds the Finnish height record and was second in the 1957 National Competitions. Prototype design and development was by members of the Poly Teknikkoyen Ilmailu Kerho. (Flying Club of the Technical University, Helsinki.)

PIK-3

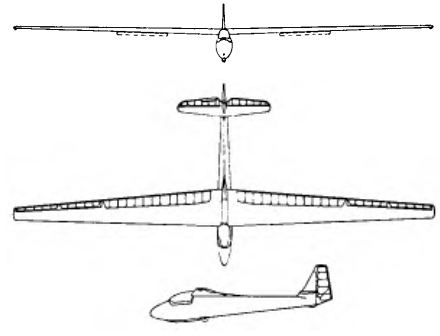
Schulterdecker für mittlere Leistungen, einfach konstruiert im Hinblick auf den Gebrauch in Klubs; alle bestehenden Flugzeuge wurden ganz oder teilweise von den Klubs gebaut. Rumpf in Holzbauweise mit diagonaler Sperrholzbeplankung. Einholmiger Flügel mit diagonaler Sperrholzbeplankung der Flügelspitze; er wird auf der Rumpf-Mittellinie in zwei Teilen mit zwei horizontalen Bolzen befestigt. Die hintere Seite des Holms ist mit Stoff bespannt. Höhen- und Seitenflosse einholmig, mit Sperrholz beplankt. Steuerruder mit D-Nase, hinten mit Tuch bespannt. Überall wird finnisches Föhren- und Birkensperrholz verwendet. Steuerung durchgehend mit Kabeln, außer für kurze Verbindungsstücke des Steuerknüppels bei den Sollbruchstellen, zur Erleichterung des Zusammenbaues. Beschläge aus Cr-Mo-Stahl. Der PIK-3 hält den finnischen Höhenrekord und belegte bei den nationalen Meisterschaften 1957 den zweiten Platz. Konstruktion und Entwicklung durch Mitglieder des Poly Teknikkojen Ilmailu Kerho (Flugklub der Technischen Hochschule in Helsinki).



PIK-3

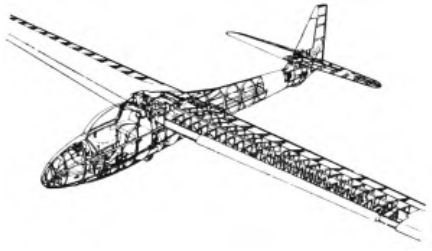
Planeur à ailes mi-surélevées pour performances moyennes, construction simple en vue de l'emploi dans les clubs; tous les exemplaires qui en existent ont été fabriqués totalement ou partiellement dans les

clubs mêmes. Fuselage de bois avec revêtement diagonal en contreplaqué. Ailes à un seul longeron avec, aux extrémités, un revêtement diagonal en contreplaqué, dont les deux parties sont fixées sur la ligne médiane du fuselage par deux boulons horizontaux. Le côté de derrière du longeron est entoilé. Le plan de dérive et le stabilisateur sont à un longeron, revêtus de contreplaqué. Gouvernails avec nez en D, l'arrière étant entoilé. Partout, il est fait usage de contreplaqué de pin et de bouleau de Finlande. Les commandes sont assurées partout par des câbles, interrompus seulement par de courtes pièces de raccordement au manche, près des zones de rupture. Le montage du tout est ainsi facilité. Ferrure en acier au chrome-molybdène. Le PIK-3 détient le record finlandais d'altitude et obtint la seconde place en 1957 aux championnats nationaux. La construction et le développement sont le fait de membres du Poly Teknikkojen Ilmailu Kerho (club d'aviation du polytechnicum d'Helsinki).



PIK-3c

The PIK-3c has been developed from the PIK-3 to the OSTIV restricted class requirements. It is suitable for advanced training and competition flying in the restricted class. The PIK-3 fuselage has been retained. Wing structure and geometry has been completely revised; subsidiary spars have been introduced fore and aft of the main spar and diagonal ply now extends back to the rear spar. The wing leading edge is made from ply covered plastic foam. Tail surface and control design is as for the PIK-3.

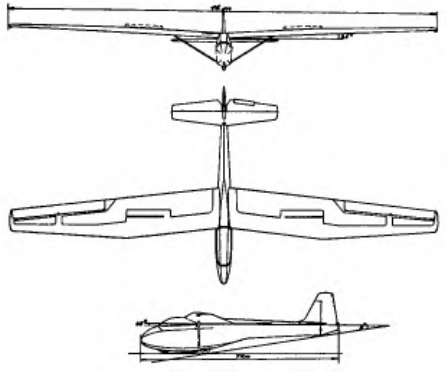


PIK-3c

Entwickelt aus dem PIK-3, zur Erreichung der Bedingungen für die Einheitsklasse der OSTIV. Geeignet für Fortgeschrittenen-Schulung und Wettkämpfe der Einheitsklasse. Rumpf verkürzt. Flügelbau und Form sind völlig neu; vor und hinter dem Hauptholm wurden Hilfsholme eingebaut; das Diagonalsperrholz erstreckt sich nun bis zum hinteren Holm. Flügelvorderkante aus sperrholzbedecktem Schaumplastik. Leitwerkoberfläche und Steuerführung wie beim PIK-3.

PIK-3 c

Développé à partir du PIK-3 en vue de remplir les conditions de la classe unitaire de l'OSTIV. Convient à l'entraînement des élèves avancés et aux concours de la classe unitaire. Le fuselage est raccourci. La structure et la forme de l'aile sont entièrement nouvelles; devant et derrière le longeron principal ont été ajoutés des longerons auxiliaires; le contreplaqué en diagonale ne va que jusqu'au longeron arrière. Le bord d'attaque de l'aile est en plastique mousse recouverte de contreplaqué. La superficie de l'empennage et la disposition des commandes sont les mêmes que sur le PIK-3.



PIK-12

The PIK-12 is a high wing two-seater sailplane for primary and advanced training. It has, like the other PIK designs, been specially developed for club construction. The slab sided fore part of the fuselage, with tandem seats, merges into a lenticular sectioned rear fuselage. Wood is used throughout, the covering being diagonal ply. A strut braced, D-nosed wing is used with sweep forward over the inner half of the wing to improve pilot view. Two spar construction over the inner wing merges into a single D-nose spar over the outer wing. Diagonal ply covering extends back to the rear spar. The two halves of the wing are fitted without fairings to the fuselage sides. The tailplane and fin are of ply covered single spar construction and control surfaces are D-nosed with fabric covering. Finnish pine and birch plywood are used. All controls are cable operated throughout. Fittings are of Cr-Mo Steel.

PIK-12

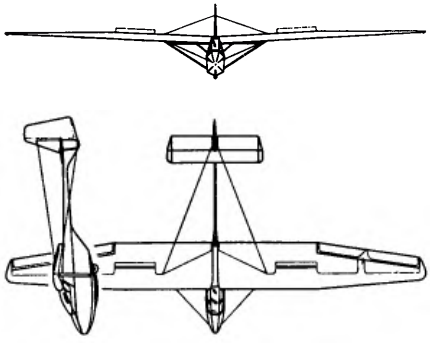
Zweisitziger Schulterdecker für Anfängerschulung und Fortgeschrittene. Wie die übrigen PIK-Konstruktionen besonders für den Gebrauch in Klubs gebaut. Der seitlich flache vordere Rumpf mit Sitzen in Tandemanordnung mündet in den hinteren Teil mit linsenförmigem Querschnitt. Durchgehend Holzbauweise mit diagonaler Sperrholzbeplankung. Abgestrebter Flügel mit D-Nase, vorwärts gepfeilt bis zur Flügelmitte, zur Verbesserung der Sicht für den Piloten. Zweiholmiger Bau im inneren Flügel, und ein Holm mit D-Nase im äußeren Flügel. Diagonale Sperrholzbeplankung bis zum hinteren Holm. Die beiden Flügelhälften werden ohne Verkleidung an den Seiten des Rumpfes befestigt. Höhenleitwerk und Seitenflossen einholmig, sperrholzbeplankt, Steuerflächen mit D-Nase und Stoffbespannung. Überall wird finnisches Föhren- und Birkensperrholz gebraucht. Steuerungen gänzlich mit Kabeln bedient. Beschläge aus Cr-Mo-Stahl.

PIK-12

Biplace à ailes mi-surélevées pour l'entraînement des débutants et des avancés. Construit, comme les autres PIK, surtout pour l'emploi dans les clubs. Le fuselage avant est plat latéralement; les sièges sont en tandem; l'arrière est de section lenticulaire. Construction entièrement en bois avec revêtement diagonal en contreplaqué. Ailes haubanées avec nez en D, en flèche jusqu'au milieu, afin que la visibilité soit meilleure pour le pilote.

La partie intérieure de l'aile a deux longerons; la partie extérieure en a un avec nez en D. Revêtement diagonal en contreplaqué jusqu'au longeron arrière. Les deux moitiés d'ailes sont fixées aux côtés du fuselage sans revêtement.

Empennage de profondeur et plan de dérive à un longeron, avec revêtement de contreplaqué; les gouvernails sont à nez en D, avec entoilage. Partout il est fait usage de contreplaqué de pin et de bouleau de Finlande. Commandes entièrement par câbles. Ferrures en acier au chrome-molybdène.



PIK-5c

Schulterdecker für Schulung, besonders geeignet für Bau und Betrieb im Klub. Dritte Entwicklungsstufe des PIK-5; die Modelle a, b und c sind aerodynamisch ähnlich, aber im Aufbau verschieden. Rumpf in Holzkonstruktion, mit Sperrholz diagonal beplankt; Höhenleitwerk schlank, mit Draht seitlich mit den Flügeln verbunden. Flügel abgestrebt, einholmig, sperrholzbeplankt, mit D-Nase und Stoffbespannung hinter dem Holm. Abgestrebtes Höhenleitwerk und einholmige, sperrholzbeplankte Seitenflossen, stoffbespannte Steuer. Überall wird finnisches Föhren- und Birkensperrholz benutzt. Beschläge aus Cr-Mo-Stahl. Steuerung wird durch Kabel bedient. Der PIK-5 gewann 1950—1955 5 von 6 Klubwettbewerben für Trainingsflugzeuge.

PIK-5c

The PIK-5c is a high wing training sailplane, specially suited to club building and use. It is the third development stage of the PIK-5, the a, b and c models being aerodynamically similar but differing in structure. The fuselage is a straigth sided "pod and boom" wooden structure covered with diagonal ply; the tail boom is slender and wire braced laterally to the wings. The wing is a strut braced single spar, ply covered, D-nose structure with fabric covering aft of the spar. A strut braced tailplane and ply covered single spar fin are used with fabric covered controls. Finnish pine and birch ply is used. Fittings are of Cr-Mo Steel. Controls are cable operated. The PIK-5 has been the winning type in 5 out of 6 club competitions held between 1950—1955 for training types.

PIK-5 c

Planeur d'entraînement à ailes mi-surélevées, particulièrement propre à être construit et employé dans un club. C'est le troisième développement du PIK-5; les modèles a, b et c sont similaires au point de vue aérodynamique, mais diffèrent par la structure. Fuselage construit en bois, revêtement diagonal de contreplaqué; l'empennage de profondeur est effilé, relié latéralement aux ailes par des câbles. Les ailes sont haubanées, à un seul longeron, recouvertes de contreplaqué, avec nez en D et entoilage derrière le longeron. L'empennage de profondeur est haubané, le plan de dérive est revêtu de contreplaqué, le gouvernail est entoilé. Partout il est fait usage de contreplaqué de pin et de bouleau de Finlande. Ferrures en acier au chrome-molybdène. Commandes par câbles. Le PIK-5 a gagné cinq concours de club pour planeurs d'entraînement sur six concours en tout, entre 1950 et 1955.

Type designation		PIK 3	PIK 3c	PIK 12	PIK 5c
Designer(s)		L. Norrmen I. Lounamaa A. Koskinen	O. Roininen U. Pikkarainen	I. Lounamaa	K. Temmes I. Lounamaa K. Tiusanen
Date of first flight of prototype		1950		1956	1946
Number produced		4 (1 under construction)	(1 under construction)	2 (1 under construction)	24 (3 under construction)
Wings					
Span	m	13	15	16	12.4
Area	m^2	13	13.1	20.8	14.7
Aspect ratio		13	17.1	12.3	10.4
Wing root chord	m	1.5	1.32	1.5	1.35
Wing tip chord	m	0.5	0.45	0.75	0.65
Mean aerodynamic chord.	m	1.0	0.88	1.30	1.19
Wing section, root		Gö 693	Gö 549	Gö 533	Gö 533
Wing section, mid		—"—	Laminarized	—"—	—"—
Wing section, tip.....		—"—	Gö 693	—"—	—"—
Dihedral (underside)	deg.	2	2	2.5	2.5
¼ chord sweep	deg.	+0.9	+0.3	Inner —6.5 Outer +0.8	Inner 0.0 Outer +1.0
Aero. twist root/tip	deg.	0	0	0	0
Length of each section of wing	m	6.53	7.53	7.83	6.17
Ailerons					
Type (e.g. slotted, frise, inset hinge, plain).....		Slotted	Slotted	Slotted	Slotted
Span	m	3.2	3.0	3.35	3.0
Area	m^2	1.05	0.75	1.17	1.05
Mean chord	m	0.33	0.25	0.35	0.35
Max. deflection up	deg.	25	30	25	25
Max. deflection down	deg.	12.5	20	25	15
Mass balance degree		NIL	NIL	NIL	NIL
Horizontal tail					
Span	m	3.3	3.3	4.0	2.8
Area of elevator and fixed tail	m^2	1.65	1.65	3.0	2.1
Area of elevator.....	m^2	0.75	0.75	1.35	1.05
Max. deflection up	deg.	30	30	30	25
Max. deflection down	deg.	20	20	30	20
Aerofoil section		NACA 0011/0009	NACA 0011/0009	Symm.	NACA 0009
Mass balance degree		NIL	NIL	NIL	NIL
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.75	3.75	4.0	3.5

Type designation		PIK 3	PIK 3c	PIK 12	PIK 5c
Elevator aerodynamic balance method		NIL	NIL	Ground adjustable balance tab.	NIL
Elevator trimming method		Trim tab.	Trim tab.		NIL
Horizontal tail volume coefficient		0.475	0.540	0.445	0.420
Vertical tail					
Area of fin and rudder	m^2	1.10	1.25	1.50	1.25
Area of rudder	m^2	0.6	0.7	0.9	0.9
Tail arm	m	4.1	4.15	4.4	3.9
Max. deflection	deg.	±30	±30	±30	±25
Aerofoil section		Symm.	Symm.	Symm.	Symm.
Mass balance degree		NIL	NIL	NIL	NIL
Aerodynamic balance		Horn balance	Horn balance	Horn balance	Horn balance
Fuselage					
Max. width	m	0.56	0.56	0.60	0.54
Overall length	m	6.5	6.6	7.4	6.4
Max. cross section	m^2	0.42	0.45	0.60	0.50
Wetted surface area	m^2	7.5	7.5	12.5	6.0
Number seats and arrangement		1	1	2 tandem	1
Undercarriage type		Fixed wheel	Fixed wheel	Fixed wheel	Fixed wheel
Wheel diameter	cm	27.5	27.5	30.0	27.5
Lift increasing devices					
Type		None	None	None	None
Drag producing devices					
Type		PIK Model Vented spoilers	PIK Model Vented spoilers	PIK Model Vented spoilers	PIK Model Vented spoilers
General location		top and bottom surface	lower surface	upper surface	upper surface
Span	m	1.0	1.8	1.4	1.2
Area	m^2	0.40	0.40	0.31	0.24
% of span (where applic.)		15.4	24	17.5	19.3
Location, % of chord (where applicable)		Upper 55 Lower 37	50	50	50
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no		yes	yes	yes	yes

Type designation	PIK 3		PIK 3c		PIK 12		PIK 5c	
Weights								
Wings ..... kg	85		115		115		74	
Fuselage ..... kg	45		45		70		40	
Tailplane and elevator ... kg	5		5		10		6	
Empty weight ..... kg	135		165		195		120	
Instruments ..... kg	3		5		3		3	
Equipped weight ..... kg	138		170		198		123	
Removable ballast ..... kg								
Max. load ..... kg	102		110		192		87	
Max. permissible flying weight kg	240		280		390		210	
Wing loading max. ..... kg/m²	18.5		21.4		18.7		14.3	
Design standards								
Airworthiness requirements to which aircraft has been built	BVS		BCAR		BVS		BVS	
Date of issue of these requirements	1939		1948		1939		1939	
Certificate of airworthiness yes/no	yes						yes	
Any other certification ..					Experimental license			
Design flight envelope *Manoeuvre loads*	V km/h	Proof load factor n	V km/h	n	V km/h	n	V km/h	n
Point A	110	4	128	5	105	4	92	4
Point B	196	4	260	4	160	4	172	4
Point C	220	0	260	0	200	0	192	0
Point D.....	136	—2	165	—2.5	138	—2	122	—2
Factor of safety (ultimate load/proof load	2		1.5		2		2	
Gust loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A	130	±10	146	±20	120	±10	120	±10
Limiting flight conditions								
Placard airspeed smooth conditions ..... km/h	200		235		200		190	
Placard airspeed gusty conditions ..... km/h	130		145		120		120	
Aero-towing speed ..... km/h	130		140		120		120	
Winch launching speed .. km/h	100		110		90		90	

Type designation	PIK 3	PIK 3c	PIK 12	PIK 5c
Cloud flying permitted yes/no	yes	yes	yes	yes
Spinning permitted yes/no	yes	yes	yes	yes
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.			15—30	
Terminal velocity with brakes opened at max. all up weight from flight tests km/h	180	200 (approx.)	200	180
Straight flight performance at flying weight of kg	230	260	375	210

No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	61	0.75	65	0.61	60	0.80	52	0.85
V for max. L/D	72	0.80	75	0.70	69	0.84	60	0.93
2.00 × V stall approx.	110	1.80	110	1.40	100	1.60	90	2.10

Stalling speed km/h	55	55	50	45
Max. L/D	25	30	23	18

France - Frankreich - France

Manufacturer: Fouga

The Etablissements Fouga et Cie. is no longer engaged in sailplane manufacture but the Company has produced numerous designs, including the following research and development types which were only built as prototypes:

CM Jalon
CM 7
CM 71
CM 8-13
CM 8-15

Production sailplanes manufactured by Fouga have included:

170 C-25S
25 C-301S
70 C-310P
45 C-311P

The C-310P is an earlier version of the C-311P described below. It had a braced rectangular-section fuselage in place of the 311-'s monocoque structure.

Die Etablissements Fouga & Cie. bauen heute keine Segelflugzeuge mehr. Die Firma brachte indessen zahlreiche Konstruktionen heraus, darunter die folgenden Forschungs- und Entwicklungstypen, von denen nur der Prototyp existierte:

CM Jalon
CM 7
CM 71
CM 8-13
CM 8-15

Unter den in Serie gebauten Flugzeugen befinden sich:

170 C-25S
25 C-301S
70 C-310P
45 C-311P

Der C-310P ist eine frühere Ausführung des nachstehend beschriebenen C-311P. An Stelle der beim 311 angewandten Schalenbauweise wies er einen abgestrebten, rechteckigen Rumpfquerschnitt auf.

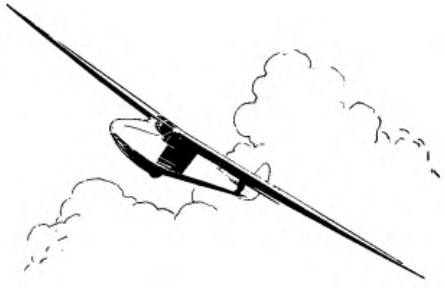
Les Etablissements Fouga et Cie ne s'occupent plus de fabriquer des planeurs, mais ils ont produit antérieurement de nombreuses constructions, parmi lesquelles on trouve les appareils suivants de recherche et de développement, qui n'existent qu'en prototype:

CM Jalon
CM 7
CM 71
CM 8-13
CM 8-15

Parmi les appareils fabriqués en série, il y eut:

170 C-25S
25 C-301S
70 C-310P
45 C-311P

Le C-310P est une version antérieure du C-311P dont il est question ci-après. A la place de la construction en coque du 311, il avait un fuselage haubané, de section rectangulaire.



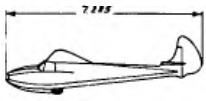
C-25S

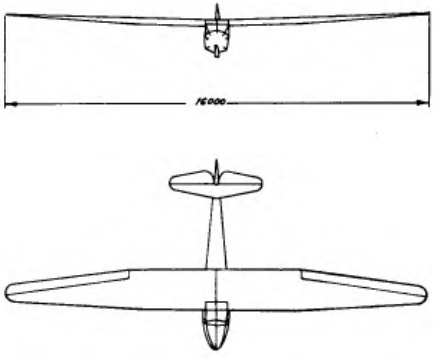
Designers: M. Castel and P. Mauboussin

The C-25S is a side-by-side two-seat training sailplane of wood construction, ply and fabric covered.

C-25S

Zweisitziges Schulungsflugzeug mit Sitzanordnung nebeneinander. Holzkonstruktion mit Sperrholzbeplankung und Stoffbespannung.





C-25S

Biplace d'école avec sièges côte à côte. Construction en bois avec revêtement de contreplaqué et entoilage.

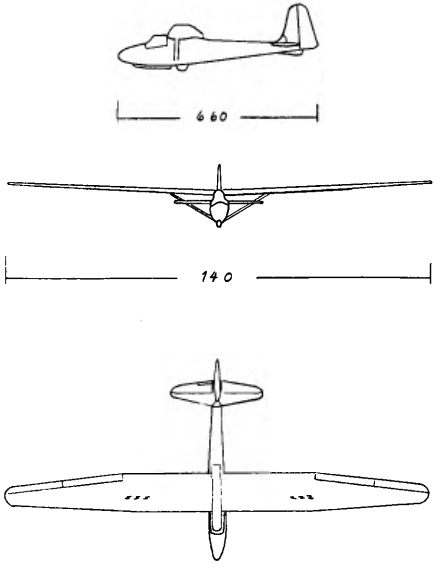
C-311P

Designers: M. Castel and P. Mauboussin

The C-311P is a single-seat trainer with wood monocoque fuselage, plywood covered. The wings and tail are of wood with fabric covering.

C-311P

Einsitziges Schulungsflugzeug. Rumpf in Schalenbauweise mit Sperrholzbeplankung. Flügel und Rumpfende aus Holz mit Stoffbespannung.



C-311P

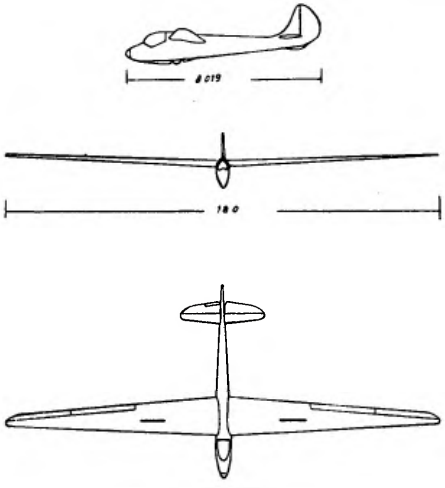
Monoplace d'école. Fuselage en coque avec revêtement de contreplaqué. Les ailes et l'extrémité du fuselage sont en bois avec entoilage.

Manufacturer: Arsenal

The Arsenal de l'Aéronautique has produced the Air 100 to 102 series of high performance competition sailplanes. In addition to Air 100 prototypes, about 45 production Air 102's have been built. The type is described below. Arsenal also produced prototypes in 1949 of the 4111 high performance sailplane.

Das Arsenal de l'Aéronautique baute die Serien der Hochleistungs-Wettkampfflugzeuge Air 100 bis 102. Zusätzlich zu den Prototypen der Air 100 wurden ungefähr 45 Air 102 in Serie gebaut (Beschreibung nachstehend). Im Jahre 1949 konstruierte Arsenal sodann die Prototypen des Hochleistungsflugzeugs 4111.

L'Arsenal de l'aéronautique a fabriqué les séries planeurs de concours pour hautes performances Air 100 à 102. En plus des prototypes du Air 100, il a été fabriqué en série environ 45 Air 102, dont il est question ci-après. En 1949, l'Arsenal produisit en outre les prototypes du planeur de haute performance 4111.



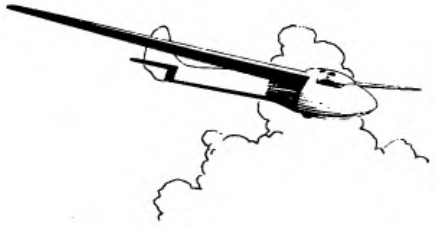
Air 102

Designer: M. Jarlaud

The Air 102 is a high performance single-seat sailplane. The fuselage is wood monocoque with plywood covering; the wings and tail are of wood with fabric covering.

Air-102

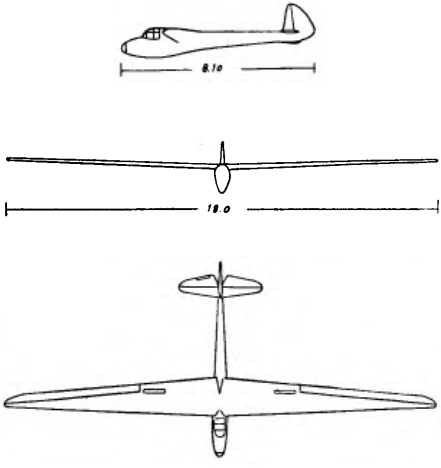
Einsitziges Hochleistungsflugzeug. Rumpf in Schalenbauweise mit Sperrholzbeplankung; Flügel und Rumpfende aus Holz mit Stoffbespannung.



Air 102

Planeur monoplace de haute performance. Fuselage en coque à revêtement de contreplaqué. Les ailes et l'extrémité du fuselage sont en bois avec entoilage.

Manufacturer: (assembled from captured war material)



VMA 200

Designer: Hans Jacobs

The VMA 200 is a French version of the DFS Weihe high performance single-seat

sailplane, with wood monocoque fuselage, plywood covered. The wings and tail are wood, fabric covered.

VMA 200

Französische Ausführung der DFS Weihe. Einsitziges Hochleistungsflugzeug in Schalenbauweise aus Holz, mit Sperrholzbeplankung. Flügel und Rumpfende aus Holz mit Stoffbespannung.

VMA 200

Version française du DFS Weihe. Planeur monoplace de haute performance en coque, construction de bois revêtue de contreplaqué. Les ailes et l'extrémité du fuselage sont en bois avec entoilage.

Type designation	Castel Mauboussin C-25 S		Castel Mauboussin C-311 P		Air-102		VMA 200 Milan	
Number of seats and arrangement	2 side-by-side		1		1		1	
Date of 1st flight	Apr. 1946		Apr. 1950 (C-310 P: 1946)		(Air-100: 1947)		(Weihe: 1938)	
Span m	16.0		14.0		18.0		18.0	
Length m	7.23		6.60		8.0		8.10	
Wing area m^2	20.0		14.7		18.0		18.26	
Aspect ratio	12.8		13.3		18.0		17.74	
Height m	2.22		2.10		2.36		2.12	
Taper ratio	0.42		0.36		0.2		0.25	
Wing section: root					Gö 549		Gö 549	
tip					Gö 576		M. 12	
Empty weight kg	261		174		278		248	
Load kg	180		85		95		95	
Flying weight kg	441		269		373		343	
Wing loading kg/m^2	22.0		18.3		20.7		18.8	
Placard airspeed km/h	140		160		210		235	
Aero-towing speed km/h	100		130		102		120	
Placard airspeed (rough air) km/h	90		90		130		130	
Straight flight performance	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	62	0.73	69	0.83	60	0.75	62	0.76
	70	0.80	80	0.96	70	0.8	69	0.81
	80	0.97	90	1.18	80	1.0	80	1.01
	100	1.44	100	1.5	100	1.7	100	1.62
	120	2.23	120	2.5	120	2.75	120	2.4
Max. L/D	~25		~24		~25		~24	

France - Frankreich - France

Manufacturer: SNCAN

The Société de Construction Aéronautique du Nord is no longer engaged in sailplane manufacture but it did produce large numbers of sailplanes to the firm's designs in the immediate post-war years. The types built included:

270 Caudron C 800
250 C-301S
265 Nord 1300 (Grunau Baby)
100 Nord 2000 (Meise)

The Castel Mauboussin C-301S was a single-seat trainer of limited performance. The other types built by SNCAN are described below.

Die Société de Construction Aéronautique du Nord baut heute keine Segelflugzeuge mehr, war aber in den Jahren unmittelbar nach dem Kriege auf diesem Gebiete tätig. Unter den zahlreichen von der SNCAN gebauten Typen sind zu nennen:

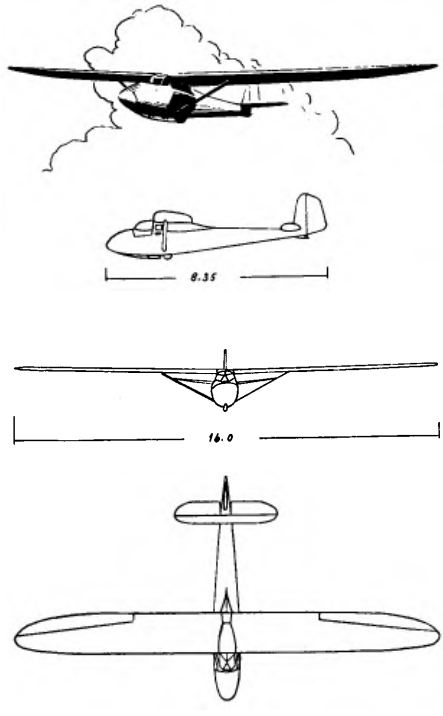
270 Caudron C 800
250 C-301S
265 Nord 1300 (Grunau Baby)
100 Nord 2000 (Meise)

Der Castel-Mauboussin C-301S war ein einsitziges Schulungsflugzeug mit beschränkter Leistung. Die übrigen Typen sind nachstehend beschrieben.

La Société de Construction Aéronautique du Nord ne fabrique plus de planeurs, mais elle en a fabriqué beaucoup tout de suite après la guerre, par exemple:

270 Caudron C 800
250 C-301S
265 Nord 1300 (Grunau Baby)
100 Nord 2000 (Meise)

Le Castel-Maubussin C-301S était un monoplace d'école de performances restreintes. Les autres types sont décrits ci-après.



Caudron C 800 Epervier

Designer: M. Jarlaud

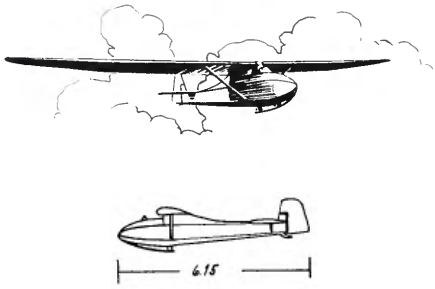
The C 800 is a side-by-side two-seat training sailplane. The fuselage is wood monocoque with plywood covering; the wings and tail are of wood with fabric covering.

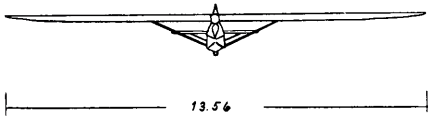
Caudron C 800 Epervier

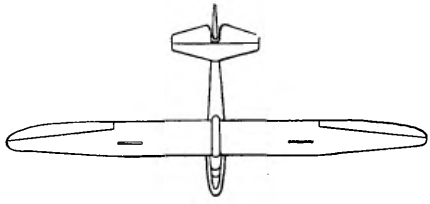
Zweisitziges Schulungsflugzeug mit Sitzanordnung nebeneinander. Rumpf in Schalenbauweise aus Holz; Flügel und Rumpfende aus Holz mit Stoffbespannung.

Caudron C 800 Epervier

Biplace d'école avec sièges côte à côte. Fuselage de bois en coque; les ailes et l'extrémité du fuselage sont en bois avec entoilage.







Nord 1300

Designer: Schneider

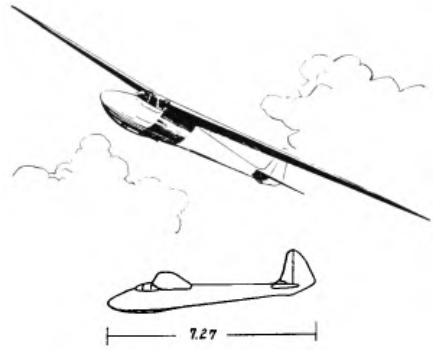
The Nord 1300 is a French version of the Grunau Baby, a single-seat trainer of wood construction, plywood and fabric covered.

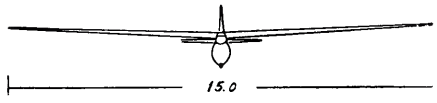
Nord 1300

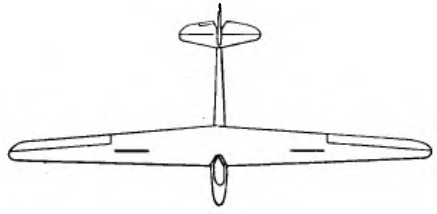
Französische Ausführung des Grunau Baby; einsitziges Schulungsflugzeug in Holzkonstruktion, sperrholzbeplankt und mit Stoffbespannung.

Nord 1300

Version française du Grunau Baby; monoplace d'école construit en bois, revêtu de contreplaqué et entoilé.







Nord 2000 Designer: Hans Jacobs

The Nord 2000 is a French version of the DFS Meise, a high performance single-seat training sailplane. It has a wood monocoque fuselage, plywood covered; the wings and tail are of wood with fabric covering.

Nord 2000

Französische Ausführung der DFS Meise; einsitziges Schulungsflugzeug mit guter Leistung. Rumpf in Schalenbauweise aus Holz mit Sperrholzbeplankung; Flügel und Rumpfende aus Holz mit Stoffbespannung.

Nord 2000

Version française du DFS Meise; monoplace d'école de bonne performance. Fuselage de bois en coque avec revêtement de contreplaqué; les ailes et l'extrémité du fuselage sont en bois avec entoilage.

Manufacturer:
Guerchais-Roche

The Ateliers Roche-Aviation ceased to exist as aircraft manufacturers some years ago but the company produced one or two prototypes and the following production sailplanes in the post-war years:

150 SA 103
100 SA 104

The SA 103 was an earlier version of the SA 104 described below. It differed in a number of details.

Die Ateliers Roche-Aviation bauen seit einigen Jahren keine Flugzeuge mehr; in den ersten Nachkriegsjahren wurden ein bis zwei Prototypen und eine Anzahl Segelflugzeuge in Serie hergestellt, nämlich

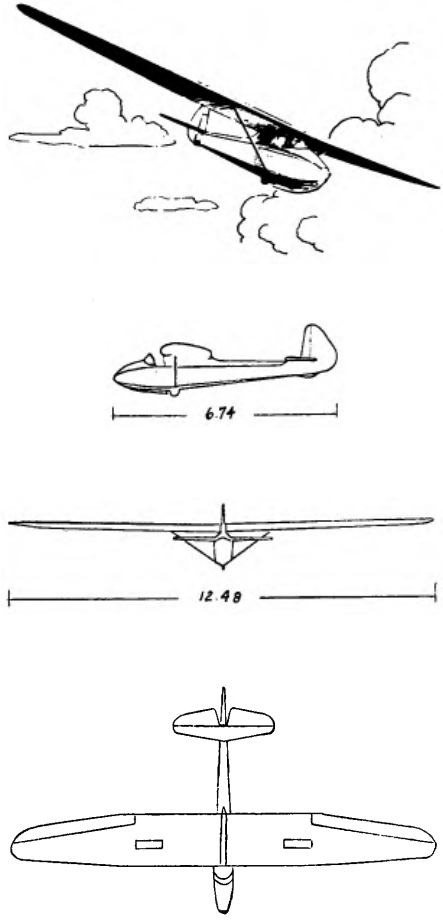
100 SA 104
150 SA 104

Der SA 103 bildete eine erste Ausführung des nachstehend beschriebenen SA 104. Er unterschied sich von diesem in einer Anzahl von Einzelheiten.

Les Ateliers Roche-Aviation ne fabriquent plus de planeurs depuis quelques années; mais tout de suite après la guerre ils ont donné un ou deux prototypes et fabriqué en série un bon nombre de planeurs, en fait:

150 SA 103 et
100 SA 104

Le SA 103 était une première version du SA 104 dont il est question ci-après. Il en différait par divers détails.



SA 104 Emouchet

Designer: M. Mangeot

The SA 104 is a single-seat trainer. The fuselage is of wood with plywood covering and the wings and tail are of wood with fabric covering.

SA 104 Emouchet

Einsitziges Schulungsflugzeug.. Rumpf aus Holz mit Sperrholzbeplankung; Flügel und Rumpfende aus Holz mit Stoffbespannung.

SA 104 Emouchet

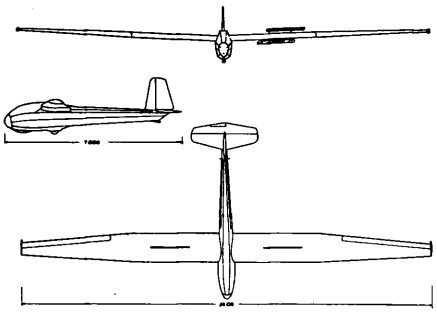
Monoplace d'écolage en bois, avec revêtement de contreplaqué. Les ailes et l'extrémité du fuselage sont en bois avec entoilage.

Type designation		Caudron C. 800 Epervier		Nord 1300		Nord 2000		SA. 104 Emouchet	
Number of seats		2 side-by-side		1		1		1	
Date of 1st flight		Aug. 1945		Apr. 1946		June 1947		1950 (SA. 103: 1945)	
Span	m	16.0		13.56		15.0		12.48	
Length	m	8.35		6.15		7.26		6.74	
Wing area	m^2	22.0		14.0		15.0		16.50	
Aspect ratio		11.6		13.13		15.0		9.4	
Height	m	2.36		1.68		1.60		2.0	
Taper ratio		0.6		0.52		0.4		0.5	
Wing section: root		Gö 654				Gö 549			
tip		Gö 676				Gö 676			
Empty weight	kg	240		163		176		176	
Load	kg	180		95		95		95	
Flying weight	kg	420		258		271		271	
Wing loading	kg/m^2	19.1		18.4		18.0		16.4	
Placard airspeed	km/h	170		115		170		160	
Aero-towing speed	km/h	90		90		110		90	
Placard airspeed (rough air)	km/h	85		80		100		90	
Straight flight performance		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		68	0.93	55	0.95	65	0.78	57	0.84
		75	1.0	64	1.05	75	0.96	62	0.87
		80	1.15	70	1.2	90	1.45	70	1.03
		90	1.64	80	1.58	100	1.8	80	1.4
		100	2.25	100	2.66	120	2.86	100	2.57
Max. L/D		~21		~17		~22		~20	

Manufacturer:
Ets. Benjamin Wassmer
13, rue Etienne-Dolt, Paris

WA 20 Javelot

The Javelot is a single-seat medium performance sailplane that is in series production. The fuselage is constructed of steel tubes, the wings of wood.



WA 20 Javelot

Einsitziges Flugzeug für mittlere Leistung in Serienproduktion. Rumpf aus Stahlrohr, Flügel aus Holz.

WA 20 Javelot

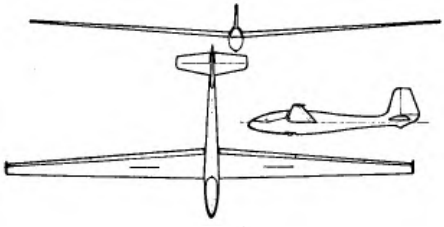
Monoplace pour performances moyennes produit en série. Fuselage de tubes d'acier, ailes en bois.

Type designation		WA 20 Javelot
Chief-designer		M. Collard
Date of first flight of prototype		1956
Wings		
Span	m	16.08
Area	m^2	15.5
Aspect ratio		16.7
Wing root chord	m	1.15
Wing tip chord	m	0.49
Wing section, root		63.618
Wing section, tip		63.615
Dihedral	deg.	3
¼ chord sweep	deg.	0
Aero. twist root/tip	deg.	5½
Ailerons		
Span	m	3.5
Area	m^2	0.7
Max. deflection up	deg.	24
Max. deflection down	deg.	18
Horizontal tail		
Span	m	2.6
Area of elevator and fixed tail	m^2	2.19
Area of elevator	m^2	0.84
Max. deflection up	deg.	29
Max. deflection down	deg.	26
Aerofoil section		HOOF 10%
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.44
Elevator trimming method		tab
Horizontal tail volume coefficient		0.63

Type designation		WA 20 Javelot
Vertical tail		
Area of fin and rudder	m^2	1.1
Area of rudder	m^2	0.62
Aspect ratio		1.6
Tail arm	m	4.13
Max. deflection	deg.	30
Fuselage		
Max. width	m	0.64
Overall length	m	
Max. cross section	m^2	0.60
Number seats		1
Undercarriage type		fixed wheel
Lift increasing devices		
Type		none
Drag producing devices		
Type		Göppingen airbrakes
Span	m	1.5
Area	m^2	0.72
% of span		19
Location, % of span		50
Weights		
Empty weight	kg	195
Equipped weight	kg	230
Max. load	kg	100
Max. permissible flying weight	kg	330
Wing loading	kg/m^2	21.2
Design standards		
Airworthiness requirements to which aircraft has been built		Norme air 2.104 (France)
Design flight envelope *Manoeuvre loads*		V km/h | n
Point A		200 | 5
Point B		120 | 5
Point C		200 | —2
Point D		100 | —2
Factor of safety		2
Limiting flight conditions		
Placard airspeed smooth conditions	km/h	200
Placard airspeed gusty conditions	km/h	150

Type designation		WA 20 Javelot	
Aero-towing speed	km/h	140	
Winch launching speed	km/h	100	
Cloud flying permitted		yes	
Permitted aerobatic manoeuvres		none	
Spinning permitted		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.		30% and 44%	
Terminal velocity with brakes opened at max. all up weight from flight tests	km/h	165	
Straight flight performance			
at flying weight of	kg	312	
No flap or brake		V km/h	v m/s
V for min. sink		75	0.68
V for max. L/D		80	0.75
		100	1.2
		120	2.0
Max. L/D		29	

Manufacturer:
Société des Ateliers
d'aviation Louis Breguet
24, rue Georges-Bizet,
Paris XVI^e



Breguet 901S

The 901S is a high performance single-seater designed for competition flying. Built entirely of wood, it has plywood and fabric covered wings and tail unit and a wooden monocoque fuselage. There is provision for 75 kg ballast.

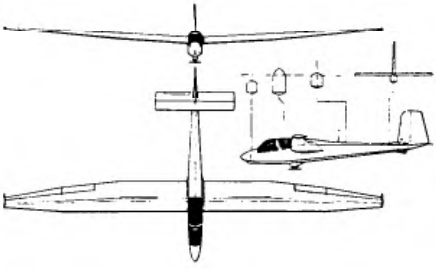
Breguet 901 S

Einsitziges Hochleistungsflugzeug, gebaut für Wettkämpfe. Holzkonstruktion; Flügel und Leitwerk mit Sperrholz beplankt und stoffbespannt, Rumpf in Schalenbauweise. Möglichkeit der Mitführung von 75 kg Ballast.

Breguet 901 S

Monoplace de haute performance, prévu pour les concours. Construction de bois,

ailes et empennages recouverts de contre-plaqué et entoilés, fuselage en coque. Possibilité d'emporter 75 kg de lest.



Breguet 902

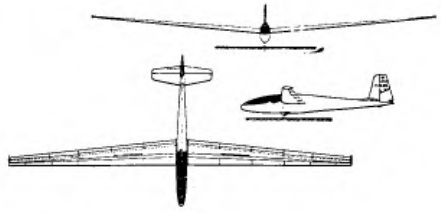
The 902 is a two-seat training sailplane designed as a replacement for the Caudron C-800. The wings and tail unit are of wooden construction, part wood and part fabric covered, while the fuselage is of steel tubes, fabric covered.

Breguet 902

Zweisitziges Schulungsflugzeug, als Ersatz für den Caudron C-800. Flügel und Leitwerk in Holzkonstruktion, teils mit Sperrholz beplankt, teils stoffbespannt. Rumpf aus Stahlrohr mit Stoffbespannung.

Breguet 902

Biplace d'école, destiné à remplacer le Caudron C-800. Ailes et empennages de bois, en partie recouverts de contre-plaqué, en partie entoilés. Fuselage en tubes d'acier avec entoilage.



Breguet 904

The 904 is a two-seat high performance sailplane designed for competition flying and derived from the 901. It is of all wood construction.

Breguet 904

Zweisitziges Hochleistungsflugzeug für Wettkämpfe, abgeleitet vom 901. Gänzlich in Holzkonstruktion.

Breguet 904

Biplace de haute performance pour concours, dérivant du 901. Entièrement en bois.

Breguet 905

The 905 is a "standard class" sailplane for competition and club flying.

Breguet 905

Flugzeug der Standardklasse für Wettkämpfe und Flugbetrieb in Gruppen.

Breguet 905

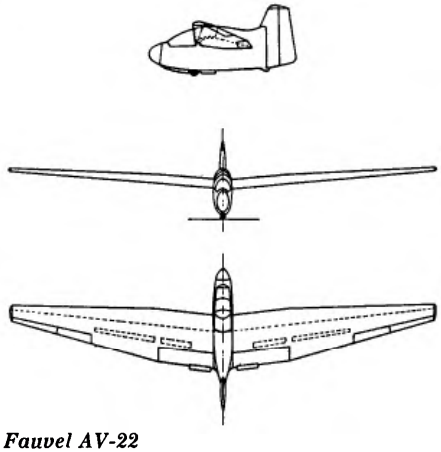
Planeur de la classe standard pour concours et pour l'usage des groupes.

Type designation	Breguet 901S	Breguet 902	Breguet 904	Breguet 905
Designer	J. Cayla	R. Jarlaud	R. Jarlaud	
Date of first flight of prototype	1956	1957	May 1956	1958
Number produced		1	2	1
Wings				
Span m	17.32	18.0	20.04	15.0
Area m^2	15.0	21.6	20.0	11.25
Aspect ratio	20	15	20	20
Wing root chord m			1.478	
Wing tip chord m			0.492	
Wing section	NACA 63 series		NACA 63 series	NACA 63 series
Dihedral deg.			3	3
Aero. twist root/tip deg.			—3° 48'	
Ailerons				
Type	slotted	slotted	slotted	
Horizontal tail				
				V-tail
Area of elevator and fixed tail m^2	2.07		3.10	2.30
Area of elevator m^2			1.18	
Aerofoil section			Breguet L-14	
Elevator aerodynamic balance method			nil	
Vertical tail				
Area of fin and rudder ... m^2			1.72	
Area of rudder m^2			0.95	
Aerofoil section			Breguet L-14	
Aerodynamic balance			nil	
Fuselage				
Max. width m			0.61	0.58
Overall length m	7.28	9.0	9.0	6.0
Max. cross section m^2			0.54	
Number seats and arrangement	1	2 tandem	2 tandem	1
Undercarriage type	retractable wheel	fixed wheel	retractable wheel	
Wheel diameter cm			35.5	
Special features	hydraulic wheel brake	hydraulic wheel brake	hydraulic wheel brake	

Type designation		Breguet 901S		Breguet 902		Breguet 904		Breguet 905	
Lift increasing devices									
Type		Fowler flaps		—		Fowler flaps		—	
Max. deflection up	deg.	— 6				— 6			
Max. deflection down	deg.	+25				+25			
Drag producing devices									
Type		wing air brakes		wing air brakes		wing air brakes			
Span	m					top: 1.80 bottom: 1.52			
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.		yes		yes		yes		yes	
Weights									
Empty weight	kg					340			
Instruments and equipment	kg					65			
Equipped weight	kg	265		330		405		148	
Removable ballast	kg					115			
Max. permissible flying weight	kg	430		500		690		250	
Wing loading	kg/m²	28.0		23.0		34.5		22.2	
Limiting flight conditions									
Placard airspeed smooth conditions	km/h	220				220			
Placard airspeed gusty conditions	km/h	180				180			
Aero-towing speed	km/h	150				150			
Cloud flying permitted		yes				yes			
Straight flight performance									
at flying weight of	kg	315				520		231	
No flap or brake		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		72	0.60	65	0.70	70	0.7	60	0.60
V for max. L/D		85	0.65	78	0.75			72	
		100	0.82	100	1.20			100	1.10
		120	1.25	120	1.75	150	2.25	120	2.0
		150	2.3	150	3.60	190	5.0	150	5.0
With...° flap	deg.	25°							
V for min. sink		60	0.65						
Limiting speed		100							
Stalling speed	km/h	62		60					
Max. L/D		36		28		35		32	

France - Frankreich - France

Manufacturer:
«Survol» Charles Fauvel
137, Avenue Francis-Tonner,
Cannes La Bacca, A.M.



Fauvel AV-22

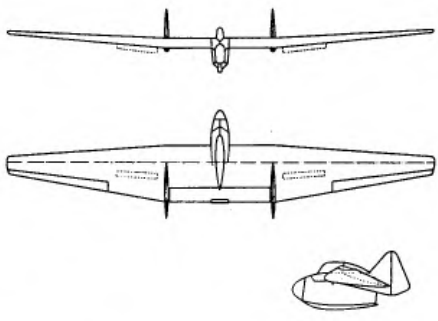
The AV-22 is a two-seat training sailplane of wooden construction. A tail-less flying wing, it has accomodation for two in tandem in a nacelle beneath the center section.

Fauvel AV-22

Zweisitziges Schulungsflugzeug in Holzkonstruktion, als schwanzloser fliegender Flügel gebaut. Tandemsitzanordnung für zwei Personen in einer Gondel unter dem Flügelmittelstück.

Fauvel AV-22

Biplace d'école, construction en bois, planeur sans queue type aile volante. Sièges en tandem dans une nacelle sous la partie médiane de la voilure.



Fauvel AV-36

The AV-36 is a single-seat medium performance sailplane of wooden construction. A tail-less flying wing, it has accomodation for the pilot in a nacelle beneath the center section.

Fauvel AV-36

Einsitzer für mittlere Leistung in Holzkonstruktion, als schwanzloser fliegender Flügel gebaut. Pilotensitz in einer Gondel unter dem Flügel-Mittelstück.

Fauvel AV-36

Monoplace pour performances moyennes, construction en bois, planeur sans queue type aile volante. Siège du pilote dans une nacelle sous la partie médiane de la voilure.

Type designation	AV-22	AV-36 Monobloc
Designer	Charles Fauvel	
Date of 1st flight of prototype	April 1956	1951
Number produced	2	approx. 50
Wings		
Span ..... m	15.04	11.95
Area ..... m^2	21.75	14.20
Aspect ratio	10.4	10.0
Wing root chord ..... m	1.90	1.60
Wing tip chord ..... m	0.60	0.50
Wing section, root	F_2 17%	F_2 17%
Wing section, mid	F_2 17%	F_2 17%
Wing section, tip	F_2 17%	F_2 17%
Dihedral ..... deg.	2.5	2.5
¼ chord sweep ..... deg.	—6	0
Aero. twist root/tip ..... deg.	0	0
Length of each section of wing ..... m	7.5	11.95
Ailerons		
Span ..... m	3.20	2.80
Area ..... m_2	0.8	0.6
Mean chord ..... m	0.25	0.213
Max. deflection up ..... deg.	26	26
Max. deflection down ..... deg.	14	13
Mass balance degree		
Mass balance method		nil
Horizontal tail		
Span ..... m	No horizontal tail	
Area of elevator and fixed tail ..... m^2		
Area of elevator ..... m^2	1.90	1.05
Max. deflection up ..... deg.	19	26
Max. deflection down ..... deg.	13	13
Aerofoil section	Extension of wing section	
Mass balance method	weight	weight
Elevator aerodynamic balance method	nil	nil
Elevator trimming method	tab	tab
Special features	Tail-less aircraft	

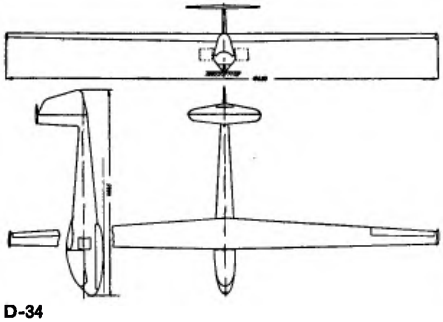
Type designation		AV-22	AV-36 Monobloc
Vertical tail			
Area of fin and rudder ...	m^2	1.955	2×0.91
Area of rudder	m^2	1.955	2×0.50
Max. deflection	deg.	20	38 — 15 (out) (in)
Aerofoil section		sym. 12%	sym. 8%
Mass balance degree		nil	nil
Aerodynamic balance.....		0.13	nil
Special features		Rudder on short fuselage	2 fins and rudders on wing
Fuselage			
Max. width	m	0.65	0.52
Overall length	m	5.10	
Max. cross section.....	m^2	0.79	
Wetted surface area	m^2	11.25	2.26
Number seats and arrangement		2, tandem	1
Undercarriage type		Wheel and skid	Skid
Wheel diameter.....	cm	33.0	nil
Special features		Semi-retractable wheel	
Lift increasing devices			
Type		none	none
Drag producing devices			
Type		*AV-22-01:* Lower surface spoilers *AV-22-02:* Schemp-Hirth dive brakes	Lower surface spoilers
General location		Bottom of wing	Bottom of wing
Span	m		
Area	m^2		
% of span (where applicable)		*AV-22-02:* 22%	22.5%
Location, % of chord (where applicable)		*AV-22-01:* 51% *AV-22-02:* 43%	51%
Weights			
Wings	kg	120	Monobloc
Fuselage	kg	110	Monobloc
Tailplane and elevator ...	kg	—	Monobloc
Empty weight	kg	230	118
Instruments	kg	3	2
Other equipment (e.g. oxygen, radio)	kg	17	
Equipped weight	kg	250	120

Type designation	AV-22		AV-36 Monobloc	
Max. load ..... kg	413		225	
Max. permissible flying weight ..... kg	440		225	
Wing loading ..... kg/m²	20.2		15.8	
Design standards				
Airworthiness requirements to which aircraft has been built	French: Reglement air 2.104 Cat. III, nuages		Cat. IV	
Date of issue of these requirements	1. 8. 1954			
Certificate of Airworthiness	yes		yes	
Limiting flight conditions				
Placard airspeed smooth conditions ..... km/h	220		220	
Placard airspeed gusty conditions ..... km/h	157		158	
Aero-towing speed ..... km/h	128		128	
Winch launching speed ... km/h			149	
Cloud flying permitted	yes		yes	
Permitted aerobatic manoeuvers	Loop, stall turn, side slip		Normal, but not inverted flight	
Spinning permitted			yes	
Terminal velocity with brakes opened at max. all up weight from flight tests km/h (if brakes are speed limiting)	*AV-22-01*: 135 *AV-22-02*: 160		*AV-36-01*: 130	
Straight flight performance				
at flying weight of ..... kg	413		225	
No flap or brake	V km/h	v m/s	V km/h	v m/s
V for min. sink	70	0.85	67	0.82
V for max. L/D	85	0.92	83	0.95
1.5 × V stall	73	0.85	75	0.90
1.75 × V stall	85	0.92	82.5	0.93
2.00 × V stall	97	1.15	100	1.35
Stalling speed ..... km/h	52 (full load)		50	
Max. L/D	26		24.15	

Germany - Deutschland - Allemagne

Manufacturer:
Akademische Fliegergruppe
Darmstadt e. V.
Technische Hochschule, Darmstadt

Designer:
Akademische Fliegergruppe
Darmstadt



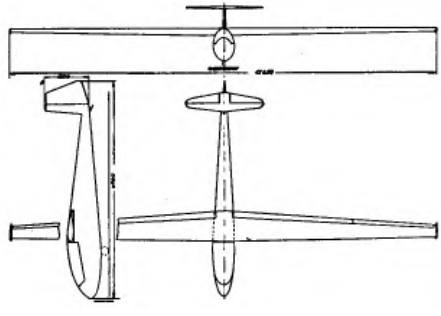
D-34

D-34 B

Darmstadt D-34 and 34 B

Akaflieg Darmstadt has designed, built and flown sailplanes for 36 years, but unlike a manufacturing firm, the personnel changes rapidly. Almost every design has a new chief designer. The D-34 and 34 B are the first post-war serious efforts of this group, and are very modern small span designs. Only 65 cm more span than the famous Windspiel (D-28), they have more than twice the wing loading and the same sinking speed, but a much better L/D and penetration. Wing structure is unusual, being a broad box spar of wood, with four webs, passing through the widely spaced ribs (at 48 cm). Between these ribs are glued blocks of foam plastic which are then faired off to blend with the ribs. The whole is then covered with thin (0,6 mm) birch plywood laid diagonally. The wing is one piece, and 21 % thick throughout.

The main difference between D-34 and D-34 B is that the latter has a new fuselage which has a somewhat longer tail and nose. There has been a serious attempt to improve it aerodynamically, in nose shape, fuselage wing junction, and tailplane to fin junction. There is also a retractable wheel instead of a skid. There are lift flaps but no airbrakes like the fuselage brakes on the D-34.



Darmstadt D-34 und 34 B

Akaflieg Darmstadt konstruiert, baut und fliegt seit 36 Jahren Segelflugzeuge; aber das Personal wechselt im Gegensatz zu einer Fabrik dauernd. Beinahe jedes Modell hat einen neuen Chefkonstrukteur. Der D-34 und 34 B ist das Ergebnis der ersten ernsthaften Anstrengungen der Nachkriegszeit in dieser Gruppe; es handelt sich um sehr moderne Konstruktionen mit kleiner

Spannweite. Mit nur 65 cm mehr Spannweite als das berühmte Windspiel (D-28) weisen sie mehr als doppelte Flächenbelastung und gleiche Sinkgeschwindigkeit, aber ein besseres L/D und Tiefenwirkung auf. Ungewöhnlich ist die Flügelbauweise, nämlich mit einem breiten Kastenholm aus Holz und vier zwischen den in weiten Abständen (48 cm) angeordneten Rippen durchlaufenden Stegen. Zwischen den letzteren befinden sich verleimte Füllblöcke aus Schaumplastik, die poliert werden, bis sie mit den Rippen zusammen eine glatte Oberfläche bilden. Das Ganze wird mit dünnem Birkensperrholz (0,6 mm) verkleidet, welches diagonal gelegt ist. Der Flügel ist einteilig und durchgehend 21 % dick.

Der Hauptunterschied zwischen D-34 und D-34 B besteht im neuen Rumpf bei letzterem, wobei Heck und Rumpfnase etwas länger sind. Es wurden ernsthafte Versuche zur aerodynamischen Verbesserung unternommen durch die Änderung der Form der Flügelnase, der Verbindung von Rumpf und Flügeln und der Verbindungsstelle von Höhen- und Seitenflosse. Ein einziehbares Rad ersetzt die Kufe. Ferner verfügt der D-34 B über auftriebserhöhende Klappen, aber keine Luftbremse wie die Rumpfbremsen am D-34.

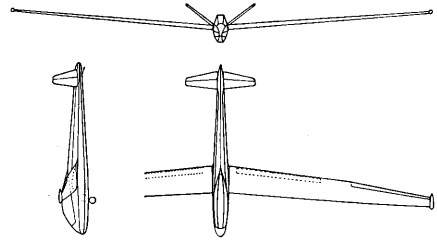
Darmstadt D-34 et 34 B

L'Akaflieg à Darmstadt crée, fabrique et fait voler des planeurs depuis 36 ans; mais, à la différence de ce qui se passe dans une fabrique, son personnel est en continuelle mutation. Presque chaque modèle a un nouveau chef constructeur. Les D-34 et 34 B résultent des premiers efforts sérieux de ce groupe après la guerre; il s'agit de constructions très modernes à faible envergure. Avec 65 cm seulement de plus d'envergure que le célèbre Windspiel (D-28), elles ont une charge alaire plus que double et la même vitesse de descente, mais un meilleur rapport d'allongement et une meilleure pénétration. La façon de construire l'aile est inusitée; il s'agit d'un large longeron de bois en caisson avec quatre cloisons continues entre des nervures passablement écartées (48 cm). Des blocs en plastique mousse sont collés pour remplir les intervalles; ils sont polis de telle sorte que la nervure et le bloc se suivent en donnant une surface lisse et continue. Le tout est recouvert de mince contreplaqué de bouleau (0,6 mm), placé en diagonale. L'aile est d'une pièce et partout épaisse de 21 %.

La principale différence entre D-34 et D-34 B réside dans le nouveau fuselage du second, où la poupe et le nez du fuselage sont un peu plus longs. On a tenté très sérieusement d'obtenir des améliorations aérodynamiques en changeant la forme du bord d'attaque de l'aile, en modifiant l'attache des ailes au fuselage et celle des gouvernails de profondeur et de direction. Une roue éclipsable remplace le patin. Le D-34 B possède aussi des volets capables d'augmenter la portance, mais non plus les freins aérodynamiques de fuselage du D-34.

Manufacturer:
Akaflieg München e. V.
Technische Hochschule

Designer: Akaflieg München
(Head: Frodo Hadwich)



Mü-22

This Akaflieg machine follows a long line of Munich types in having a steel tube fuselage. This machine is a moderate-span, single-seater with a rather thick wing, 18 % throughout. It is stressed to a high manœuvre load factor of 12.

Mü-22

Diese Konstruktion der Akaflieg folgt einer langen Reihe von München-Typen, indem sie einen Stahlrohrrumpf aufweist. Das Flugzeug hat mittlere Spannweite; es handelt sich um einen Einsitzer mit eher dikkem Flügel (durchgehend 18 %). Die Mü-22 ist für das hohe Abfanglastvielfache von Wert 12 gebaut.

Mü-22

Cette construction de l'Akaflieg fait suite à une longue série de types München en présentant comme eux un fuselage en tubes d'acier. Planeur d'envergure moyenne, il s'agit d'un monoplace à aile plutôt épaisse (partout 18 %). Le Mü-22 est construit pour un facteur de charge à la ressource particulièrement élevé (valeur 12).

Type designation		D-34	D-34 B	Mü 22
Designer		Akademische Fliegergruppe Darmstadt e.V.		AKAFLIEG München Head: Frodo Hadwich
Date of 1st flight of prototype		1955	1957	1954
Number produced		1	1	1
Wings				
Span	m	12.65	12.65	16.60
Area	m^2	8.0	8.0	13.54
Aspect ratio		20.0	20.0	20.35
Wing root chord	m	0.915	0.915	1.07
Wing tip chord	m	0.360	0.360	0.362
Mean aerodynamic chord (m.a.c.)	m	0.683	0.683	0.816
Wing section, root		64_4-621	64_4-621	63_3-618
Wing section, mid		64_4-621	64_4-621	63_3-618
Wing section, tip		64_4-621	64_4-621	63_3-618
Dihedral	deg.	+0.8	+0.8	+3.0
¼ chord sweep	deg.	—0.3	—0.3	—5.0
Aero. twist root/tip	deg.	0	0	0
Length of each section of wing	m	1×12.65	1×12.65	2×8.4
Ailerons				
Type		plain	plain	normal ailerons fastened with piano hinge
Span	m	1.92	2.40	3.08
Area	m^2	0.307	0.22	0.893

Type designation		D-34	D-34 B	Mü 22
Mean chord	%	37	20	24.4
Max. deflection up	deg.	22.5	30	35
Max. deflection down	deg.	7.5	30	13
Mass balance degree		none	none	none
Mass balance method		none	none	none
Special features			ailerons are deflected down to 20° with trailing edge flaps	
Horizontal tail				
Span	m	2.16	2.36	3.38
Area of elevator and fixed tail	m^2	0.96	0.99	1.582
Area of elevator	m^2	0.495	0.495	0.721
Max. deflection up	deg.	26	26	23+23 = 46
Max. deflection down	deg.	26	26	23+23 = 46
Aerofoil section		NACA 0012 NACA 0009	NACA 0012 NACA 0009	NACA 0012–0,825–35
Mass balance degree		none	none	none
Mass balance method		none	none	none
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.60	3.80	4.44
Elevator aerodynamic balance method		none	none	none
Elevator trimming method		none	none	
Horizontal tail volume coefficient				0.451 (45°)
Special features		T-tail	T-tail	V-tail[4]
Vertical tail				
Area of fin and rudder	m^2	1.04	0.92	—
Area of rudder	m^2	0.59	0.575	—
Aspect ratio		1.75	1.44	—
Tail arm	m	3.55	3.80	—
Max. deflection	deg.	35	≈30	—
Aerofoil section		NACA 63–015 NACA 63–010	NACA 65 A 010 NACA 65 A 012	—
Mass balance degree		—	—	—
Mass balance type		—	—	—
Aerodynamic balance		—	—	—
Fuselage				
Max. width	m	0.62	0.60	0.61
Overall length	m	6.053	6.351	6.95
Max. cross section	m^2	0.48	0.49	0.48
Wetted surface area	m^2	≈7.5	≈7.5	
Number seats and arrangement		1	1	1

Type designation		D-34	D-34B	Mü 22
Undercarriage type		skid	wheel	retractable wheel with brake and rubber-spring
Wheel diameter	cm	—	26	29
Special features		airbrakes in fuselage		rubber-spring as compression member
Lift increasing devices				
Type		none	20° drooping ailerons and trailing edge flaps	split flap fastened with piano hinge
Span	m		3.36	3.30
Area	m^2		0.655	1.15
Mean chord	%		20	19
Max. deflection up	deg.		10	0
Max. deflection down	deg.		60	72
Drag producing devices				
Type		fuselage airbrakes	none	split flaps
General location		fuselage, below wing		
Area	m^2	0.26		
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no		yes		yes
Weights				
Wings	kg	64.0	77.7	150
Fuselage	kg	54.5	55.4	88
Tailplane and elevator ..	kg	4.2	3.6	7.5
Empty weight	kg	122.7	136.7	245.5
Instruments	kg	~3.0	~4.0	
Equipped weight	kg	128	141	
Max. load	kg	88	94	90[5] 150[6]
Max. permissible flying weight	kg	216	235	340[5] 400[6]
Wing loading	kg/m^2	27.0	29.4	25.1 29.5
Design standards				
Airworthiness requirements to which aircraft has been built		Bauvorschriften für Segelflugzeuge		Bauvorschriften für Flugzeuge
Date of issue of these requirements		1951		1952 (1936)

Type designation	D-34		D-34B		Mü 22	
Certificate of Airworthiness yes/no	yes				Category of certification: Beanspruchungsgruppe 2 (G = 400 kg) 3 (G = 340 kg)	
Any other certification (e.g. experimental license, permit to fly)	permit to fly				experimental license	
Design flight envelope Manoeuvre loads	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Ultimate load factor n
Point A	131	4	131	4	155	12
Point B	236.5	4	236.5	4	244	12
Point C	236.5	0	236.5	0	280	0
Point D					244	—6
Factor of safety	2.5		2.5			
Gust loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A	127.5	+10	127.5	+10	163.8	+10
Point B	127.5	—10	127.5	—10		
Point C						
Point D					163.8	—10
Limiting flight conditions						
Placard airspeed smooth conditions ..... km/h	210		210		280	
Placard airspeed gusty conditions ..... km/h	125		125		160	
Aero-towing speed ..... km/h	125		125		160	
Winch launching speed .. km/h	110		110		123	
Cloud flying permitted ...	no		no		yes	
Permitted aerobatic manoeuvres	no		no		yes	
Spinning permitted	yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.					22% and 42%	
Straight flight performance						
at flying weight of ..... kg	216		235		340	

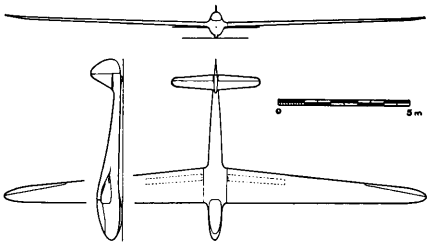
Type designation	D-34		D-34 B		Mü 22	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	73[7]	0.56[7]	73[7]	0.56[7]	68	0.56
V for max. L/D	76[7]		76[7]		80	0.63
					75	0.58
					87.5	0.69
					100	0.86
With .....° flap ..... deg					72°	
V stall					~45[8]	
					60[8]	3.0[8]
					90[8]	8.0[8]
Stalling speed ..... km/h	<63				54[8]	
Max. L/D	≈36		≈36		36	

[1] With struts, controls, flaps and brakes.
[2] Complete with rudder and fin, less instruments and equipment.
[3] To include any fixed ballast.
[4] Angle of V-tail to horizontal plane normal 45°. For test flying it can be changed to 30° and 37.5°. The V-tail can also be replaced by a normal empennage.
[5] Permitted maximal load for aerobatic manoeuvres.
[6] Permitted maximal load for normal flying.
[7] Figures are theoretical.
[8] Instrument reading.

Manufacturer:
Akademische Fliegergruppe
Stuttgart e. V.
Technische Hochschule, Stuttgart

FS 24 Phönix

This sailplane is unusual in several respects. It is designed not for minimum sink or best penetration, but for the highest average cruising speed. The solution is a low wing loading (18.5 kg/m²) achieved by a very light structure in a combination of glass-cloth, polyester plastic and balsa wood, a specially designed wing section and the utmost care given to the elimination of parasitic drag. (A description of the design is given in " Schweizer Aero Revue", March 1957 and in OSTIV Publication IV.)



FS 24 Phönix

Ein in verschiedener Beziehung außergewöhnliches Flugzeug. Nicht für minimale Sinkgeschwindigkeit oder besten Einflug, sondern für größte durchschnittliche Reisegeschwindigkeit gebaut. Die Lösung wurde gefunden in kleiner Flächenbelastung (18,5 kg/m²) durch leichte Bauweise, als Kombination von Glasgewebe, Polyesterharz und Balsaholz, einen besonders konstruierten Flügelquerschnitt und größtmögliche Vermeidung des schädlichen Luftwiderstandes. (Beschreibung dieser Konstruktion erfolgte in der «Schweizer Aero-Revue», März 1958, und in der OSTIV Publication IV.)

FS 24 Phönix

Ce planeur sort de l'ordinaire à plusieurs égards. Il n'a pas été construit en vue d'une vitesse de descente minimum ou de qualités de vol particulières, mais bien en vue d'une vitesse de croisière aussi grande que possible. La solution a été trouvée dans une faible charge alaire (18,5 kg/m²) obtenue par une construction légère (tissu de verre, résine de polyester, balsa), par un type particulier de section d'aile, et en évitant le plus possible les résistances nuisibles. Cette construction a été décrite dans l'«Aéro-Revue Suisse» en mars 1958, et aussi dans la publication IV de l'OSTIV.

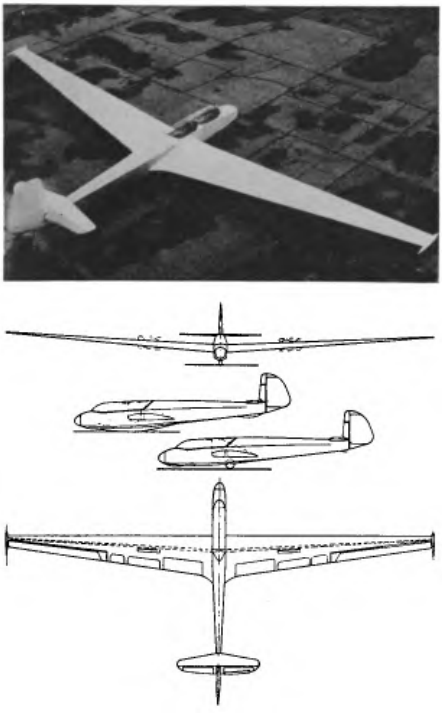
Type designation		FS 24 Phönix
Designers		H. Nägele, R. Eppler
Date of first flight of prototype		27 November 1957
Number produced		1
Wings		
Span	m	16.00
Area	m²	14.36
Aspect ratio		17.83
Wing root chord	m	1.25
Wing tip chord	m	0.53
Mean aerodynamic chord (m.a.c.)	m	0.90
Wing section		EC 86 (-3) - 914
Dihedral	deg.	2.0
¼ chord sweep	deg.	—1.37
Aero. twist root/tip	deg.	0
Ailerons		
Span	m	2.35
Area	m²	0.344
Mean chord	m	0.15

Type designation		FS 24 Phönix
Max. deflection up	deg.	30
Max deflection down	deg.	15
Mass balance degree		nil
Mass balance method		none
Horizontal tail		
Span	m	3.36
Area of elevator and fixed tail	m^2	1.56
Area of elevator	m^2	0.61
Max. deflection up	deg.	30
Max. deflection down	deg.	30
Aerofoil section		NACA 65-009
Mass balance degree		nil
Mass balance method		none
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.15
Horizontal tail volume coefficient		0.531
Vertical tail		
Area of fin and rudder	m^2	0.97
Area of rudder	m^2	0.50
Aspect ratio		1.94
Tail arm	m	4.30
Max. deflection	deg.	30
Aerofoil section		NACA 651-012
Mass balance degree		nil
Mass balance type		none
Aerodynamic balance		none
Fuselage		
Max. width	m	0.55
Overall length	m	6.84
Max. cross section	m^2	0.41
Wetted surface area	m^2	8.0
Number seats		1
Undercarriage type		skid
Lift increasing devices		
Type		none
Drag producing devices		
Type		airbrakes, bottom of wing
Span	m	2.20
Area	m^2	0.49
% of chord		20
Location, % of span		65
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.		yes

Type designation		FS 24 Phönix	
Weights			
Wings	kg	94.9	
Fuselage	kg	58.8	
Tailplane and elevator	kg	8.0	
Empty weight	kg	161.7	
Instruments	kg	2.5	
Equipped weight	kg	164.2	
Max. load	kg	100.8	
Max. permissible flying weight	kg	265.0	
Wing loading	kg/m²	18.5	
Design standards			
Airworthiness requirements to which aircraft has been built		German BVS	
Date of issue of these requirements		1958	
Certificate of Airworthiness		yes	
Design flight envelope *Manoeuvre loads*		V km/h	proof load factor
Point A		103	4
Point B		196	4
Point C		231	0
Point D		138	—2
Factor of safety		2	
Limiting flight conditions			
Placard airspeed smooth conditions	km/h	140	
Placard airspeed gusty conditions	km/h	100	
Aero-towing speed	km/h	100	
Winch launching speed	km/h	90	
Spinning permitted		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.		33% and 40%	
Straight flight performance			
at flying weight of	kg	265	
No flap or brake		V km/h	v m/s
V for min. sink		69.2	0.53
V for max. L/D		80.2	0.60
		73.5	0.55
		85.6	0.68
		97.8	0.94
Stalling speed	km/h	43	
Max. L/D		~37	

Germany - Deutschland - Allemagne

Manufacturer:
Focke-Wulf GmbH
Hünefeldstrasse 1–5
Bremen-Flughafen



Kranich III

The Kranich III has practically nothing in common with the earlier pre-war marks of Kranich. The basic design is still by Jacobs but it was detailed and produced by Focke-Wulf.

The wing was developed from the Weihe, but the wing tips are equipped with end-plates. There is some slight aerodynamic forward sweep, although the wing leading edge is at right-angles to the fuselage centre-line.

The wing is of normal single spar and plywood construction, most of the wing being plywood covered. The wing itself is much lower on the fuselage than the earlier Kranich marks, and the fuselage itself is entirely different in that it is of welded steel tube and fabric covered.

Kranich III

Der Kranich III hat praktisch nichts mehr mit den gleichnamigen Typen der Vorkriegszeit gemeinsam. Die Grundkonstruktion stammt immer noch von Jacobs, wurde aber von Focke-Wulf umgebaut und herausgebracht.

Flügel aus der Weihe entwickelt, aber mit Endkörpern an den Flügelenden. Leichte aerodynamische Vorwärtspfeilung, trotzdem die Flügeleintrittskante rechtwinklig zur Rumpfmittellinie verläuft.

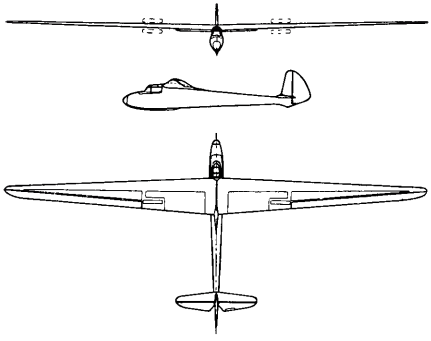
Flügel in normaler einholmiger Sperrholzkonstruktion, wobei der Hauptteil des Flügels mit Sperrholz beplankt ist. Der Flügel selbst liegt bedeutend tiefer am Rumpf als bei den früheren Kranich-Mustern; der Rumpf ist von diesen völlig verschieden, indem er aus geschweißtem Stahlrohr besteht und mit Stoff bespannt ist.

Kranich III

Le Kranich III n'a pratiquement plus rien de commun avec les Kranich d'avant la guerre. La conception fondamentale de la construction est bien toujours de Jacobs, mais le type a été complètement remanié par Focke-Wulf.

Les ailes proviennent de la Weihe, mais il y a des corps terminaux aux bouts d'aile. Légère flèche aérodynamique négative, quoique le bord d'attaque des ailes soit perpendiculaire à l'axe du fuselage.

Ailes de construction normale à un longeron, en contreplaqué; la partie principale de l'aile est revêtue de contreplaqué. L'aile elle-même est notablement plus bas par rapport au fuselage que sur les anciens types de Kranich, et le fuselage en diffère considérablement, en ce qu'il est en tubes d'acier soudés, avec entoilement.



Weihe 50

Freitragender Mitteldecker, Einsitzer in normaler Sperrholzkonstruktion. Der einholmige Flügel weist eine Spannweite von 18 m auf und kann leicht demontiert werden. Die große Spannweite der Querruder ergibt eine bedeutende Beweglichkeit um die Längsachse des Flugzeuges.

Bremsklappen mit Schemp-Hirth-System. Rumpf in Schalenbauweise mit geräumigem Pilotensitz und großem Gepäckraum. Plexiglashaube mit ausgezeichneter Sicht in allen Richtungen.

Normales Leitwerk mit fester Oberfläche, mit Sperrholz beplankt, und stoffbespannte Steuerflächen. Rumpf mit Federsporn und abwerfbarem Fahrgestell. Haken am Rumpfvorderende für Flugzeugschlepp, zusätzlicher Haken weiter hinten (Hirth-Typ) für Windenstart.

Weihe 50

The Weihe 50 is a cantilever mid-wing monoplane of normal plywood construction. The monospar wing has a span of 18 metres and can be easily dismantled. Ailerons having a large span result in high manœuvrability around the longitudinal axis of the aircraft.

Air brakes are of the Schemp-Hirth System. The fuselage in monocoque construction offers space for a roomy cabin and a large baggage compartment. The plexiglas hood makes excellent visibility in any direction possible.

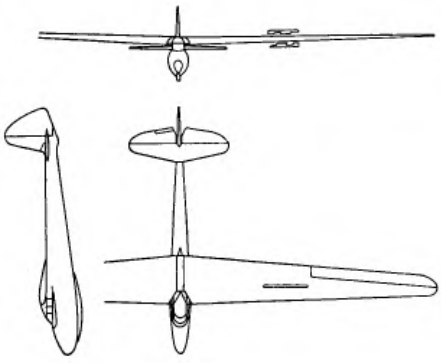
The normal tail unit has fixed surfaces covered with plywood and fabric-covered control surfaces. The fuselage is equipped with a sprung skid and droppable undercarriage. A nose hook has been provided for towing by aircraft, whilst a further aft hook of the Hirth type has been provided for towing with a winch.

Weihe 50

Planeur cantilever à ailes mi-surélevées, monoplace de construction normale en contreplaqué. L'aile à un longeron a 18 m d'envergure et peut être aisément démontée. La grande envergure des ailerons donne une mobilité notable autour de l'axe longitudinal du planeur.

Volets de freinage du système Schemp-Hirth. Fuselage en coque, avec poste de pilotage spacieux et grande soute à bagages. Habitacle en plexiglas avec vue parfaite de tous côtés.

Gouvernes normales dont les plans fixes sont recouverts de contreplaqué et les parties mobiles entoilées. Fuselage avec béquille à ressort et train de lancement largable. Crochet à l'avant du fuselage pour le remorquage, autre crochet plus en arrière (type Hirth) pour le start au treuil.



Olympia Meise 51

The Olympia Meise 51 is a single-seat mid-wing monoplane with a cantilever monospar wing.

The DFS air brakes render an efficient gliding angle control possible. The fuselage is carried out in monocoque construction and has an oval section. The normal tail unit has fixed surfaces covered with plywood and fabric-covered control surfaces. There is a small elevator trimming tab. The rudder-pedals are adjustable in flight.

A nose hook has been installed for towing by aircraft, whilst a hook at the centre of gravity has been installed for towing with a winch.

Olympia Meise 51

Einsitziger Mitteldecker mit einholmigem, freitragendem Flügel. DFS-Bremsklappen zur Erzielung einer guten Kontrolle des Gleitwinkels. Rumpf in Schalenbauweise mit ovalem Querschnitt. Normales Leitwerk mit fester Oberfläche, mit Sperrholz beplankt, und stoffbespannte Steuerflächen. Kleines Höhen-Trimmruder. Seitenruder im Flug verstellbar.

Haken am Rumpfvorderende für Flugzeugschlepp, zusätzlicher Haken im Schwerpunkt für Windenstart.

Olympia Meise 51

Monoplace cantilever à ailes mi-surélevées, à un longeron. Volets de freinage DFS permettant d'obtenir un bon contrôle de l'angle de plané. Fuselage en coque de section ovale. Gouvernes normales dont les plans fixes sont recouverts de contreplaqué et les parties mobiles entoilées. Petit volet horizontal de centrage. Le gouvernail de direction est réglable en vol.

Crochet à l'avant du fuselage pour le remorquage, autre crochet au centre de gravité pour le start au treuil.

Type designation	Kranich III	Weihe 50	Olympia Meise 51
Designer	Hans Jacobs		
Date of first flight of prototype	1950	1950	1951
Number produced	40	9	25
Wings			
Span ..... m	18.0	18.0	15.0
Area ..... m^2	21.06	18.34	15.0

Type designation		Kranich III	Weihe 50	Olympia Meise 51
Aspect ratio		15.6	17.7	1.5
Mean aerodynamic chord (m.a.c.)	m	1.16	1.02	1.00
Wing section, root		Gö 549	Gö 549	
Wing section, mid		Gö 549	Gö 549	
Wing section, tip		M 12	M 12	
Aero. twist root/tip	deg.	8	6.5	
Special features		trapezoid construction with "salmons"	trapezoid construction	trapezoid construction
Ailerons				
Type		slotted	slotted	slotted
Span	m	4.2	5.8	3.7
Area	m^2	1.54	1.9	1.1
Horizontal tail				
Span	m	3.5	3.5	2.9
Area of elevator and fixed tail	m^2	2.32	2.25	2.18
Area of elevator	m^2	0.96	1.24	0.90
Aerofoil section		Gö 409	Gö 409	sym.
Mass balance degree		—	—	—
Mass balance method			weight-balance	weight-balance
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.7	4.7	4.1
Elevator trimming method		trim tab	trim tab	trim tab
Vertical tail				
Area of fin and rudder	m^2	1.68	1.27	1.35
Area of rudder	m^2	1.38	0.88	0.78
Aspect ratio		0.95	1.05	1.35
Tail arm	m	5.0	5.0	4.5
Aerofoil section		sym.	Gö 409	sym.
Mass balance degree			—	—
Mass balance type		weight-balance	—	—
Aerodynamic balance		yes	—	—
Fuselage				
Max. width	m	0.60	0.58	0.58
Overall length	m	9.3	8.135	7.3
Max. cross section	m^2	0.54	0.50	0.48
Number seats and arrangement		2 tandem	1	1
Undercarriage type		droppable or fixed wheel	droppable wheel	droppable wheel
Wheel diameter	cm	40	40	40

Type designation		Kranich III		Weihe 50		Olympia-Meise 51	
Lift increasing devices							
Type		none		none		none	
Drag producing devices							
Type		DFS airbrakes		Schemp-Hirth airbrakes		DFS airbrakes	
General location		top and bottom of wing		top and bottom of wing		top and bottom of wing	
Span	m	2.42		1.76		1.80	
Area	m^2	0.45		0.42		0.34	
% of span		11.1		9.8		12	
Location, % of chord		30		30		50	
Is device intended to limit terminal velocity (vertical dive) to max. permissible IAS		yes		yes		yes	
Weights							
Wings	kg	180		126			
Fuselage	kg	135		90			
Tailplane and elevator	kg	11		11			
Instruments	kg	4		3			
Equipped weight	kg	330		230		165	
Max. load	kg	190		105		125	
Max. permissible flying weight	kg	520		335		290	
Wing loading	kg/m^2	24.6		18.25		17.0	
Design standards							
Airworthiness requirements to which aircraft has been built		Bauvorschriften für Segelflugzeuge (BVS)		Bauvorschriften für Segelflugzeuge (BVS)		Bauvorschriften für Segelflugzeuge (BVS)	
Date of issue of these requirements		August 1939		August 1939		August 1939	
Certificate of airworthiness		yes		yes		yes	
Design flight envelope Manoeuvre loads		V km/h	proof load factor				
Point A		126	4				
Point B		198	4				
Point C		222	0				
Point D		163	—2				

Type designation	Kranich III		Weihe 50		Olympia-Meise 51	
Factor of safety	2					
Gust loads	V km/h	v m/s				
Horizontal flight – up gusts	130	10				
Horizontal flight – down gusts	130	10				
Limiting flight conditions						
Placard airspeed ..... km/h						
Aero-towing speed ..... km/h	130		110		100	
Winch launching speed .. km/h	100		90		80	
Cloud flying permitted ..	yes		yes		no	
Permitted aerobatic manoeuvres	no		no		no	
Spinning permitted	yes		no		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	18.5% and 37.1%		28% and 42.6%		30% and 38%	
Straight flight performance						
at flying weight of ..... kg	520		335		290	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	77	0.75	60	0.58	60	0.67
V for max. L/D	90	0.80	70	0.67	70	0.78
	97	0.88				
	114	1.22				
	130	1.65				
Stalling speed ..... km/h	65		55		55	
Max. L/D	31		29		25	

Germany - Deutschland - Allemagne

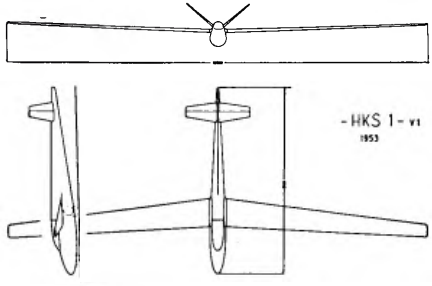
Manufacturer:
Entwicklungsgemeinschaft
Haase–Kensche–Schmetz
Herzogenrath, Merksteiner-Str. 27

Three HKS sailplanes have been built. The HKS 1/V1 was the first and deserves considerable comment. It epitomizes one of the main developmental directions taken since the War. Inspired by Raspet's work on the RJ-5 and by other recent developments, Kensche set out to develop a high-speed, high-penetration sailplane. He chose the very high wing loading of 35 kg/m² and, to retain a flat glide, made every effort to maintain laminar flow over most of the wing in the operational regime. In addition, he minimized the parasite drag. Apart from detailed refinements such as practised by Raspet, the HKS has a butterfly tail which reduces interference and wetted area, and has no ailerons or flaps or wing air brakes of the types normally used. The upper surface of the wing is entirely free from discontinuities and the only break in surface of the under-surface is at 70 % chord where the wing warping mechanism causes a slight slit to be formed. The detail of the clever wing warping mechanism has been described elsewhere. Warping supplies not only lateral control, but also changes in wing camber as a whole. The wing has 4° of sweep forward so that the aft pilot may be seated at the C. G. and still have a good view.

Es wurden 3 HKS-Flugzeuge gebaut. Der HKS 1/V1 kam als erster heraus und verdient besondere Aufmerksamkeit; er verkörpert einer der Hauptentwicklungsrichtungen seit dem Kriege. Kensche unternahm, inspiriert von Raspets Arbeit am RJ-5 und anderen Neuentwicklungen, die Konstruktion eines Segelflugzeuges für hohe Geschwindigkeit und Einflug. Er wählte die hohe Flächenbelastung von 35 kg/m², und zur Erzielung eines flachen Gleitwinkels suchte er die Laminarströmung über den größten Teil des Wirkungsbereichs des Flügels aufrechtzuerhalten. Außerdem verminderte er den schädlichen Widerstand. Neben Verbesserungen im einzelnen, wie sie auch von Raspet angewandt wurden, weist der HKS zur Verminderung von Störungen und Oberfläche ein Schmetterlingsleitwerk auf; dazu hat er keine Querruder, Klappen oder Luftbremsen an den Flügeln, wie sie gewöhnlich verwendet werden. Die Flügeloberfläche ist frei von Unterbrechungen, und die Unterfläche wird nur in 70 % Tiefe unterbrochen, wo der Flügelverwindungsmechanismus einen schmalen Schlitz bildet. Einzelheiten des ausgezeichneten Flügelverwindungsmechanismus wurden andernorts beschrieben. Die Flügelverwindung gewährleistet nicht nur seitliche Steuerung, sondern ändert die Flügelwölbung als solche. Der Flügel ist 4° nach vorn gepfeilt, so daß der hintere Pilot im Schwerpunkt sitzt und immer noch gute Sicht hat.

On a construit trois planeurs HKS.
Le HKS 1/V1 vint d'abord et mérite de retenir spécialement l'attention; il incarne l'une des principales directions de développement qui se soient manifestées depuis la guerre. Inspiré par le travail de Raspet sur le RJ-5 et d'autres développements nouveaux, Kensche entreprit de construire un planeur pour la haute vitesse et les vols d'expérimentation. Il choisit la grande charge alaire de 35 kg/m² et, pour avoir un angle de plané suffisamment plat, il s'efforcera de conserver l'écoulement laminaire sur la plus grande partie de l'aile. D'autre part il réduisit la résistance nuisible. Outre les petites améliorations, telles que celles que Raspet avait aussi employées, il donna au planeur des gouvernes en papillon pour réduire les perturbations et la superficie. D'autre part les ailes ne portent ni ailerons, ni volets, ni freins d'un type usuel. Rien n'interrompt la face supérieure de l'aile; quant à la face inférieure, elle n'est interrompue qu'à 70% de la profondeur de l'aile, où le mécanisme de gauchissement forme une étroite fente. Les détails de ce mécanisme excellemment conçu ont été décrits ailleurs. Le gauchissement des ailes n'assure pas seulement le

pilotage latéral; il change la courbure de l'aile elle-même. L'aile forme une flèche de 4° vers l'avant, de sorte que le pilote qui est derrière se trouve au centre de gravité tout en gardant une bonne visibilité.



HKS 1

Structure: The main part of the fuselage is based on stiff frames of plywood reinforced by foam plastic. The front portion is double-planked with 1 mm plywood to keep the shape properly. The wing is of single spar type, double box fir and plywood. Ribs ahead of the spar consist of two layers of plywood separated by foam plastic as in the fuselage frames. The skin ahead of the spar consists of a similar structure, the inner layer being 0.6 mm plywood, the foam plastic 6 mm thick and the outer layer varying from 1.5 mm to 1 mm plywood, giving a stable surface of great stiffness.

HKS 1

Aufbau: Der Hauptteil des Rumpfes beruht auf steifen Spanten aus Sperrholz, die mit Schaumplastik verstärkt sind. Vorderteil doppelt beplankt mit 1 mm Sperrholz zur Erzielung einer sauberen Oberfläche. Einholmiger Flügel mit zwei Kasten, Fichten- und Sperrholz. Rippen vor dem Holm aus zwei Lagen Sperrholz, getrennt durch Schaumplastik, wie in den Rumpfspanten. Beplankung vor dem Holm aus gleichem Material (innere Schicht 0,6 mm Sperrholz, 6 mm Schaumplastik, äußere Schicht 1,5 bis 1 mm Sperrholz, zur Erzielung einer stabilen Oberfläche mit großer Steigfähigkeit.)

HKS 1

Structure: la partie principale du fuselage est constituée par des parois rigides en contreplaqué, renforcées de plastic mousse. La partie antérieure a un double revêtement avec du contreplaqué de 1 mm, de façon que la superficie soit propre. Ailes à un longeron et deux caissons, bois de pin et de contreplaqué. Les nervures devant le longeron sont formées de deux couches de contreplaqué séparées par de la plastique mousse, disposition que nous avions déjà dans les cloisons du fuselage. Le revêtement devant le longeron est de la même matière: à l'intérieur 0,6 mm de contreplaqué; puis 6 mm de plastique mousse; couche externe: contreplaqué de 1,5 à 1 mm, pour obtenir une superficie stable et un ensemble bien rigide.

HKS 1/V2

The HKS 1/V2 (flown in 1954) is exactly the same as the HKS 1/V1 except that it has 3° less sweepforward. When the V1 was built, the centre of gravity was found to be too far aft, because the tail unit weighed more than estimated because of lack of experience with this type of tail and because excessive strength was built into it. This necessitated a ballast weight of 10 kg in the nose. The reduction of sweepforward in the V2 made this ballast no longer necessary.

HKS 1/V2

Der HKS 1/V2 (geflogen 1954) ist dieselbe Ausführung wie der HKS 1/V1, mit Ausnahme des um 3° weniger vorwärts ge-

pfeilten Flügels. Beim Bau des V/1 wurde festgestellt, daß der Schwerpunkt zu weit hinten lag, da das Leitwerk schwerer als erwartet war; es fehlte an Erfahrung mit solchen Konstruktionen, und man hatte es zu stark gebaut. Dies hatte ein Ballastgewicht von 10 kg in der Rumpfnase zur Folge. Durch die Reduktion der Vorwärtspfeilung beim V/2 war der Ballast nicht länger notwendig.

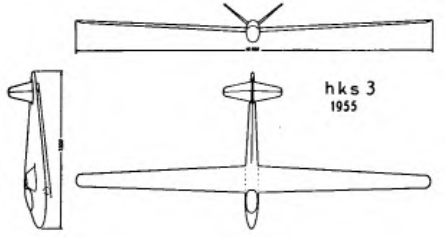
HKS 1/V 2

Le HKS 1/V 2 (qui vola pour la première fois en 1954) est fait comme le HKS 1/VI, sauf que la flèche de l'aile vers l'avant est de 3° de moins. En construisant le V/1 on avait constaté que le centre de gravité était trop en arrière, les gouvernes ayant présenté un poids supérieur à ce qui était prévu; on manquait d'expérience avec ces constructions et l'on avait construit trop massivement. D'où la nécessité d'un lest de 10 kg dans le nez du fuselage. En réduisant sur le V/2 la flèche vers l'avant, on rendait le lest inutile.

HKS 3

The HKS 3 is essentially a smaller single-seat version of the HKS 1 with a lower wing loading, but with approximately the same performance. Experience showed that although the high wing loading of the HKS 1 gave a high cruising speed and therefore inherently long range, it had faults as a contest machine. To keep in formation with other sailplanes in circling flight, it has to fly wider circles and in many thermals this is a grave disadvantage. The more normal wing loading of about 26 kg/m² was therefore chosen for the HKS 3. The weights given in the table show 30 kg of water ballast, but this may be increased to 50 kg if desired and the maximum weight increased to 400 kg. Being a single-seater, there is no reason for sweepforward.

Structure: The same as for the HKS 1, except for the following important points: The wing spar booms are of light alloy cemented to 0.4 mm plywood on both sides; the rest of the wing is of wood except for the ribs in the warping part of the wing which are of steel. The HKS 1 has its landing wheel aft of the c. g., but the HKS 3 has this wheel forward of the c. g. The braking parachute is in both cases 1.3 m in diameter and is of the Kostelezky type.



HKS 3

Es handelt sich im wesentlichen um eine kleinere, einsitzige Ausführung des HKS 1 mit kleinerer Flächenbelastung, aber annähernd gleicher Leistung. Die Erfahrung zeigte, daß trotz der hohen Flächenbelastung des HKS 1 mit entsprechend hoher Reisegeschwindigkeit und demzufolge großer Reichweite das Flugzeug im Wettkampf seine Schwächen zeigte. Um mit anderen Flugzeugen kreisen zu können, mußte es die Kurven weiter fliegen; dies führte in vielen Aufwindfeldern zu großen Unzulänglichkeiten. Für den HKS 3 wurde deshalb die normale Flächenbelastung von 26 kg/m² gewählt. Die Gewichte in der Tabelle geben 30 kg Wasserballast an; dieser kann aber bis zu 50 kg erhöht werden, das Höchstgewicht bis zu 400 kg. Da es sich um einen Einsitzer handelt, ist keine Vorwärtspfeilung nötig.

Der Aufbau des HKS 3 ist gleich wie beim HKS 1, mit Ausnahme folgender wichtiger Punkte: Die Flügelholmenden bestehen aus einer leichten Legierung, die auf beiden Seiten an 0,4 mm Sperrholz anzementiert wird, der übrige Flügel aus Holz, außer den Spanten im Verwindungsteil des Flügels, die aus Stahl hergestellt sind.

Während der HKS 1 das Rad hinter dem Schwerpunkt hat, ist dieses beim HKS 3 vor dem Schwerpunkt angebracht. Der Landefallschirm vom Typ Kostelezky hat in beiden Fällen 1,3 m Durchmesser.

HKS 3

Il s'agit pour l'essentiel d'une version plus petite, monoplace, du HKS 1, avec charge alaire plus réduite; mais les performances sont à peu près les mêmes. L'expérience avait montré que, malgré sa grande charge alaire et la grande vitesse de croisière, par conséquent le grand rayon d'action, qui en résultait, le planeur révélait des faiblesses dans les concours. Pour pouvoir tourner en cercle avec d'autres planeurs, il devait prendre les courbes avec un plus grand rayon. Cela conduisait dans beaucoup d'ascendances à de graves insuffisances. On est donc revenu, avec le HKS 3, à la charge alaire normale de 26 kg/m². Les poids indiqués dans le tableau font état de 30 kg d'eau comme lest, mais on peut aller jusqu'à 50 kg; poids en vol maximum: 400 kg. Pas de flèche vers l'avant, vu qu'il s'agit d'un monoplace.

La structure du HKS 3 est pareille à celle du HKS 1, sauf sur les points suivants, d'ailleurs importants: les extrémités des longerons d'aile sont en alliage léger cimenté de part et d'autre sur du contreplaqué de 0,4 mm. Le reste de l'aile est en bois, sauf les parois de la partie où il y a les ailerons; celles-ci sont en acier.

Pendant que la roue, chez le HKS 1, se trouve derrière le centre de gravité, celle du HKS 3 est située avant le centre de gravité. Le parachute d'atterrissage, du type Kostelezky, a chez les deux types un diamètre de 1,3 m.

Type designation		HKS 1/V1	HKS 3
Designer(s)		Entwicklungsgemeinschaft Haase-Kensche-Schmetz	
Date of first flight of prototype		July 1953	June 1955
Number produced		1	1
Wings			
Span	m	19	17.2
Area	m²	17.79	14.8
Aspect ratio		20.3	20.0
Wing root chord	m	1.3	1.234
Wing tip chord	m	0.58	0.522
Mean aerodynamic chord (m.a.c.)	m	0.99	0.922
Wing section, root		$65_{215}714$	$65_{215}11^{16}$
Wing section, mid			
Wing section, tip			
Dihedral	deg.	1.5	2.8
¼ chord sweep	deg.	—4	+1
Aero. twist root/tip	deg.	0	0
Length of each section of wing	m	9.5	8.6

Type designation		HKS 1/V1	HKS 3
Ailerons			
Type		Camber change of aft part of wing without a slit on the upper surface	
Span	m	7.9	7.05
Area	m^2	2.34	1.81
Mean chord	m	0.28	0.26
Max. deflection up	deg.	13.5	12
Max. deflection down	deg.	7	7
Mass balance degree		none	none
Mass balance method		none	none
Horizontal tail			
Span (projected)	m	2,9	2.52
Area of elevator and fixed tail (projected)	m^2	1.97	1.66
Area of elevator (projected)	m^2	0.88	0.73
Max. deflection up	deg.	16	22
Max. deflection down	deg.	16	22
Aerofoil section		symm. 14%	symm. 14%
Mass balance degree		30%	55%
Mass balance method		weight in control horn	external bob weight
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.88	4.09
Elevator aerodynamic balance method		none	none
Elevator trimming method		spring	spring
Horizontal tail volume coefficient $\frac{F_H \cdot l_H}{F \cdot t_m}$	=	0.54	0.76
Vertical tail			
Area of fin and rudder	m^2	1.65	1.39
Area of rudder	m^2	0.73	0.62
Aspect ratio		1:3.6	1:3.24
Tail arm	m	4.88	4.09
Max. deflection	deg.	17	26
Aerofoil section		symm. 14%	symm. 14%
Mass balance degree		30%	55%
Mass balance type		weight in control horn	external bob weight
Aerodynamic balance		none	none
Special features		none	none
Fuselage			
Max. width	m	0.74	0.62
Overall length	m	8.25	7.16
Max. cross section	m^2	0.64	0.48
Wetted surface area	m^2	14.2	11.47
Number seats and arrangement		2 tandem	1

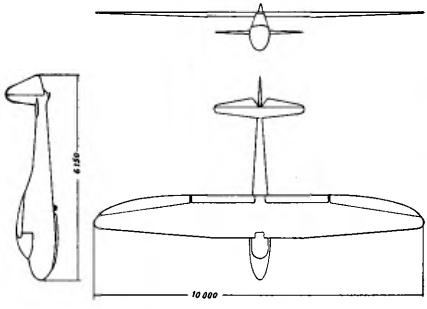
Type designation		HKS 1/V1	HKS 3
Undercarriage type		Retractable nose skid Low pressure wheel with 2 shock struts behind c of g	Tail skid Low pressure wheel with 2 shock struts ahead of c of g
Wheel diameter	cm	39	28.5
Lift increasing devices			
Type		Flexible wing camber	Flexible wing camber
Span	m	2 × 9.0	2 × 7.42
Area	m^2	2 × 2.58	2 × 2.00
Mean chord	m	0.28	0.26
Max. deflection up	deg.	~ 7	~ 7
Max. deflection down	deg.	~12	~12
Drag producing devices			
Type		Tail parachute	Tail parachute
General location		End of fuselage	End of fuselage
Area	m^2	1.31	1.13
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no		yes	yes
Weights			
Wings	kg	270	145
Fuselage[1]	kg	170	112
Equipped weight	kg	440	257
Removable ballast	kg	—	~30 (water)
Max. load	kg	180	83
Max. permissible flying weight	kg	620	380
[1] Complete with rudders, elevators and fins; including instruments and equipment.			
Wing loading	kg/m^2	solo 29, 2-seat 35	25,7
Design standards			
Airworthiness requirements to which aircraft has been built		BVS	BVS
Date of issue of these requirements		1939	1939
Certificate of airworthiness yes/no		yes	yes

Design flight envelope *Manoeuvre loads*		V km/h Forward speed	Proof load factor (½ ultimate)	V km/h Forward speed	Proof load factor (½ ultimate)
Point A	2-seat	130	4.2	125	4.2
	Solo	139	5.2		
Point B	2-seat	261	4.2	214	4.2
	Solo	261	5.2		
Point C	2-seat	261	—2.2	214	— 2.2
	Solo	261	—3.2		
Point D	2-seat	185	—2.2	163	— 2.2
	Solo	215	—3.2		

Type designation	HKS 1/V1		HKS 3	
Gust loads	V km/h	m/s	V km/h	m/s
Point A 2-seat	130	15.1	125	12.5
Point A ..... Solo	139	16.1		
Point B 2-seat	261	7.5	214	6.8
Point B ..... Solo	261	8.6		
Point C 2-seat	261	— 7.5	214	— 6.8
Point C ..... Solo	261	— 8.6		
Point D 2-seat	185	—10.0	163	— 8.8
Point D ..... Solo	215	—10.4		
Limiting flight conditions				
Placard airspeed smooth conditions ..... km/h	230		200	
Placard airspeed gusty conditions ..... km/h	150		140	
Aero-towing speed ..... km/h	150		140	
Winch launching speed .. km/h	80		105	
Cloud flying permitted yes/no	yes		yes	
Permitted aerobatic manoeuvres	Not normally permitted in Germany			
Spinning permitted yes/no	yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	30 to 36% t_m		35 to 40% t_m	
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) ..... km/h	230		200	
Straight flight performance at flying weight of ..... kg	2-seat 600 kg Solo 500 kg		380	
No flap or brake	V km/h	v m/s	V km/h	v m/s
V for min. sink 2-seat	77	0.61		
V for min. sink ..... Solo	72	0.56	66.5	0.53
V for max. L/D 2-seat	89	0.66		
V for max. L/D ..... Solo	80	0.60	77	0.57
1.5 × V stall 2-seat	97.5	0.74		
1.75 × V stall 2-seat	114	0.98		
2.00 × V stall 2-seat	130	1.37		
Stalling speed ..... km/h	2-seat 65			
	solo 60		56	
Max. L/D	37.2		37.2	

Germany - Deutschland - Allemagne

Manufacturer:
Wolf Hirth GmbH, Nabern-Teck, Wurttemberg, Germany



Lo-100

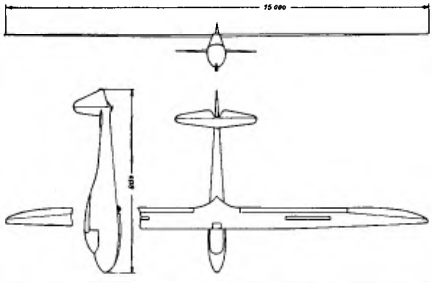
The Lo-100 is designed for aerobatic flight. The 10 meter wing is in one section, of single-spar construction and plywood covered. It has a wooden monocoque fuselage and cantilever tail.

Lo-100

Konstruiert für Kunstflug. Einteiliger Flügel von 10 m, einholmige Konstruktion, mit Sperrholz beplankt. Rumpf in Schalenbauweise aus Holz; freitragendes Leitwerk

Lo-100

Construit pour le vol d'acrobatie. Aile de 10 m en une seule partie, à longeron unique, avec revêtement en contre-plaqué. Fuselage monocoque en bois et empennage cantilever.



Lo-150

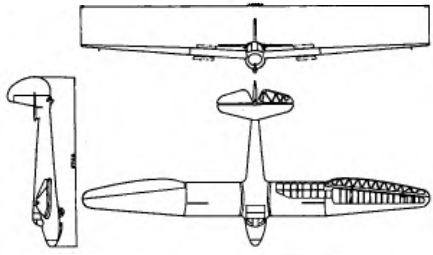
The Lo-150 is similar to the Lo-100 but has a 15 m span in two sections and is designed for high performance. The international 300 km triangular speed record was established in the machine. It is cf wooden construction.

Lo-150

Ähnlich wie der Lo-100, aber zweiteiliger Flügel mit 15 m Spannweite, und für Hochleistungsflüge konstruiert. Mit diesem Flugzeug wurde der internationale Geschwindigkeitsrekord über die 300-km-Dreieckstrecke aufgestellt. Holzkonstruktion.

Lo-150

Le Lo-150 ressemble au Lo-100, mais se distingue de celui-ci par l'envergure de 15 m. Aile en deux parties. Il est construit pour les vols de performance. Avec ce planeur a été établi le record international de vitesse en vol triangulaire sur 300 km. Construction en bois.



Goevier

The Goevier is a side-by-side training sailplane of wooden construction.

Goevier

Schulungs-Segelflugzeug in Holzkonstruktion, mit Sitzanordnung nebeneinander.

Goevier

Planeur d'entraînement, construit en bois, avec des sièges côte à côte.

Type designation	Lo-100	Lo-150	Goevier
Designers	Alfred Vogt	Alfred Vogt	Wolf Hirth Wolfgang Hütter
Date of 1st flight	1952	1954	1938
Number produced	30 approx.	15 approx.	125 approx.
Wings			
Span ..... m	10.00	15.00	14.73
Area ..... m^2	10.90	10.90	19.00
Aspect ratio	9.2	20.6	11.5
Wing root chord ..... m	1.3	0.86	1.45
Wing tip chord ..... m	0.49	0.20	0.60
Mean aerodynamic chord (m. a. c.) ..... m	1.09	0.73	1.28
Wing section, root	Clark Y	Clark Y	Joukowsky
Wing section, tip	Clark Y	Clark Y	Joukowsky

Type designation		Lo-100	Lo-150	Goevier
Dihedral	deg.	0	0	4.5
¼ chord sweep	deg.	0	0	0
Aero. twist root/tip	deg.	3.0	3.0	3.5
Length of each section		1 section		
of wing	m	10.00	7.5	7.0
Special features		Elliptic plan form	Elliptic plan form	
Ailerons				
Type		normal unslotted	normal unslotted	slotted
Span	m	2.81	3.17	4.5
Area	m^2	1.36	1.84	3.1
Mean chord	m	0.24	0.19	
Max. deflection up	deg.	30	30	45
Max. deflection down	deg.	20	20	20
Horizontal tail				
Span	m	2.70	2.70	3.20
Area of elevator and				
fixed tail	m^2	1.50	1.50	2.50
Area of elevator	m^2	0.49	0.49	1,10
Max. deflection up	deg.	22	22	22
Max. deflection down	deg.	22	22	16
Aerofoil section		Gö. mod.	Gö. mod.	symmetrical
Tail arm (from ¼ chord				
m. a. c. wing to				
¼ chord m. a. c. tail)	m	3.14	3.27	
Elevator trimming method		spring on stick	spring on stick	none
Vertical tail				
Area of fin and rudder	m^2	0.57	0.57	1.70
Area of rudder	m^2	0.39	0.39	1.05
Aspect ratio		0.66	0.66	
Tail arm	m	3.59	3.62	
Max. deflection	deg.	29	29	
Aerofoil section		Gö. mod.	Gö. mod.	symmetrical
Fuselage				
Max. width	m	0.63	0.63	0.85
Overall length	m	6.15	6.15	6,24
Max. cross section	m^2	0.42	0.42	1.10
Number seats and				
arrangement		1	1	2 side by side
Undercarriage type		fixed wheel and skid	fixed wheel and skid	fixed wheel and skid
Wheel diameter		28	28	38
Lift increasing devices				
Type		Trailing edge flaps and droopable ailerons	Trailing edge flaps	none

Type designation		Lo-100	Lo-150	Goevier
Span	m	1.95	3.58	
Area	m²	0.82	1.22	
Mean chord		0.21	0.18	
Max. deflection up	deg.	8	8	
Max. deflection down	deg.	55	55	
Drag producing devices				
Type		none	spoilers	wing airbrakes
General location		—	top of wing	top and bottom of wing
Span	m	—	1.20	0.72
Area	m²	—	0.19	0.16
% of span		—	16	11
Location, % of chord		—	41	
Weights				
Wings[1]	kg	76	121	120
Fuselage[2]	kg	67	67	112
Tailplane and elevator	kg	7	7	10
Empty weight[3]	kg	150	195	242
Instruments	kg			3
Equipment	kg	5	5	
Equipped weight	kg	155	200	245
Max. load	kg	90[4] 110[5]	110	165
Max. permissible flying weight	kg	245[4] 265[5]	310	410
Wing loading (max.)	kg/m²	22.5 24.3	28.4	21.6
Design standards				
Airworthiness requirements to which aircraft has been built		Bauvorschriften für Segelflugzeuge		
Date of issue of these requirements		October 1952		
Category of certification		full aerobatics and normal flight	normal	normal
Design flight envelope *Manœuvre loads*		V km/h / n	V km/h / n	V km/h / n
Point A		(6)	(7)	(7)
Point B				
Point C				
Point D				
Limiting flight conditions				
Placard airspeed smooth conditions	km/h	290 190	200	175
Placard airspeed gusty conditions	km/h	225 150	150	110

Type designation	Lo-100		Lo-150		Goevier	
Aero-towing speed ..... km/h	225	150	150		110	
Winch launching speed .. km/h	140	125	100		80	
Cloud flying permitted ..	yes		yes		no	
Permitted aerobatic manœuvers	all		none		none	
Spinning permitted	yes		yes		no	
Foremost and aftmost c. g. positions for which compliance with regulations has been shown or is intended in % m. a. c. ..	23% and 34%		22% and 31,6%		38,2% and 43%	
Straight flight performance at flying weight of ..... kg	265		310		410	
	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
No flap or brake						
V for min. sink	72	0.80	86	0.68	60	0.90
V for max. L/D	85	0.94	105	0.86	70	0.97
Max. L/D	25		34		20	

[1] with struts, controls, flaps and brakes
[2] complete with rudder and fin, less instruments and equipment
[3] to include any fixed ballast
[4] for aerobatic flight
[5] for normal flight
[6] according to BVS stress classification 3
[7] according to BVS stress classification 2

Manufacturer: Wolf Hirth GmbH

Kria

The Kria is a fibreglass sailplane that was still under construction in April 1958. It has a 35° butterfly tail.

Kria

Flugzeug aus Fiberglas, im April 1958 noch im Bau. 35° Schmetterlingsleitwerk.

Kria

Planeur en fibre de verre, encore en construction en avril 1958. Empennage papillon à 35°.

Wings: span 11.9 m; area 9.88 m²; aspect ratio 14.33; m. a. c. 0.83 m; wing section STE 961—516

Ailerons: span 1.7 m; max. deflection up and down 30°

V tail: total area 1.9 m²; tail arm 4.4 m

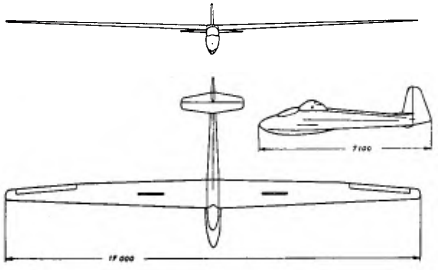
Fuselage: length 6.85 m; width 0.55 m; max. cross section 0.37 m²; wetted surface area 7.5 m²

Airbrakes (bottom of wing): span 2.05 m; 20 % of chord

Deutschland - Germany - Allemagne

Manufacturer:
Scheibe-Flugzeugbau-GmbH
August-Pfaltz-Strasse 29
Dachau bei München

Designer:
Dipl.-Ing. Egon Scheibe



Zugvogel III

A single seat high performance competition sailplane developed from earlier Zugvogel models. Span has been increased slightly and the camber changing flaps tried on earlier models have been eliminated. Laminar flow wing sections have been used and attention paid to fuselage and canopy shape and to wing finish to get high performance.

Fuselage construction is of welded steel tubes, faired by wooden stringers and covered with fabric. The nose is covered by a moulded plywood shell; cockpit cover is of blown plexiglass. Wings have a single box spar located unusually far back on the wing to give increased area of laminar flow. Closely spaced nose ribs and thick diagonal ply has resulted in a smooth and accurate surface without resort to fillers. Ailerons are ply covered and attached by piano hinges. Wings are attached by one vertical central bolt with nose pins to take drag and torsion. Elevators, ailerons and airbrakes are push rod operated; rudder by cables. Ball bearings are used in the systems. Nose and belly hooks are provided.

Hanna Reitsch won the German National contests in a Zugvogel in 1955 and came 8th in the single seater class at the World Championships in 1956 in France.

Zugvogel III

Einsitziges Hochleistungs-Segelflugzeug für Wettkämpfe, entwickelt aus früheren Zugvogel-Modellen. Die Spannweite wurde leicht erhöht, die bei den ersten Modellen versuchten Wölbungsklappen weggelassen. Der Zugvogel weist ein Laminarprofil auf; zur Erzielung guter Leistungen wurde der Form von Rumpf und Kabine sowie der Lackierung der Flügel besondere Aufmerksamkeit geschenkt.

Der Rumpf besteht aus einem Stahlrohrgerüst, verkleidet mit Holzholmen und überzogen mit einer Stoffbespannung. Der Rumpfvorderteil ist mit einer Sperrholzschale verkleidet, die Kabine mit einer geblasenen Plexiglashaube gedeckt. Flügel mit auffallend weit hinten liegendem Kastenholm zur Verbesserung des Laminarprofils. Der enge Abstand der Nasenrippen und die Dicke der diagonalen Sperrholzteile ergeben eine glatte, einwandfreie Oberfläche. Querruder mit Sperrholz beplankt und mit Gelenken befestigt. Flügel mit dem Rumpf durch je ein Auge und feste Bolzen verbunden und durch einen Hauptbolzen miteinander gekuppelt, zur Sicherung gegen den Einfluß von Luftwiderstand und Verdrehung. Höhenruder, Querruder und Bremsklappen werden durch Stoßstangen betätigt, Seitenruder durch Kabel. In diesen Anlagen werden Kugellager verwendet. Eingerichtet für Flugzeugschlepp und Schwerpunktschlepp an der Winde.

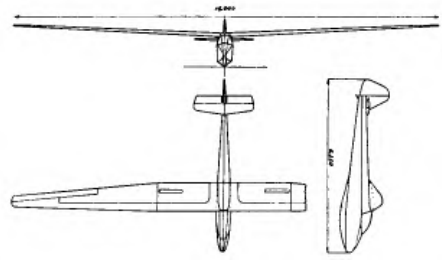
Hanna Reitsch gewann mit einem Zugvogel die deutsche Meisterschaft 1955 und belegte an der Weltmeisterschaft 1956 in Frankreich den achten Rang der Einsitzerklasse.

Zugvogel III

Monoplace de haute performance pour concours, développé à partir des types précédents de la série Zugvogel. L'envergure a été un peu augmentée, et les volets de courbure des types précédents ont disparu. Le profil est laminaire; la forme du fuselage et de la cabine ainsi que le vernissage des ailes ont bénéficié d'une attention particulière en vue d'obtenir de bonnes performances.

Le fuselage se compose d'une carcasse en tubes d'acier, carénée avec des longerons de bois et entoilée. L'avant du fuselage est caréné avec une coque en contreplaqué; la cabine est couverte d'un capot soufflé en plexiglas. Les ailes frappent par leur longeron en caisson placé très en arrière, en vue d'améliorer le profil laminaire. Le faible écartement des nervures arêtières et l'épaisseur des diagonales en contre-plaqué donnent une superficie lisse et irréprochable. Les ailerons sont revêtus de contreplaqué et montés sur charnières. Les ailes sont rattachées au fuselage chacune par un œillet et des boulons fixes, et elles sont rattachées l'une à l'autre par un boulon principal, de façon à être garanties contre l'influence de la résistance de l'air et des torsions. Le gouvernail de profondeur, les ailerons et les volets de freinage sont mus à l'aide de tringles, le gouvernail de direction est actionné par des câbles. Il est fait usage de paliers à billes. Le planeur est installé pour être remorqué aussi bien par avion que par treuil agissant à son centre de gravité.

Hanna Reitsch a gagné le championnat allemand 1955 sur un Zugvogel. En 1956, aux championnats mondiaux, en France, elle obtint sur le même appareil le huitième rang de la classe des monoplaces.



L-Spatz-55

The single seater L-Spatz-55 has been developed from the L-Spatz; performance and handling have been improved by raising the wing. Relatively cheap and simple construction and operation has been combined with good flight performance and handling, making the sailpane suitable for group operation by advanced pilots. Many Gold "C" flights have been made on the type.

Fuselage is of welded steel tube, with wooden stringers, fabric covered. Wings are single box spar cantilever type, ply and fabric covered. Elevator, ailerons and airbrakes are operated by push rods, rudder by cables. Nose and belly hooks are provided.

L-Spatz-55

Der Einsitzer L-Spatz-55 wurde aus dem L-Spatz entwickelt; Leistung und fliegerische Eigenschaften wurden durch Hebung des Flügels verbessert. Relativ billig und einfach in Konstruktion und Unterhalt, zusammen mit guten Flugleistungen und Steuereigenschaften, ist der L-Spatz-55 für fortgeschrittene Piloten im Gruppenbetrieb geeignet. Auf diesem Typ wurden viele Gold-C-Leistungen erflogen.

Rumpf mit Stahlrohrgerüst, Holzholmen und Stoffbespannung. Flügel mit Kastenholm, freitragend, Sperrholz und Stoffbespannung. Höhenruder, Querruder und Bremsklappen werden durch Stoßstangen betätigt, Seitenruder durch Kabel. Eingerichtet für Flugzeugschlepp und Schwerpunktschlepp an der Winde.

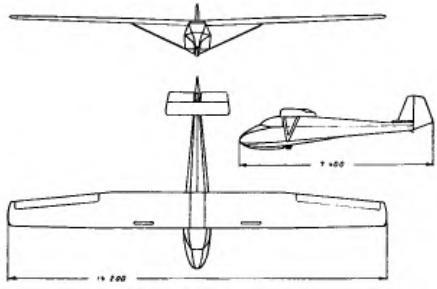
L-Spatz-55

Le monoplace L-Spatz-55 provient du L-Spatz. Les performances et les qualités de vol ont été améliorées en relevant les ailes. Relativement peu coûteux, simple à construire et à entretenir. Ceci, joint à de bonnes performances de vol et de bonnes qualités de pilotage, fait du L-Spatz-55 un bon planeur pour pilotes avancés travaillant en groupe. Beaucoup d'insignes d'or C ont été acquis sur ce planeur.

Fuselage à carcasse en tubes d'acier, longerons de bois et entoilage. Aile cantilever avec longeron-caisson, contre-plaqué et entoilage. Gouvernail de profondeur, ailerons et volets de freinage actionnés par des tringles, gouvernail de direction par des câbles. Remorquable par avion, ou par treuil à son centre de gravité.

Sperber

The Sperber is a side-by-side two seater developed from the earlier Specht. Fuselage construction is of welded steel tubes faired by wooden stringers and covered with fabric. Structure is quadrilateral in section at the front and triangular at the back. Wings are of two spar type, plywood covered to the rear spar on the upper surface and the front spar on the bottom surface. Sperber and Specht wings are nearly identical. Wing V struts are of streamline section steel tube. Control system is partly run in ball bearings; ailerons and elevator are operated by push rods, rudder and spoilers by cables. Fuselage and wings are assembled by four bolts; the V-struts are detached only at the fuselage and remain on the wings during transport. Nose and belly hooks are fitted.



Sperber

Zweisitzer mit Sitzanordnung nebeneinander, entwickelt aus dem früheren Specht. Rumpf mit Stahlrohrgerüst, verkleidet mit Holzholmen und überzogen mit Stoffbespannung. Konstruktion im Querschnitt vorn viereckig, hinten dreieckig. Flügel zweiholmig, sperrholzbeplankt auf der Oberseite bis zum hinteren Holm, auf der Unterseite bis zum vorderen Holm. Die Flügel von Sperber und Specht sind nahezu gleich. V-Flügel-Streben aus Stahlrohr mit Stromlinienquerschnitt. Steuerung teilweise über Kugellager; Querruder und Höhenruder durch Stoßstangen betätigt, Seitenruder und Störklappen durch Kabel. Rumpf und Flügel sind durch vier Bolzen verbunden; die V-Flügel-Streben werden nur am Rumpf gelöst und bleiben für den Transport an den Flügeln. Eingerichtet für Flugzeugschlepp und Schwerpunktschlepp an der Winde.

Sperber

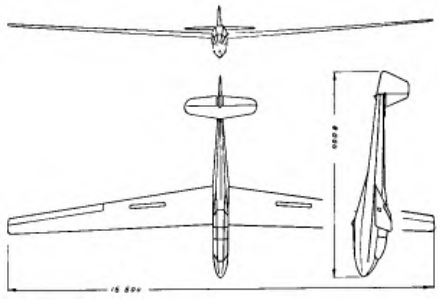
Biplace à sièges l'un à côté de l'autre, développé à partir du Specht. Fuselage à carcasse de tubes d'acier, caréné avec lon-

gerons de bois et entoilé. La section de cette construction est quadrangulaire en avant, triangulaire en arrière. Aile à deux longerons, avec contre-plaqué à la face supérieure jusqu'au longeron avant. Les ailes du Sperber et du Specht sont presque identiques. Les mâts de cellule en V sont en tubes d'acier de profil aérodynamique. Les commandes passent en partie sur des paliers à billes; les ailerons et le gouvernail de profondeur sont commandés par des tringles, le gouvernail de direction et les volets d'extrados, par des câbles. Le fuselage et les ailes sont réunis par quatre boulons; les mâts de cellule en V ne se détachent que du côté du fuselage; pour le transport, ils restent réunis aux ailes. Ce planeur est prévu pour le remorquage par avion, ou par treuil à son centre de gravité.

Bergfalke II/55

This is a quantity produced tandem two seater developed from the Mü 13 E-Bergfalke and its improved version Bergfalke II produced in 1953. Good performance, robust, simple construction, ease of assembly, make the sailpane suitable for club or group use.

Fuselage is of welded steel tube, with wooden stringers, fabric covered. Wings are of single box spar cantilever construction, ply and fabric covered; ailerons are of steel tube, fabric covered. Elevator, ailerons and airbrakes are push rod operated, rudder by cables. Nose and belly hooks are provided. Helical steel spring wheel suspension.



Bergfalke II/55

In Serie gebauter Zweisitzer mit Tandemanordnung, entwickelt aus dem Mü 13 E-Bergfalke und dessen verbesserter Version Bergfalke II, gebaut im Jahre 1953. Gute Leistungen, stark, einfache Konstruktion, leicht bereitzustellen, geeignet für den Klub- und Gruppenbetrieb.

Rumpf mit Stahlrohrgerüst, Holzholmen und Stoffbespannung. Flügel mit einem Kastenholm, freitragend, sperrholzbeplankt und stoffbespannt; Querruder aus Stahlrohr, stoffbespannt. Höhenruder, Querruder und Bremsklappen durch Stoßstangen betätigt, Seitenruder durch Kabel. Eingerichtet für Flugzeugschlepp und Schwerpunktschlepp an der Winde. Spiralstahlfeder-Radaufhängung.

Bergfalke II/55

Biplace construit en série avec disposition en tandem, développé à partir du Mü 13 E-Bergfalke et de sa version améliorée Bergfalke II, de 1953. Bonnes performances, solide, construction simple, facile à mettre en ordre de vol, propre au travail de club et en groupe.

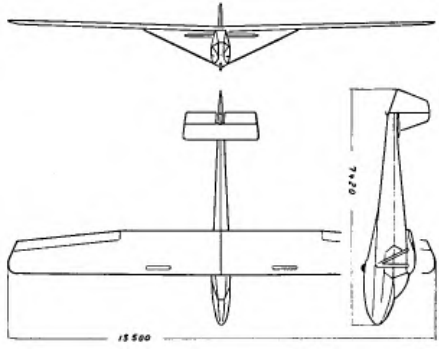
Fuselage avec carcasse en tubes d'acier, longerons de bois et entoilage. Aile avec un longeron en caisson, cantilever, revêtue de contre-plaqué, entoilée; ailerons en tubes d'acier, entoilés. Gouvernail de profondeur, ailerons et volets de freinage mus par des tringles, gouvernail de direction par des câbles. Propre au remorquage par avion, ou par treuil à son centre de gravité. Suspension des roues sur ressort spiral d'acier.

Specht

This is a tandem two seater utility sailplane of medium performance with a high-wing strut-braced layout. Fuselage is of welded steel tube with wooden stringers, fabric covered. Wing is of two spar construction, braced by V struts of streamline steel tube. The nose is ply covered back to the rear spar on the upper surface and to the front spar on the lower surface. Control system is cable operated throughout, except for the aileron run in the rear cockpit. Nose and belly hooks are fitted.

Specht

Zweisitzer mit Tandemanordnung, Segelflugzeug mittlerer Leistung für allgemeinen Gebrauch. Hochdecker mit verstrebtem Flügel. Rumpf mit Stahlrohrgerüst, Holzholmen und Stoffbespannung. Flügel zweiholmig, gestützt durch V-Streben aus Stahlrohr mit Stromlinienquerschnitt. Flügelnase sperrholzbeplankt auf der Oberseite bis zum hinteren Holm, auf der Unterseite bis zum vorderen Holm. Steuerung durchwegs mit Kabeln, außer für die Betätigung der Querruder beim hinteren Sitz. Eingerichtet für Flugzeugschlepp und Schwerpunktschlepp an der Winde.



Specht

Biplace en tandem, planeur de moyenne performance et d'usage général. Aile haute haubanée. Fuselage à carcasse de tubes d'acier, longerons de bois et entoilage. Aile à deux longerons, soutenue par des mâts en V, en tubes d'acier de profil aérodynamique. Le nez de l'aile est recouvert de contre-plaqué à la face supérieure jusqu'au longeron arrière, à la face inférieure jusqu'au longeron avant. Les gouvernes fonctionnent par câble, sauf pour les ailerons s'ils sont commandés du siège arrière. Remorquable par avion, ou par treuil à son centre de gravité.

Type designation	Zugvogel III	L-Spatz-55	Sperber	Bergfalke II/55	Specht
Date of prototype construction	1954	1952	1956	1951	1953
Number produced.....	12	200	5	280	55

Type designation		Zugvogel III	L-Spatz-55	Sperber	Bergfalke II/55	Specht
Wings						
Span	m	17.00	15.00	14.20	16.60	13.50
Area	m^2	14.48	11.70	17.40	17.70	16.60
Aspect ratio		20.0	19.0	11.6	15.6	11.0
Wing root chord	m	1.20	0.99	1.35	1.51	1.35
Wing tip chord	m	0.40	0.36	0.94	0.65	1.00
Taper ratio		3.0	2.75	1.5	2.3	1.35
Wing section, root		63_2 616	Mü-Profil 14%	Mü-Profil 14%	Mü-Profil 14.5%	Mü-Profil 14%
Wing section, mid		63_2 615	Mü-Profil 14%	Mü-Profil 14%	Mü-Profil 14.5%	Mü-Profil 14%
Wing section, tip		63_2 614 mod.	Mü-Profil 14%	Mü-Profil 14%	Mü-Profil 14.5%	Mü-Profil 14%
Dihedral	deg.	2.5	2.5	2.0	3.5	2.0
¼ chord sweep	deg.	0	0	0	–4	0
Aero. twist root/tip	deg.	0	0	0	0	0
Length of each section of wing (disassembled)	m	8.56	7.55	7.12	8.35	6.75
Ailerons						
Type		Inset hinge	Inset hinge	Inset hinge	Frise	Inset hinge
Span	m	2.50	3.06	3.20	3.80	3.45
Area	m^2	1.17	1.35	1.92	0.98	1.90
Mean chord ratio		0.36	0.46	0.25	0.32	0.25
Max. deflection up	deg.	28	29	26	28	26
Max. deflection down	deg.	9°30′	7°45′	9°15′	8°40′	8°20′
Horizontal tail						
Span	m	2.60	2.40	2.40	2.80	2.40
Area of elevator and fixed tail	m^2	1.81	1.34	1.94	2.00	1.94
Area of elevator	m^2	0.83	0.69	0.96	1.00	0.96
Max. deflection up	deg.	20°	19°30′	19°15′	23°	21°30′
Max. deflection down	deg.	20°	23°30′	19°15′	23°	21°30′
Aerofoil section		63_1012	Symmetrical	Symmetrical	Symmetrical	Symmetrical
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.76	3.36	3.88	4.115	3.91
Elevator trimming method		tab	–	tab	spring at stick	–
Horizontal tail volume coefficient		0.56	0.385	0.346	0.43	0.365
Vertical tail						
Area of fin and rudder	m^2	1.36	0.84	1.03	1.15	1.03
Area of rudder	m^2	0.83	0.54	0.75	0.90	0.75
Aspect ratio		1.85	1.5	1.65	1.4	1.65
Tail arm	m	4.195	3.88	4.61	4.865	4.56

Type designation		Zugvogel III	L-Spatz-55	Sperber	Bergfalke II/55	Specht
Max. deflection	deg.	29° 40′	39°	32°	29°	32°
Aerofoil section		63_1012	Symmetrical	Symmetrical	Symmetrical	Symmetrical
Fuselage						
Max. width	m	0.60	0.58	1.03	0.60	0.60
Overall length	m	7.10	6.25	7.40	8.00	7.42
Max. cross section	m^2	0.51	0.52	0.95	0.67	0.68
Number seats and arrangement		1	1	2 side-by-side	2 tandem	2 tandem
Undercarriage type		skid, droppable wheels	skid, wheel optional	skid and fixed wheel	skid and fixed wheel	skid and fixed wheel
Wheel diameter	cm	30.	26.	31.	31.	31.
Special features						Rear seat accessible through door under wing
Lift increasing devices						
Type		none	none	none	none	none
Drag producing devices						
Type		Schempp-Hirth airbrakes	DFS airbrakes	spoilers	DFS airbrakes	spoilers
Span	m	1.10	0.99	0.79	1.40	0.79
Area	m^2	0.43	0.40	0.11	0.57	0.11
Percentage of span		13	13	11	17	12
Location, percentage of chord		50	50	11	50	11
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.		yes	yes	no	yes	no
Weights						
Wings[1]	kg	154	94	128	148	123
Fuselage[2]	kg	83	53	82	90	75
Tailplane and elevator	kg	6	6	8	8	8
Empty weight[3]	kg	243	153	218	246	206
Instruments	kg	2	2	2	4	4
Other equipment	kg	–	–	–	–	–
Equipped weight	kg	245	155	220	250	210
Removable ballast	kg	–	–	6	–	–
Max. load	kg	120	110	180	190	180
Max. permissible flying weight	kg	365	265	400	440	390
Wing loading (max.)	kg/m^2	25.2	22.6	23.0	24.8	23.5

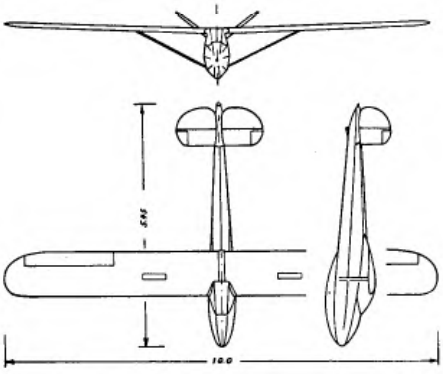
Design standards
Airworthiness requirements to which aircraft has been built: Deutsche Bauvorschriften für Segelflugzeuge
Date and issue number: Ausgabe 1939, Nachdruck 1951
Category of certification: Beanspruchungsgruppe 2

Type designation	Zugvogel III		L-Spatz-55		Sperber		Bergfalke II/55		Specht	
Design flight envelope Manœuvre loads	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n
Point A	122	4	113	4	144	4	113	4	118	4
Point B	229	4	217	4	230	4	217	4	221	4
Point D	160	−2	154	−2	157	−2	154	−2	156	−2
Factor of safety (ultimate load/proof load)	2.		2.		2.		2.		2.	
Gust Loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A	142	10.	130	10.	144	10.	130	10.	143	10.
Point D	142	−10.	130	−10.	144	−10.	130	−10.	143	−10.
Limiting flight conditions										
Placard airspeed smooth conditions ..... km/h	200		180		170		160		170	
Placard airspeed gusty conditions ..... km/h	140		110		130		120		130	
Aero-towing speed ..... km/h	140		110		130		120		130	
Winch launching speed .. km/h	100		90		90		85		90	
Cloud flying permitted ...	yes		yes		no		yes		no	
Permitted aerobatic manœuvers	none		none		none		none		none	
Spinning permitted	yes		yes		yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in percentage m.a.c.	22% and 42%		18% and 38%		18% and 34%		15% and 33.7%		18% and 34%	
Terminal velocity with brakes opened at max. all up weight from flight tests km/h	210		200		–		205			
Straight flight performance										
at flying weight of ..... kg	320		250		400		410		390	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	67	0.58	62	0.64	68	0.93	72	0.72	68	0.87
V for max. L/D	80	0.65	73	0.70	75	1.10	80	0.78	75	1.04
	90	0.78	80	0.8			90	0.9		
	105	1.03	95	1.1			105	1.2		
	120	1.42	110	1.6			120	1.6		
Stalling speed ..... km/h	58		50		54		60		55	
Max. L/D	35		29		19		28		20	

[1] With struts, controls, flaps and brakes
[2] Complete with rudder and fin less instruments and equipment
[3] To include any fixed ballast

Germany - Deutschland - Allemagne

Manufacturer:
Flugzeugbau A. Schleicher
Poppenhausen/Wasserkuppe



Kaiser Ka 1 and Ka 3

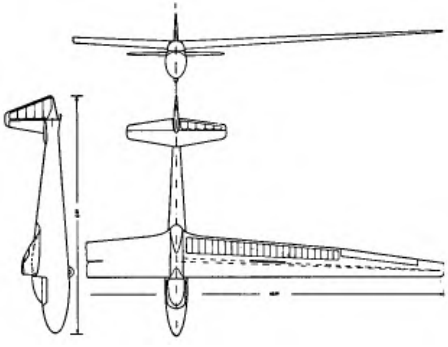
Ka 1 and Ka 3 are both small single-seat trainers sold mainly in kit form for home assembly. The main differences between them are that the Ka 1 has a wooden fuselage which is slightly shorter than the steel tube fuselage of the Ka 3. Their weights and performances are the same, and both have V-tails.

Kaiser Ka 1 und Ka 3

Ka 1 und Ka 3 sind beides kleine einsitzige Schulungsflugzeuge, hauptsächlich als Baukasten für den Selbstbau verkauft. Der Hauptunterschied zwischen den beiden Typen besteht darin, daß die Ka 1 einen Holzrumpf aufweist, der etwas kürzer ist als der Stahlrohrrumpf der Ka 3. Gewicht und Leistungen sind dieselben; beide Flugzeuge sind am V-Leitwerk erkennbar.

Kaiser Ka 1 et Ka 3

Les planeurs Ka 1 et Ka 3 sont tous deux de petits monoplaces d'entraînement, vendus surtout en caissettes de pièces détachées, en vue de la construction individuelle. Ces deux modèles diffèrent surtout en ce que le fuselage du Ka 1 est en bois, et un peu plus court que le fuselage en tubes d'acier du Ka 3. Le poids et les performances sont identiques; on reconnaît ces planeurs à leur empennage en V.



Ka 6B Rhönsegler

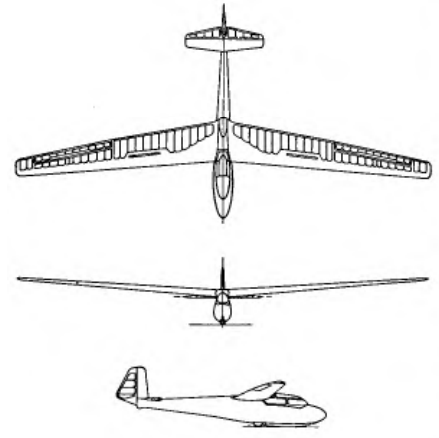
The Rhönsegler is in effect an Olympia replacement having approximately the same span but being more modern with a considerably improved gliding angle. It is of normal wooden construction.

Ka 6B Rhönsegler

Der Rhönsegler kann als Ersatz für die Olympia-Meise betrachtet werden. Er weist annähernd die gleiche Spannweite auf, ist aber moderner und verfügt über den bedeutend besseren Gleitwinkel. Normale Holzkonstruktion.

Ka 6B Rhönsegler

Le planeur Rhönsegler peut être regardé comme le type de remplacement de l'Olympia Meise. L'envergure est sensiblement la même, mais le Rhönsegler est plus moderne et son angle de plané est notablement meilleur. Construction normale en bois.



Ka 2 and Ka 2B Rhönschwalbe

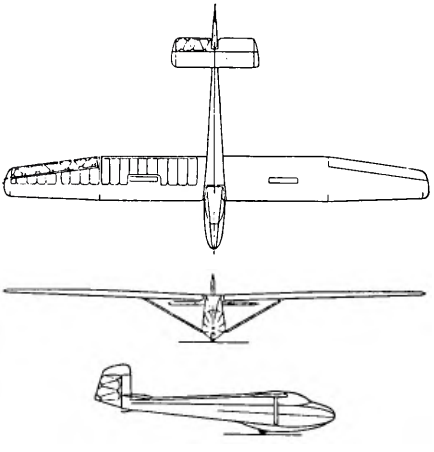
The Ka 2 is the first of a series of 2-seaters designed by Kaiser. The Ka 2B Rhönschwalbe is a development of the Ka 2 with slightly greater span and better performance. It is intended as a 2-seat training sailplane as well as one capable of quite good performances. The main feature of this aircraft is a slight sweep forward for the purpose of improving the view of the second pilot.

Ka 2 und Ka 2B Rhönschwalbe

Die Ka 2 ist die erste einer ganzen Reihe von Kaiser berechneter Zweisitzerkonstruktionen. Die Ka 2B Rhönschwalbe wurde aus der Ka 2 entwickelt; sie hat etwas größere Spannweite und erzielt bessere Leistungen. Als zweisitziges Schulungsflugzeug mit gleichzeitigen guten Leistungen gedacht. Typisch ist eine leicht negative Pfeilform der Flügel zur Verbesserung der Sicht für den zweiten Piloten.

Ka 2 et Ka 2B Rhönschwalbe

Le Ka 2 est le premier de toute une série de constructions biplaces calculées par Kaiser. Le Ka 2B Rhönschwalbe a été développé à partir du Ka 2. L'envergure est un peu plus grande, et les performances sont meilleures. Conçu comme biplace d'entraînement devant produire en même temps de bonnes performances. Une forme en flèche légèrement négative est typique des ailes; le but en est une meilleure visibilité pour le second pilote.



Rhönlerche II

The Rhönlerche II is a small training 2-seater with strutted wings and steel tube fuselage, fabric covered.

Rhönlerche II

Kleines zweisitziges Schulungsflugzeug mit abgestrebten Flügeln und Stahlrohrrumpf, stoffbespannt.

Rhönlerche II

Petit biplace d'entraînement à ailes lambarées et fuselage en tubes d'acier; entoilé.

K 7 Rhönadler

The Rhönadler is a development of the Rhönschwalbe, the only significant difference being that it has a steel tube fuselage instead of a wooden one. In an effort to preserve the aerodynamic qualities of the wooden fuselage, the steel fuselage is covered with a pre-formed plywood skin. Otherwise this aircraft is of normal wooden construction and its dimensions and performance are identical with that of the Rhönschwalbe.

Ka 7 Rhönadler

Der Rhönadler ist eine Weiterentwicklung der Rhönschwalbe. Der einzige größere Unterschied besteht im Stahlrohrrumpf gegenüber dem Holzrumpf der letzteren. Zur Beibehaltung der aerodynamischen Vorteile des Holzrumpfes wurde der Stahlrohrrumpf mit einer vorgeformten Sperrholzschale bedeckt. Im übrigen handelt es sich um eine normale Holzkonstruktion. Größe und Leistungen sind dieselben wie bei der Rhönschwalbe.

Ka 7 Rhönadler

Le Rhönadler est un développement du type Rhönschwalbe. La seule différence de quelque importance, c'est que le fuselage n'est plus en bois, mais bien en tubes d'acier. Pour conserver les avantages aérodynamiques du fuselage en bois, on a recouvert le fuselage en tubes d'acier d'une coque préformée en contreplaqué. Pour le reste, le Rhönadler est une construction normale en bois. Mêmes dimensions et mêmes performances que pour le type Rhönschwalbe.

Type designation	Kaiser Ka3	Ka 6B Rhönsegler	Ka 2	Rhön-lerche II	K 7 Rhönadler
Designer	Rudolf Kaiser				
Date of 1st flight of prototype	1954	1955	1953	1954	
Number produced	15	40			
Wings					
Span ..... m	10.0	15.0	15.0	13.0	16.0
Area ..... m^2	9.9	12.4	16.8	16.34	17.5
Aspect ratio	10.1	18.1	13.4	10.3	14.6
Wing root chord ..... m	1.0	1.2	1.5	1.38	1.5
Wing tip chord ..... m	1.0	0.38	0.68	0.88	0.6
Mean aerodynamic chord (m. a. c.) . m	1.0	0.83	1.12	1.26	1.09

Type designation		Kaiser Ka 3	Ka 6B Rhönsegler	Ka 2	Rhön-lerche II	K 7 Rhönadler
Wing section, root		Gö 549 16%	63-618	Gö 533 16%	Gö 533 15.7%	Gö 533 16%
Wing section, mid		Gö 549 16%	63-614	Gö 533 14%	Gö 533 15.7%	Gö 533 14%
Wing section, tip		Gö 549 16%	Joukow-sky 12%	Gö 533 12%	Gö 533 12.5%	Gö 533 14%
Dihedral	deg.	2.5	3.0	2.5	2.5	4.0
¼ chord sweep	deg.	0	1.5	6.0	0	6
Aero. twist root/tip	deg.	5.8	3.5	1.0	1.0	3.0
Length of each section of wing	m	5.0	7.5	7.53	6.2	8.03
Ailerons						
Type (e. g. slotted, frise, inset hinge, plain)		plain	plain	plain	plain	plain
Span	m	2.05	2.15	2.95	2.90	2.95
Area	m^2	0.6×2	0.43×2	0.8×2	0.95×2	0.8×2
Mean chord	m	0.3	0.2	0.27	0.33	0.27
Max. deflection up	deg.	30	30	30	25	30
Max. deflection down	deg.	12.5	12	15	10	15
Mass balance method		nil	nil	nil	nil	nil
Horizontal tail						
Span	m	2.0 projection	2.8	3.0	2.7	3.0
Area of elevator and fixed tail	m^2	1.8	1.61	2.25	2.32	2.25
Area of elevator	m^2	0.88	0.64	1.04	1.06	1.04
Max. deflection up	deg.	17.5 *	20	20	30	20
Max. deflection down	deg.	17.5 *	20	20	20	20
Aerofoil section		sym. 12%	sym. 12%	sym. 12%	sym. 12%	sym. 12%
Mass balance method		nil	nil	nil	nil	nil
Tail arm (from ¼ chord m. a. c. wing to ¼ chord m. a. c. tail)	m	3.4	3.67	4.4	4.03	4.4
Elevator aerodynamic balance method		nil	nil	nil	nil	nil
Elevator trimming method		nil	spring trim or trim tab	nil	spring trim	trim tab
Horizontal tail volume coefficient			0.445	0.4	0.335	0.39
Special features		V-tail 37°				
Vertical tail						
Area of fin and rudder	m^2		1.07	1.15	1.13	1.21
Area of rudder	m^2		0.64	0.66	0.85	0.69
Aspect ratio			1.81	1.59	1.5	1.74

Type designation	Kaiser Ka3	Ka 6B Rhönsegler	Ka 2	Rhön-lerche II	K 7 Rhönadler
Tail arm ..... m		3.96	4.95	4.64	4.95
Max. deflection ..... deg.		30	30	30	30
Aerofoil section		sym. 12%	sym. 12%	sym. 12%	sym. 12%
Mass balance type		horn weight	nil	nil	nil
Aerodynamic balance				horn	
Fuselage					
Max. width ..... m	0.6	0.6	0.7	0.68	0.7
Overall length ..... m	5.45	6.66	8.15	7.3	8.15
Max. cross section ..... m^2	0.47	0.47	0.61	0.68	0.61
Wetted surface area ..... m^2	8.5	10.15	13.0	13.0	13.0
Number seats and arrangement	1	1	2 tandem	2 tandem	2 tandem
Undercarriage type	skid	wheel with brake	fixed wheel and skid	fixed wheel and skid	fixed wheel and skid
Wheel diameter ..... cm		30	38	30	38
Special features	steel tube fuselage			steel tube fuselage	steel tube fuselage
Lift increasing devices	none	none	none	none	none
Drag producing devices					
Type (e. g. spoilers, wing airbrakes, tail parachute, fuselage airbrakes)	spoilers	wing airbrakes	wing airbrakes	spoilers	wing airbrakes
General location (e. g. top of wing, bottom of wing, fuselage)	top of wing	both sides of wing	both sides of wing	top of wing	both sides of wing
Span ..... m	0.6	1.0	1.2	0.9	1.2
Area (total) ..... m^2	0.12	0.35	0.45	0.25	0.45
% of span (where applicable)	12.0	13.3	16.0	13.8	15.0
Location, % of chord (where applicable)	40	44	38	36	38
Is device intended to limit terminal velocity (vertical dive) to max. permissible I. A. S. yes/no	no	yes	yes	no	yes
Weights					
Wings (1) ..... kg	43	110	133.5	100	160
Fuselage (2) ..... kg		65.5	108.5	97.5	112
Tailplane and elevator ... kg		6.5	9.5	10	10
Empty weight (3) ..... kg	98.5	182	251.5	107.5	282
Instruments ..... kg	1.5	3	2.5	2.5	2.5

Type designation	Kaiser Ka3	Ka 6B Rhönsegler	Ka 2	Rhön-lerche II	K 7 Rhönadler
Equipped weight ..... kg	100	185	254	210	284.5
Max. load ..... kg	95	115	200	190	200
Max. permissible flying weight ..... kg	195	300	460	400	484.5
Wing loading max. ..... kg/m²	19.5	24.2	27.4	24.5	27.3
Design standards					
Airworthiness requirements to which aircraft has been built	German BVS	German BVS	German BVS	German BVS	German BVS
Date of issue of these requirements	August 1939	August 1939	August 1939	August 1939	August 1939
Certificate of Airworthiness yes/no	yes	yes	yes	yes	yes

Design flight envelope Manoeuvre loads	V km/h	Proof load factor *n*	V km/h	Proof load factor *n*	V km/h	Proof load factor *n*	V km/h	Proof load factor *n*	V km/h	Proof load factor *n*
Point A	110	4	122	4	125	4	126	4.7	124	4
Point B	200	4	225	4	238	4	208	4.7	236	4
Point C	219	0	250	0	266	0	172	-2.3	264	0
Point D	143	-2	158	-2	168	-2	208	-2.3	167	-2
Factor of safety			2		2		1.5		2	

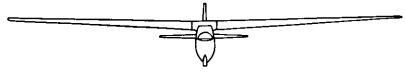
Gust loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
	100	±10	140	±10	130	±10			130	±10

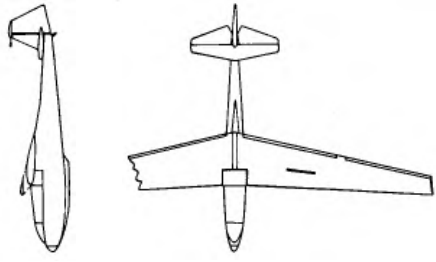
Limiting flight conditions					
Placard airspeed smooth conditions ..... km/h	160	200	200	170	200
Placard airspeed gusty conditions ..... km/h	100	140	130	120	130
Aero-towing speed ..... km/h	100	140	130	120	130
Winch launching speed ... km/h	90	100	100	90	100
Cloud flying permitted ...	no	yes		no	
Spinning permitted	no	yes	yes	yes	yes
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	31% and 36%	19.3% and 40%	28.6% and 46.4%	26.6% and 40.5%	25% and 46%
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) ..... km/h		230			

Type designation	Kaiser Ka 3		Ka 6B Rhönsegler		Ka 2		Rhön-lerche II		K 7 Rhönadler	
Straight flight performance										
at flying weight of ..... kg	180		276		415		360		445	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	65	1.0	68	0.63	65	0.9	62	1.1	67	0.81
V for max. L/D	75	1.2	76	0.67	80	0.95	78	1.25	85	0.91
			90	0.84						
			104	1.10					100	1.14
			119	1.48					120	1.70
With ...° flap ..... deg.										
Stalling speed ..... km/h	53		59.5		58.5		56		59.3	
Max. L/D	17.5		31.5		24		17.5		26	

* Elevator deflection 17.5°
Rudder deflection 20°

Manufacturer:
Ahrens Sportflugzeugbau
Hülserstrasse 398, Krefeld
Designer: Ing. Paul Lüty





Ly 542-K Stösser

The Stösser is a two-seat aerobatic sailplane of small span. It is characterised by modern use of sweepforward to improve the vision of the second pilot who is seated approximately at the centre of gravity. The ailerons are of very small chord (8 cm) but are full span and have up and down deflections of 60°. The designer claims that a certain amount of turbulent boundary layer suction occurs, but does not give details. The aircraft is of normal wooden construction. The upper side of the wing is entirely covered with plywood; the lower surface is plywood covered only as far aft as the spar, the rest being fabric covered.

Ly 542-K Stösser

Zweisitziges Flugzeug für Kunstflug, mit kleiner Spannweite. Charakterisiert durch die moderne Anwendung der Vorwärtspfeilung, zur Verbesserung der Sicht des zweiten Piloten, der annähernd im Schwerpunkt sitzt. Querruder mit geringer Tiefe (8 cm), aber über die ganze Spannweite und mit einem Ausschlag in beiden Richtungen von 60 °. Der Konstrukteur erwähnt, daß eine gewisse Ansaugung der verwirbelten Grenzschicht vorhanden ist, gibt aber keine Einzelheiten. Das Flugzeug ist in normaler Holzkonstruktion gebaut. Flügeloberseite gänzlich mit Sperrholz beplankt, Flügelunterseite nur von vorn bis zum Holm, hinten stoffbespannt.

Ly 542-K Stösser

Biplace d'acrobatie, de petite envergure. Caractérisé par l'emploi moderne de la flèche négative, pour améliorer la vue qu'a le second pilote, assis à peu près au centre de gravité. Aileron de peu de profondeur (8 cm), mais s'étendant sur toute l'envergure et permettant de part et d'autre un écart de 60°. Le constructeur mentionne, mais sans donner de détails, une certaine aspiration de la couche limite tumultueuse. Construction de bois normale. Face supérieure de l'aile entièrement recouverte de contreplaqué, face inférieure seulement du bord d'attaque jusqu'au longeron; le reste est entoilé.

Type designation		Ly 542-K Stösser
Designer		Ing. Paul Lüty
Date of first flight of prototype		11 August 1955
Number produced		1
Wings		
Span	m	12.80
Area	m^2	14.0
Aspect ratio		11.7
Wing root chord	m	1.66
Wing tip chord	m	0.55
Mean aerodynamic chord	m	1.10
Wing section		Gö 549
Dihedral	deg.	1.5
¼ chord sweep	deg.	—5
Aero. twist root/tip	deg.	2.5
Ailerons		
Type		plain
Span	m	2.90
Area	m^2	0.58
Mean chord	m	0.10
Max. deflection up	deg.	60
Max. deflection down	deg.	60
Mass balance method		external
Horizontal tail		
Span	m	2.80
Area of elevator and fixed tail	m^2	2.11
Area of elevator	m^2	0.91
Max. deflection up	deg.	25
Max. deflection down	deg.	22.5

Type designation		Ly 542-K Stösser
Vertical tail		
Area of fin and rudder	m^2	1.157
Area of rudder	m^2	0.788
Max. deflection	deg.	30
Fuselage		
Max. width	m	0.68
Overall length	m	7.8
Number seats and arrangement		2 tandem
Lift increasing devices		
Type		sucking-off of the turbulent boundary layer
Span	m	2.40
Drag producing devices		
Type		wing airbrakes
Span	m	1.10
Location, % of chord		40
Is device intended to limit terminal velocity to max. permissible I.A.S.?		no
Weights		
Wings	kg	166
Fuselage	kg	108
Tailplane and elevator	kg	14
Empty weight	kg	288
Instruments	kg	7
Equipped weight	kg	295
Max. load	kg	180
Max. permissible flying weight	kg	475
Wing loading	kg/m^2	33
Design standards		
Airworthiness requirements to which aircraft has been built		fully aerobatic (strength group 3, use group K)
Date of issue of these requirements		1955
Limiting flight conditions		
Placard airspeed, smooth conditions	km/h	300
Placard airspeed, gusty conditions	km/h	200
Aero-towing speed	km/h	160
Winch launching speed	km/h	110
Cloud flying permitted		yes
Permitted aerobatic manoeuvres		fully aerobatic
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.		26.6% and 41%

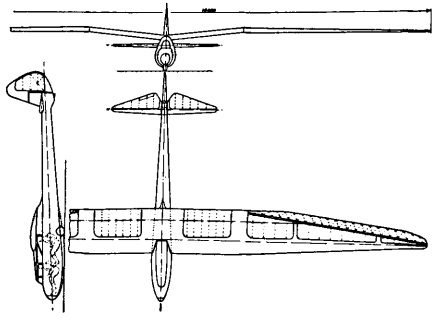
Type designation	Ly 542-K Stösser	
Straight flight performance at flying weight of ..... kg	475	
	V km/h	v m/s
V for min. sink	80	0.9
V for max. L/D	88	
Stalling speed ..... km/h	60	
Max. L/D	26	

Manufacturer:
Moewe Flugzeugbau
Augsburg
Designer:
Heini Dittmar

Condor 4

The Condor 4 is the result of many years' development by Heini Dittmar, which began with the Condor 1 with its strutted wing. The Condor 3 was developed some years later with a cantilever wing and the two-seat Condor 4, which has essentially the same layout, first flew in 1953. It is of normal wooden construction; most of the wing aft of the spar is fabric covered.

Wings: span 18.0 m; area 21.3 m²; aspect ratio 15.2; wing root chord 1.5; mean aerodynamic chord 1.18; wing section, root Gö 532; tip NACA 0012; dihedral 0°
Ailerons: total area 3.0 m²
Horizontal tail: area of all moving tail 1.85 m²
Fuselage: max. width 0.58 m; overall length 8.4 m; max. cross section 0.50 m²
Weights: empty 300 kg; equipped 358 kg; max. load 200 kg; max. permissible flying weight 520 kg; wing loading 24 kg/m²
Limiting flight conditions: placard airspeed, smooth conditions 170 km/h; placard airspeed, gusty conditions 100 km/h
Straight flight performance at flying weight of 500 kg: min. sink 0.71 at 70 km/h; max. L/D 30 at 80 km/h

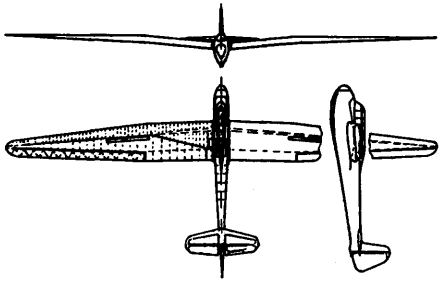


Condor 4

Das Ergebnis langjähriger Entwicklungsarbeiten durch Heini Dittmar, welche mit dem abgestrebten Condor 1 begannen. Der Condor 3 folgte einige Jahre später mit freitragendem Flügel; der zweisitzige Condor 4, der grundsätzlich die gleichen Eigenheiten aufweist, flog erstmals 1953. Normale Holzkonstruktion; der größte Teil des Flügels hinter dem Holm ist stoffbespannt.

Condor 4

C'est le résultat de longues années de développement par Heini Dittmar, qui a commencé par le Condor 1 haubané. Le Condor 3 a suivi quelques années plus tard, avec aile en porte à faux; le biplace Condor 4, qui fondamentalement a les mêmes qualités, a volé pour la première fois en 1953. Construction de bois normale; la plus grande partie de l'aile derrière le longeron est entoilée.



Kranich II

The Kranich II is a well-known pre-war sailplane designed by Hans Jacobs for advanced training. It is of all wood construction with fabric covered wing.

Kranich II

Bekanntes Flugzeug der Vorkriegszeit für höhere Schulung, konstruiert von Hans Jacobs. Holzkonstruktion mit tuchbespanntem Flügel.

Kranich II

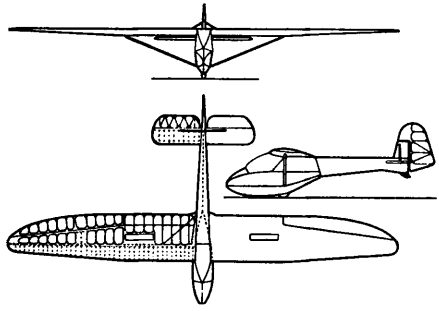
Planeur connu d'avant la guerre, prévu pour la formation supérieure, construit par Hans Jacobs. Construction en bois, ailes entoilées.

Doppelraab V-5

The Doppelraab series began in 1950/51 as a small two-seat trainer. The instructor sits immediately behind the pupil and uses the same aileron and elevator controls but separate rudder control. The fuselage is of steel tube, fabric covered. It has a single spar, wood wing.

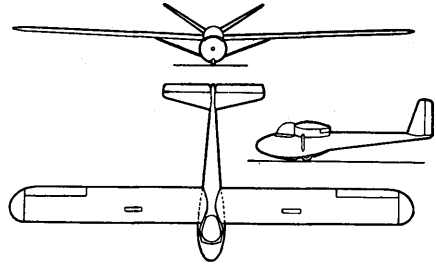
Doppelraab V-5

Die Doppelraab-Serie begann 1950/51 mit einem kleinen zweisitzigen Schulungsflugzeug. Der Fluglehrer sitzt unmittelbar hinter dem Schüler und betätigt dasselbe Höhensteuer und Verwindung, aber ein eigenes Seitensteuer. Tuchbespannter Stahlrohrrumpf; hölzerner, einholmiger Flügel.



Doppelraab V-5

La série Doppelraab a commencé en 1950-51 par un petit biplace d'école. L'instructeur est assis droit derrière l'élève et a en commun avec lui la commande de profondeur et celle des ailerons. En revanche, il dispose de sa propre commande de direction. Fuselage en tubes d'acier avec entoilage, ailes de bois à un seul longeron.



Nipp Bremen-Lane

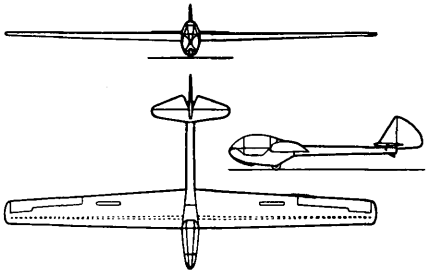
The Nipp Bremen-Lane is an all metal 2-seat training sailplane designed for series production.

Nipp Bremen-Lane

Zweisitziges Ganzmetall-Schulungsflugzeug, für den Serienbau konstruiert.

Nipp Bremen-Lane

Biplace d'école, entièrement en métal, prévu pour la fabrication en série.



Greif I

The Greif I is a medium performance single-seat trainer with wood wing, fabric covered. The fuselage pod is of steel tube, fabric covered; the tail boom is aluminium.

Greif I

Einsitziges Schulungsflugzeug für mittlere Leistung. Holzflügel mit Tuchbespannung. Boot aus geschweißtem Stahlrohr, mit Tuchbespannung, Leitwerkträger aus Aluminium.

Greif I

Monoplace d'école pour performances moyennes. Ailes entoilées en bois. Coque de tubes d'acier soudées, avec entoilage; les supports des gouvernes sont en aluminium.

Greif III

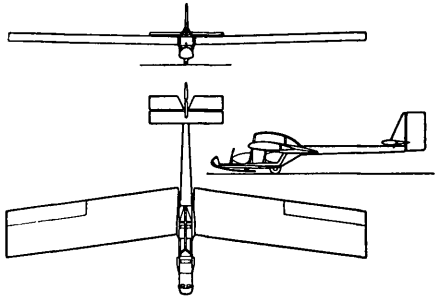
The Greif III is a two-seat medium performance trainer. It has a steel tube fuselage, fabric covered and an aluminum tail boom.

Greif III

Zweisitziges Schulungsflugzeug für mittlere Leistung. Stahlrohrrumpf mit Tuchbespannung; Leitwerkträger aus Aluminium.

Greif III

Biplace d'école pour performances moyennes. Fuselage en tubes d'acier avec entoilage; supports des gouvernes en aluminium.



Greif V-DSG

The Greif V is an open cockpit two-seat trainer with construction similiar to the Greif III.

Greif V-DSG

Zweisitziges Schulungsflugzeug mit offener Kabine. Ähnlich gebaut wie der Greif III.

Greif V-DSG

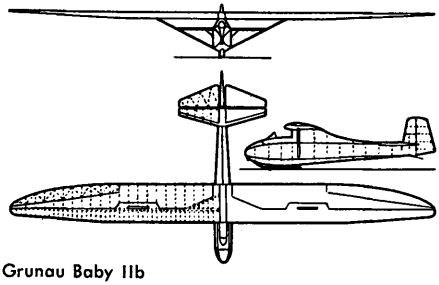
Biplace d'école à cabine ouverte. Construction analogue à celle du Greif III.

Type designation	Kranich II	Doppel-raab V-5	Nipp Bremen-Lane	Greif I	Greif III	Greif V-DSG
Manufacturer		Wolf Hirth	E. Nipp	Greif Flugzeug-bau		
Address		Nabern/ Teck	Bremen	Rendsburg		
Designer(s)	Hans Jacobs	Fritz Raab	Nipp, Eilers Lane	Hans Hollfelder	Hans Hollfelder	Hans Hollfelder
Date of first flight of prototype	1935	1951	1952	1953		
Number produced			2	5	1	1
Wings						
Span ..... m	18.0	12.76	16.00	13.60	16.00	13.00
Area ..... m^2	22.7	18.0	21.00	14.65	17.80	21.00
Aspect radio	14.3	9.0	12.2	13.4	13.8	
Wing root chord..... m	1.6	1.54		1.41	1.65	1.70
Wing tip chord ..... m		0.68		0.80	0.70	1.70
Mean aerodynamic chord (m. a. c.)..... m	1.26	1.42		1.10	1.18	1.70
Dihedral ..... deg.	0	0		2.0		2.0
Sweep..... deg.	+2	0		0	−10.0	−7.7
Aero. twist root/tip ..... deg.	—	3.5		0.75	0.75	0.75
Wing section (root)	Gö 535	Gö 550/629	laminar	Gö 404		
Ailerons						
Type.....	plain	plain	plain	plain		
Area ..... m^2	2.13	2.66	1.30	1.75	2.60	2.80
Horizontal tail						
Area of elevator and fixed tail ..... m^2	2.21	2.68	V-tail	1.85	1.85	2.52
Area of elevator ..... m^2	1.0	1.09		0.85	0.85	1.32
Aerofoil section	symmetrical	symmetrical	NACA 0012	symmetrical		
Vertical tail						
Area of fin and rudder .. m^2	1.37	1.46		1.11	1.11	1.29
Area of rudder ..... m^2	1.0	1.07		0.66	0.66	0.84
Aerofoil section	symmetrical	symmetrical		symmetrical		
Fuselage						
Max. width ..... m		0.62		0.58	0.58	0.58
Overall length..... m	7.7	6.90	6.78	6.95	7.80	7.40
Max. cross section ..... m^2		1.0		0.61	0.64	
Number seats and arrangement.....	2 tandem	2 tandem	2 side by side	1	2 tandem	2 tandem
Undercarriage type	skid droppable wheels	fixed wheel and skid	fixed wheel and skid	wheel		fixed wheel and skid

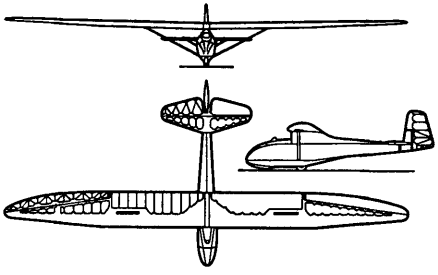
Type desiguation		Kranich II	Doppel-raab V-5	Nipp Bremen-Lane	Greif I	Greif III	Greif V-DSG
Lift increasing devices							
Type		none	none	none	none		
Drag producing devices							
Type		wing airbrakes	wing airbrakes	wing airbrakes	wing airbrakes	wing airbrakes	none
General location		top and bottom of wing	top and bottom of wing	top and bottom of wing	top and bottom of wing	top and bottom of wing	
Area		0.32			0.40	0.55	
Weights							
Equipped weight	kg	185	290	230	170	240	210
Max. load	kg	165	160	200	105	200	180
Max. permissible flying weight	kg	350	465	430	275	400	390
Wing loading	kg/m²	19.4	20.5	20.5	18.8	23.6	18.5
Design Standards							
Airworthiness requirements to which aircraft has been built		German BVS category 2	German BVS category 2	German BVS category 2	German BVS category 2	(no permit to fly)	no permit to fly)
Date of issue of these requirements		1939	1939	1939	1939		
Max. ultimate load factor	g	8	8	8	8		
Limiting flight conditions							
Placard airspeed	km/h	175	140	220	175	180	150
Aero-towing speed	km/h	100	110	165	115	110	100
Winch launching speed	km/h	80	85	110	80	80	85
Permitted aerobatic manoeuvers		none	none	none	none		
Spinning permitted yes/no		yes	no	yes	yes		
Straight flight performance							
at flying weight of	kg	465	350		275		

	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		0.69	58	0.85		1.0		0.75		0.72		1.1
V for max. L/D			65									
Stalling speed			~48									
Max. L/D	23.6		20		22		23		26		14	

Germany - Deutschland - Allemagne



Grunau Baby IIb



Grunau Baby III

Grunau Baby IIb and III

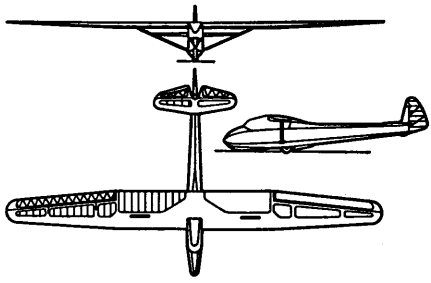
The Grunau Baby is a well-known single-seat trainer originally designed in 1932. It is of all wood construction, with fabric covered wing. The Grunau Baby III is a postwar development of the Baby IIb.

Grunau Baby IIb und III

Bekanntes einsitziges Schulungsflugzeug mit Baujahr 1932. Es ist völlig als Holzkonstruktion gebaut, mit tuchbespanntem Flügel. Das Grunau Baby III stellt eine Nachkriegsentwicklung des Baby IIb dar.

Grunau Baby IIb et III

Monoplace connu d'école, remontant à 1932, tout en bois, avec ailes entoilées. Le Grunau Baby III est une version évoluée d'après guerre du Baby IIb.



E. S. 49 V-3

The E. S. 49 V-3 is a two-seat tandem trainer, designed by Edmund Schneider and developed from the open-cockpit V-1. It is of all wood construction.

E. S. 49 V-3

Zweisitziges Schulungsflugzeug mit Tandem-Sitzanordnung. Konstruiert von Edmund Schneider als Entwicklung des V-1 mit offener Kabine. Holzkonstruktion.

E. S. 49 V-3

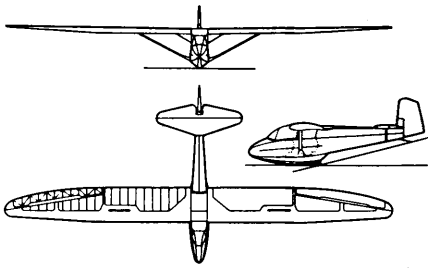
Biplace d'école avec siège en tandem. Construit par Edmund Schneider à partir du V-1 à cabine ouverte. Construction en bois.

Grunau Baby V

The Grunau Baby V, designed by Herbert Gomolzig, is a two-seat tandem trainer with the 2nd seat on the c. g. The wing is similar to the Baby III. The fuselage is steel tube, fabric covered.

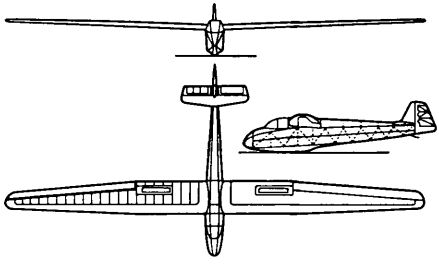
Grunau Baby V

Zweisitziges Schulungsflugzeug mit Tandem-Sitzanordnung und Schwerpunktzentrum beim zweiten Sitz, konstruiert von Herbert Gomolzig. Flügel ähnlich wie beim Baby III. Stahlrohrrumpf mit Tuchbespannung.



Grunau Baby V

Biplace d'école avec sièges en tandem et position moyenne du centre de gravité près du second siège. Construit par Herbert Gomolzig. Ailes pareilles à celles du Baby III. Fuselage en tubes d'acier avec entoilage.



Scheibe Spatz-B

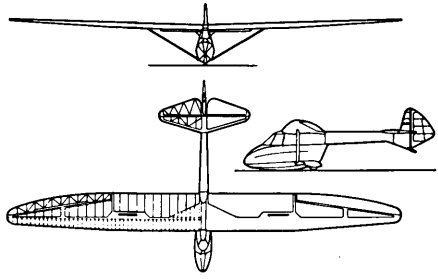
The Spatz B is a medium performance sailplane with wood wing, fabric covered. It has a steel tube fuselage, fabric covered.

Scheibe Spatz-B

Mittleres Leistungsflugzeug mit Holzflügel und Tuchbespannung. Stahlrohrrumpf mit Tuchbespannung.

Scheibe Spatz-B

Planeur pour performances moyennes, ailes en bois entoilées, fuselage en tubes d'acier également avec entoilage.



Reinhard Cumulus

The Cumulus is a single-seat trainer with wings similar to the Grunau Baby II b. The fuselage is steel tube, fabric covered.

Reinhard Cumulus

Einsitziges Schulungsflugzeug mit Flügeln ähnlich dem Grunau Baby IIb. Stahlrohrrumpf mit Tuchbespannung.

Reinhard Cumulus

Monoplace d'école avec ailes pareilles à celles du Grunau Baby IIb. Fuselage en tubes d'acier avec entoilage.

Type designation	Grunau Baby IIb	Grunau Baby III	ES 49 V-3	Grunau Baby V	Scheibe Spatz-B	Reinhard Cumulus
Manufacturer	diverse	diverse	Alexander Schleicher	Gomolzig	Scheibe-Flugzeugbau GmbH	diverse
Address	—	—	Poppenhausen	Wuppertal	Dachau bei München	—
Designer(s)	Edmund Schneider	Edmund Schneider	Edmund Schneider	Herbert Gomolzig	E. Scheibe	Gerhard Reinhard
Date of first flight of prototype			1951	1954	1954	1951
Number produced			~5	3		~10
Wings						
Span ..... m	13.57	13.50	16.00	14.0	13.2	13.57
Area ..... m^2	14.20	14.40	21.3	15.0	10.9	14.2
Aspect ratio	13.00	12.8	11.74	13.0	16.0	13.0
Wing root chord..... m	1.18	1.20	1.60	1.2	0.99	1.18
Wing tip chord ..... m	0.50	0.50	0.90	0.50	0.50	0.50
Mean aerodynamic chord (m.a.c.) ..... m	1.05	1.06	1.25	1.06	0.83	1.05
Dihedral ..... deg.	1.5	1.0	0	1.0	2.5	1.5
Sweep..... deg.	0	0	0	0	0	0
Aero. twist root/tip ..... deg.	1.7	3.0	3.0	3.0		3.5
Wing section (root)	Gö 535	Gö 535	Gö 549	Gö 535	Mü-Profil	Gö 535
Ailerons						
Type.....	plain	plain	plain	plain	plain	
Area ..... m^2	2.14	2.06	3.54	2.06	1.8	2.14
Horizontal tail						
Area of elevator and fixed tail ..... m^2	2.32	2.16	3.03	2.16	1.18	2.32
Area of elevator ..... m^2	1.09	0.89	1.25	0.89	0.60	1.09
Aerofoil section	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical
Vertical tail						
Area of fin and rudder .. m^2	0.84	1.10	1.37	1.10	0.80	1.06
Area of rudder ..... m^2	0.76	0.89	1.05	0.89	0.50	0.86
Aerofoil section.....	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical
Fuselage						
Max. width ..... m	0.55		0.65	0.60	0.58	0.52
Overall length..... m	6.09	6.35	8.61	6.4	6.00	6.09
Max. cross section ..... m^2	0.47		0.69	0.68	0.52	0.45
Number seats and arrangement.....	1	1	2 tandem	2 tandem	1	1
Undercarriage type	skid	fixed wheel	fixed wheel	fixed wheel	skid	fixed wheel

Type designation		Grunau Baby IIb	Grunau Baby III	ES 49 V-3	Grunau Baby V	Scheibe Spatz-B	Reinhard Cumulus
Lift increasing devices							
Type		none	none	none	none	none	none
Drag producing devices							
Type		wing airbrakes	wing airbrakes	wing airbrakes	wing airbrakes	wing airbrakes	wing airbrakes
General location		top and bottom of wing	top and bottom of wing	top and bottom of wing	top and bottom of wing	top and bottom of wing	top and bottom of wing
Area		0.30	0.30	0.40		0.40	0.30
Weights							
Equipped weight	kg	170	170	280	195	130	160
Max. load	kg	80	90	200	165	90	90
Max. permissible flying weight	kg	250	260	480	360	220	250
Wing loading	kg/m²	17.68	18.0	21.6	24	20	17.62
Design standards							
Airworthiness requirements to which aircraft has been built		German BVS category 2	German BVS category 2	German BVS category 2	German BVS category 2	German BVS category 2	German BVS category 2
Date of issue of these requirements		1939	1939	1939	1939	1939	1939
Max. ultimate load factor	g	8	8	8	9	8	8
Limiting flight conditions							
Placard airspeed	km/h	150	160	150	175	175	150
Aero-towing speed	km/h	90	90	120	100	110	90
Winch launching speed	km/h	80	80	90	80	90	80
Permitted aerobatic manoeuvres		none	none	none	none	none	none
Spinning permitted	yes/no	yes	yes	yes	no	yes	yes
Straight flight performance							
at flying weight of	kg	250	260	480	360	220	250

	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	55	0.85	55	0.85	65	0.85	65	0.8	58	0.68	52	0.80
V for max. L/D	60		60		70				65		63	
Stalling speed									50			
Max. L/D	17		17		24		20		25		19	

East Germany – Deutsche Demokratische Republik – Allemagne de l'Est

Manufacturer:
VEB Apparatebau Lommatzsch
Raubaerstr. 4, Lommatzsch/Sa.,
East Germany

Lom 55/I Libelle

The Libelle is a single-seat high performance sailplane of wooden construction.

Lom 55/I Libelle

Einsitziges Hochleistungsflugzeug in Holzkonstruktion.

Lom 55/I Libelle

Monoplace de haute performance, construction en bois.

FES 530 Lehrmeister

The Lehrmeister is a two-seat primary, aerobatic and instrument training sailplane. The fabric-covered wood wing is strut-braced. The fuselage is wood, plywood covered.

FES 530 Lehrmeister

Zweisitziges Flugzeug für Grundschulung, Kunst- und Blindflugtraining. Abgestrebter Holzflügel, stoffbespannt. Rumpf aus Holz, sperrholzbeplankt.

FES 530 Lehrmeister

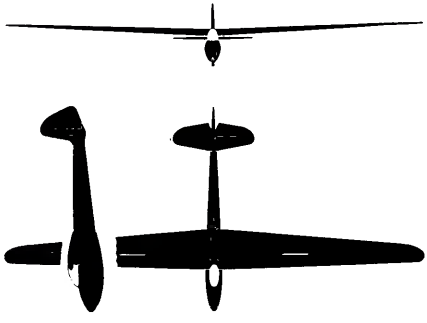
Biplace pour la formation de base et l'entraînement à l'acrobatie et au vol sans visibilité. Ailes de bois haubanées, entoilées. Fuselage en bois, revêtu de contreplaqué.

Type designation		Lom 55/I Libelle	FES 530 Lehrmeister
Designers		Heinz Roessing Prof. Landmann	Wilhelm Zimmermann Hans Wegerich Hans Hartung
Date of first flight of prototype		1957	1956
Wings			
Span	m	16.50	17.0
Area	m^2	14.85	19.0
Aspect ratio		18.33	15.2
Wing root chord	m	1.20	1.80
Wing tip chord	m	0.60	0.45
Mean aerodynamic chord	m	0.933	1.27
Wing section, root		Gö 549	Gö 549
Wing section, tip			Gö 676
Dihedral	deg.		2.0
Ailerons			
Type		slotted	
Area	m^2		2.6
Max. deflection up	deg.	25	30
Max. deflection down	deg.	12	15
Horizontal tail			
Span	m	3.2	3.6
Area of elevator and fixed tail	m^2	1.98	2.85
Area of elevator	m^2	0.81	1.14
Max. deflection up	deg.	20	22
Max. deflection down	deg.	18	19.5
Tail arm	m	3.89	4.71
Aerodynamic balance method		none	none
Elevator trimming method			trim tab
Vertical tail			
Area of fin and rudder	m^2	1.31	1.46
Area of rudder	m^2	0.76	0.67
Aspect ratio		1.63	1.44
Tail arm	m	3.92	5.11
Max. deflection	deg.	20	25
Mass balance degree		nil	nil
Aerodynamic balance		none	none

Type designation		Lom 55/I Libelle		FES 530 Lehrmeister	
Fuselage					
Max. width	m	0.6		0.82	
Overall length	m	6.8		7.95	
Max. cross section	m^2	1.2		1.8	
Number seats and arrangement		1		2 tandem	
Undercarriage type		wheel and shock absorbing skid		wheel and shock absorbing skid	
Wheel diameter	cm	26		35	
Drag producing devices					
Type		spoilers (top of wing) airbrakes (bottom of wing)		spoilers (top of wing) airbrakes (bottom of wing)	
Weights					
Wings	kg	140		149	
Fuselage	kg	79		132	
Tailplane and elevator	kg	8		13	
Empty weight	kg	227		294	
Instruments and equipm.	kg	3		6	
Equipped weight	kg	230		300	
Max. load	kg	100		200	
Max. permissible flying weight	kg	330		500	
Wing loading	kg/m^2	22.2		26.3	
Limiting flight conditions					
Placard airspeed, smooth conditions	km/h	240		200	
Aero-towing speed	km/h	130		130	
Winch launching speed	km/h	100		100	
Straight flight performance		V km/h	v m/s	V km/h	v m/s
V for min. sink		70	0.7	72	0.85
V for max. L/D		80		85	
Stalling speed				42	
Max. L/D		30		24	

Great Britain – Großbritannien – Grande-Bretagne

Manufacturer:
Elliotts of Newbury Ltd.
Albert Works
Newbury, Berks.



Olympia Eon Mark 2

The Mark 2 is a single-seater constructed of wood and is basically similar to the Olympia originally designed by Hans Jacobs.

Olympia Eon Mark 2

Einsitzer in Holzkonstruktion, grundsätzlich gleich wie die von Hans Jacobs konstruierte Original-Olympia.

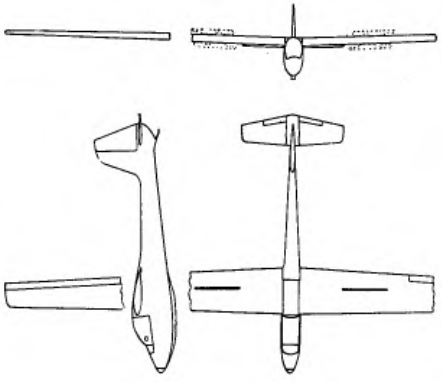
Olympia Eon Mark 2

Monoplace construit en bois, identique quant au principe à l'Olympia originelle construite par Hans Jacobs.

Olympia Eon Mark 4/15 and Mark 4/19

These single-seat high performance sailplanes are the result of seven years development by the manufacturers. Starting as a laminar wing version of the Mark 2, the relationship to this aircraft can now only be traced through such features as the wing root fittings and some of the fuselage structure.
Development has been in four stages. The original Olympia IV, now identified as the 401, was similar in plan form to the standard Olympia but had a laminar wing section of the 64 series. Frise ailerons were fitted.
The Olympia 402 was virtually a 17 m version of the 401, obtained by extending the existing wing plan form with straight leading and trailing edges in order to obtain the necessary additional span. Root and tip aerofoil sections were the same as the 401 but the aileron chord and span were both increased.
The Olympia 403 retained the 17 m wing of the 402. Compared with the standard Olympia the fuselage was extended 25 cm

forward by putting an extra bay between the main bulkhead and the cockpit. The canopy and fuselage "neck" were also widened considerably. It was fitted with an entirely re-designed fin and rudder of increased area and with an all-moving tailplane that could be hinged upward for transport. This tailplane had a full span (latter reduced to half span) antibalance tab of 2:1 gear ratio which also functioned as a trimmer. The Olympia 4/19 retains the fuselage of the 403 with certain detail modifications, the nose being slightly longer and the rudder area greater. The wing has been increased to almost 19 m; the span of the one piece Frise ailerons have been extented. The tailplane is similar to that fitted to the 403.
The 4/15 is a 15 m version of the 4/19.



Olympia Eon Mark 4/15 und Mark 4/19

Diese Einsitzer sind das Ergebnis einer siebenjährigen Entwicklungsarbeit durch die Hersteller. Ursprünglich als Ausführung mit Laminarflügel der Mark 2 gebaut, besteht heute nur noch eine geringe Ähnlichkeit mit dieser, die sich etwa auf die Befestigung der Tragflächenwurzel und einen Teil der Rumpfkonstruktion bezieht.

Die Entwicklung erfolgte in vier Phasen. Die Original-Olympia IV, heute mit der Bezeichnung 401, war im Grundriß gleich wie die Standard-Olympia, aber wies einen Laminarflügel der 64er-Serie auf. Dazu kommen Fix-Querruder.

Die Olympia 402 war eigentlich eine Variante der 401 mit 17 m Spannweite, welche erzielt wurde durch Ausdehnung der Flügelgrundrißfläche mit geraden Flügeleintritts- und Hinterkanten zur Erreichung der nötigen zusätzlichen Spannweite. Die inneren und äußeren Tragflächenquerschnitte waren dieselben wie bei der 401, aber Tiefe und Spannweite der Querruder wurden vergrößert.

Die Olympia 403 behielt die 17 m Spannweite der 402 bei. Im Vergleich mit der Standard-Olympia wurde der Rumpf um 25 cm nach vorn verlängert, indem man ein besonderes Stück zwischen Hauptrumpfspant und Pilotensitz einfügte. Die Oberseite von Pilotensitzbedeckung und Rumpf wurde erheblich erweitert. Die 403 wurde mit völlig neukonstruierter Seitenflosse und -steuer mit größerer Oberfläche ausgerüstet; dazu kam eine nach allen Seiten bewegliche Höhenflosse mit Scharnieren zum Aufklappen beim Transport. Diese Höhenflosse wies über die ganze Spannweite (später halbe Spannweite) ein Gegenausgleichshilfsruder im Getriebeverhältnis von 2:1 auf, das zugleich zur Trimmung diente.

Die Olympia 4/19 behielt den Rumpf der 403 mit kleinen Abänderungen, wobei die Nase etwas länger, die Seitenruderfläche größer ist. Der Flügel weist eine Spannweite von 19 m auf; die Spannweite der aus einem Stück bestehenden Frise-Querruder wurde vergrößert. Höhenflosse ähnlich wie bei der 403.

Die 4/15 ist eine 15 m-Ausführung der 4/19.

Olympia Eon Mark 4/15 et Mark 4/19

Ces monoplaces résultent du travail de développement de sept ans auquel se sont livrés les producteurs. Construit d'abord comme version à aile laminaire du Mark 2, ce planeur ne lui ressemble plus guère aujourd'hui, sauf peut-être par la fixation de la racine de l'aile et une partie de la construction du fuselage.

Le développement eut lieu en quatre phases. L'Olympia IV du début, qui porte aujourd'hui la désignation 401, était en projection horizontale semblable à l'Olympia standard, mais présentait une aile laminaire de la série 64. A cela s'ajoutaient les ailerons en frise.

L'Olympia 402 était à proprement parler une variante du type 401, avec 17 m d'envergure, ce qui fut obtenu en étendant la projection horizontale de l'aile grâce à un bord d'attaque et à un bord de fuite rectilignes. Les sections intérieure et extérieure de l'aile étaient les mêmes que sur 401, mais la profondeur et l'envergure des ailerons furent agrandies.

L'Olympia 403 garda les 17 m d'envergure du type 402. Le fuselage fut allongé de 25 cm vers l'avant, en comparaison de l'Olympia standard, par l'adjonction d'une pièce spéciale entre la cloison principale du fuselage et le poste de pilotage. La partie supérieure du capotage du siège du pilote et du fuselage fut notablement agrandie. Le type 403 fut équipé d'un plan fixe vertical et d'un gouvernail de direction de plus grande étendue et de construction entièrement nouvelle; à cela s'ajoute un stabilisateur à charnières, mobile de toutes parts de façon à pouvoir être relevé pendant le transport. Ce stabilisateur montrait sur toute son envergure (plus tard sur la moitié seulement) un gouvernail de compensation présentant le rapport de transmission 2:1, qui servait en même temps à l'équilibrage.

L'Olympia 4/19 conserva le fuselage de 403, avec de légères modifications: le nez est un peu plus long, le gouvernail de direction un peu plus grand. Envergure des ailes: 19 m; l'envergure de l'aileron en frise, d'une seule pièce a été agrandie. Stabilisateur comme sur le 403.

Le 4/15 est une variante du type 4/19, mais l'envergure a été ramenée à 15 m.

Type designation	Olympia Eon Mark 2	Olympia Eon Mark 4/15	Olympia Eon Mark 4/19
Designer(s)	Aviation and Engineering Projects Ltd.		
Date of first flight of prototype	March 1947	April 1958	March 1958
Number produced	100	1	2
Wings			
Span ..... m	15.0	15.0	18.9
Area ..... m^2	15.0	15.0	17.9
Aspect ratio	15.0	15.0	19.9
Wing root chord ..... m	1.4	1.34	1.4
Wing tip chord ..... m	0.58	0.62	0.48
Mean aerodynamic chord (m.a.c.) ..... m	0.99	0.99	0.94

Type designation		Olympia Eon Mark 2	Olympia Eon Mark 4/15	Olympia Eon Mark 4/19
Wing section, root		Gö 549 mod.	64_3 618	64_3 618
Wing section, tip		Gö 676	64_4 421 mod.	64_4 421 mod.
Dihedral	deg.	3	3	3
¼ chord sweep	deg.	+0.25	+0.25	+0.25
Aero. twist root/tip	deg.	5	1	1.75
Ailerons				
Type		plain	frise	frise
Span	m	3.6	4.3	5.8
Area	m^2	1.18	0.86	1.16
Mean chord	m	0.33	0.2	0.2
Max. deflection up	deg.	26	29	29
Max. deflection down	deg.	13	10	10
Mass balance degree		nil	nil	66%
Mass balance method		—	—	LE
Horizontal tail				
Span	m	2.9	3.0	3.0
Area of elevator and fixed tail	m^2	2.15	2.2	2.2
Area of elevator	m^2	1.0	2.2	2.2
Max. deflection up	deg.	24	8	8
Max. deflection down	deg.	24	10	10
Aerofoil section		symmetrical	symmetrical	symmetrical
Mass balance degree		50%	80%	80%
Mass balance method		horn	LE	LE
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.1	4.9	4.9
Elevator aerodynamic balance method		unbalanced	unbalanced	unbalanced
Elevator trimming method		tab		
Horizontal tail volume coefficient		0.59	0.64	0.64
Special features			anti-balance tabs	anti-balance tabs
Vertical tail				
Area of fin and rudder	m^2	1.37	1.6	1.6
Area of rudder	m^2	1.0	0.75	0.75
Aspect ratio		1.6	1.23	1.23
Tail arm	m	4.9	4.8	4.8
Max. deflection	deg.	32	25	25
Aerofoil section		symmetrical	symmetrical	symmetrical
Mass balance degree		nil		
Aerodynamic balance		none	none	none

Type designation	Olympia Eon Mark 2	Olympia Eon Mark 4/15	Olympia Eon Mark 4/19
Fuselage			
Max. width ..... m	0.6	0.61	0.61
Overall length ..... m	6.61	7.57	7.62
Max. cross section ..... m^2	0.55	0.6	0.6
Number seats	1	1	1
Undercarriage type	fixed wheel	skid, droppable wheels	skid, droppable wheels
Wheel diameter ..... cm	25		
Lift increasing devices			
Type	none	none	none
Drag producing devices			
Type	wing airbrakes	wing airbrakes	wing airbrakes
Span ..... m	0.95	1.28	1.28
Area ..... m^2	0.38	0.6	0.6
% of span	38	26	26
Location, % of chord	37	60	60
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.	yes	yes	yes
Weights			
Empty weight ..... kg	195	226	272
Max. load ..... kg	109	114	113
Max. permissible flying weight ..... kg	304	340	385
Wing loading ..... kg/m^2	20	22.6	21
Design standards			
Airworthiness requirements to which aircraft has been built	BCAR	BCAR	BCAR
Date of issue of these requirements	1948	1958	1958
Certificate of airworthiness	yes		

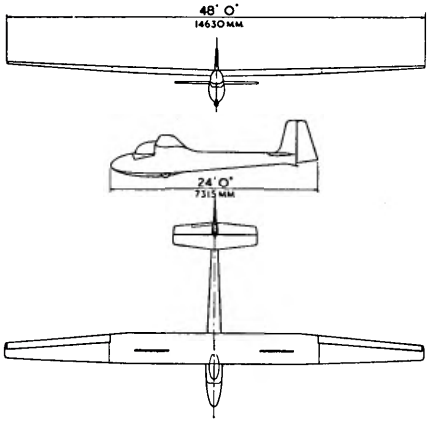
Design flight envelope Manoeuvre loads	V km/h	n	V km/h	n	V km/h	n
Point A			135	5.	135	5.
Point B			217	4.	217	4.
Point C			217	0	217	0
Point D			117	—2.5	117	—2.5

Type designation	Olympia Eon Mark 2		Olympia Eon Mark 4/15		Olympia Eon Mark 4/19	
Limiting flight conditions						
Placard airspeed smooth conditions ..... km/h	208		224		224	
Placard airspeed gusty conditions ..... km/h	128		137		127	
Aero-towing speed ..... km/h	100		120		120	
Winch launching speed .. km/h	100		120		120	
Cloud flying permitted ..	yes		yes		yes	
Permitted aerobatic manoeuvres	loop, stall turns		loop, stall turns, slow rolls		loop, stall turns, slow rolls	
Spinning permitted	yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.....	30% and 40%		28% and 40%		30% and 45%	
Straight flight performance						
at flying weight of ..... kg	304		340		385	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink.....	63	0.67	81.5	0.70	74.	0.56
V for max. L/D	72.5		86	0.73	83.5	0.61
			100	1.00	100	0.93
			120	1.63	120	1.57
			140	2.35	140.	2.25
Stalling speed ..... km/h	50		60		56	
Max. L/D	~25		~33		~38	

Great Britain - Großbritannien - Grande-Bretagne

Manufacturer:
Slingsby Sailplanes Ltd.
Kirbymoorside, Yorkshire

Photo Charles E. Brown



Skylark 2

The Skylark 2 is a medium high performance single seat sailplane intended for private owner or club use. It is highly manœuvrable yet retains good inherent stability. It is fitted with speed limiting airbrakes and meets the requirements of the "Standard Class" sailplane. The main constructional materials are spruce and plywood. Fibre glass is used for fairings and nose cap.

Skylark 2

Einsitzer für mittlere Leistungsflüge, geeignet für Klubs oder Private. Sehr beweglich bei gleichzeitiger Stabilität. Mit geschwindigkeitsbeschränkenden Bremsklappen ausgerüstet und nach den Vorschriften der Standardklasse für Segelflugzeuge gebaut. Das Baumaterial besteht in erster Linie aus Rottannen- und Sperrholz. Verkleidung und Rumpfspitze aus Fiberglas.

Skylark 2

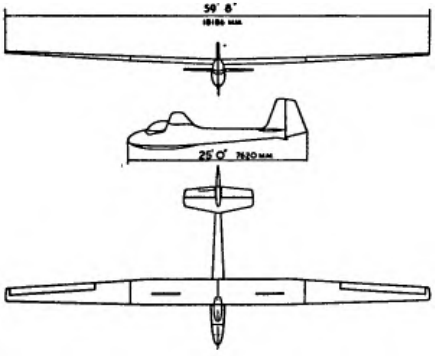
Monoplace pour vols de performance moyenne. Convient aux clubs et aux particuliers. Très manœuvrable et en même temps très stable. Avec volets de freinage qui limitent la vitesse. Construit selon les prescriptions de la classe standard des planeurs. Matériau: surtout sapin rouge et contreplaqué. Revêtement et nez du fuselage en fibre de verre.

Photo Charles E. Brown

Skylark 3B

The Skylark 3 is a single-seat sailplane developed from the Skylark 2. A high performance sailplane, of reasonable cost, it is suitable for competition and extended

cloud flying. The airbrakes are speed limiting and it may be fitted with or without a wheel. The main constructional materials are spruce and plywood. The Skylark 3 was flown by several teams in the 1956 Internationals.



Skylark 3B

Einsitziges Segelflugzeug, entwickelt aus dem Skylark 2. Hochleistungsflugzeug mit bescheidenen Gestehungskosten, geeignet für Wettkämpfe und Wolkenflug jeder Art. Geschwindigkeitsbeschränkende Bremsklappen. Mit oder ohne Rad erhältlich. Wichtigstes Baumaterial: Rottannen- und Sperrholz. Der Skylark 3 wurde an der Weltmeisterschaft 1956 von verschiedenen Mannschaften eingesetzt.

Skylark 3B

Monoplace développé à partir du Skylark 2. Planeur de haute performance, prix de revient modique. Convient pour tous concours et vols dans les nuages. Volets de freinage limitant la vitesse. Livré avec et sans roue. Matériau: surtout sapin rouge et contreplaqué. Le Skylark 3 a été utilisé aux championnats du monde 1956 par plusieurs équipes.

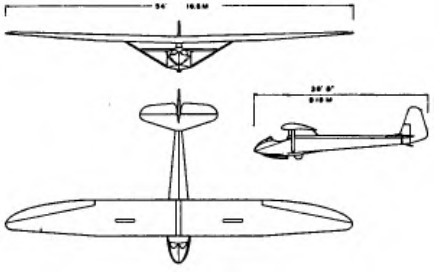
Slingsby 21B

The Slingsby 21B is a side-by-side two-seat sailplane and is primarily intended for general training and club use. Its performance at low speeds makes it suitable for conditions of marginal convection. The main constructional materials are spruce and plywood.

Slingsby 21B

Zweisitziges Segelflugzeug mit Sitzanordnung nebeneinander. Vornehmlich für allgemeine Schulung und den Klubgebrauch gebaut. Seine Leistungen bei kleinen Geschwindigkeiten machen es für Flüge mit enger Thermik geeignet. Hauptbaumaterial: Rottannen- und Sperrholz.

Photo Charles E. Brown



Slingsby 21B

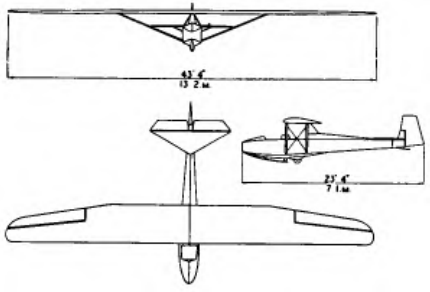
Planeur biplace à sièges côte à côte. Prévu surtout pour la formation des élèves et l'usage des clubs. Ses performances aux basses vitesses le rendent très propre aux vols sur ascendance thermique resserrée. Matériau: surtout sapin rouge et contreplaqué.

Tandem Tutor

The Tandem Tutor is designed as a two-seat training glider for the minimum initial cost. The main constructional materials are spruce and plywood.

Tandem Tutor

Zweisitziges Schulungs-Segelflugzeug, besonders im Hinblick auf geringe Anfangskosten gebaut. Hauptbaumaterial: Rottannen- und Sperrholz.



Tandem Tutor

Planeur biplace d'école, construit surtout en vue de restreindre les frais initiaux. Matériau: surtout sapin rouge et contreplaqué.

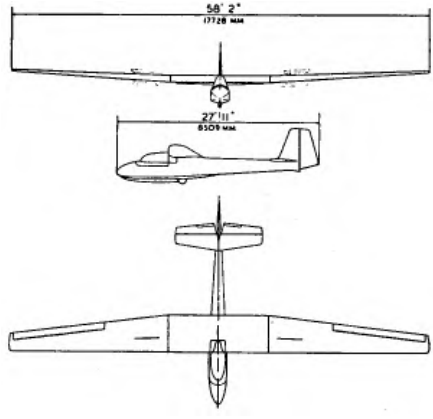
Photo Charles E. Brown

Eagle 3

The Eagle 3 is a high performance two-seat sailplane for competition flying or training. Its handling characteristics are very similar to modern high performance single-seat sailplanes. Its laminar flow airfoil combined with a smooth wing surface provide it with an exceptionally good performance over a wide speed range. It is fitted with speed limiting airbrakes. The main constructional materials are spruce and plywood. The Eagle 3 won the 1956 World Gliding Championships two-seat class.

Eagle 3

Zweisitziges Hochleistungs-Segelflugzeug für Wettkämpfe und Schulung. Seine Flugeigenschaften sind jenen eines modernen Hochleistungs-Einsitzers sehr ähnlich. Laminarflügel und störungsfreie Flügeloberfläche verleihen ihm außerordentlich gute Leistungen über einen großen Geschwindigkeitsbereich. Mit geschwindigkeitsbeschränkenden Bremsklappen ausgerüstet. Hauptbaumaterial: Rottannen- und Sperrholz. Der Eagle 3 siegte an der Weltmeisterschaft 1956 in der Doppelsitzerklasse.



Eagle 3

Planeur biplace de haute performance pour les concours et l'entraînement. Ses qualités de vol sont très semblables à celles d'un monoplane moderne de haute performance. Les ailes laminaires et un dessus d'aile exempt de perturbations lui assurent des performances excellentes à des vitesses très diverses. Doté de volets de freinage limitant la vitesse. Matériau: surtout sapin rouge et contreplaqué. Le planeur Eagle 3 a gagné les championnats du monde 1956 dans la classe des biplaces.

Type designation		Skylark 2	Skylark 3B	Slingsby T-21B	Tandem Tutor T-3I	Eagle 3 T-42
Designer		Slingsby Sailplanes Ltd.				
Date of 1st flight of prototype		Nov. 1953	July 1955	Dec. 1947	Sept. 1950	May 1956
Number produced		37	18	157	139	4
Wings						
Span	m	14.63	18.2	16.5	13.2	17.8
Area	m^2	13.4	16.1	24.2	15.8	21.3
Aspect ratio		16.0	20.5	11.2	11.0	14.8
Wing root chord	m	1.07	1.07	1.68	1.38	1.52
Wing tip chord	m	0.53	0.53	0.64	0.79	0.73
Mean aerodynamic chord (m.a.c.)	m	0.92	0.89	1.47	1.20	1.20
Wing section, root		63_3–620	63_3–620	Gö 535	Gö 426	63_3–618
Wing section, tip		4415	4415	Sym.	Sym.	4412
Dihedral	deg.	2.0	2.0	1.5	0.5	2.0
¼ chord sweep	deg.	0.2	0.2	1.0	—1.4	—1.1
Aero. twist root/tip	deg.	3.0	3.0	8.4	3.0	3.0
Length of each section of wing	m	1 center 7.4 2 outer 3.61	1 center 7.4 2 outer 5.4	2 sections	2 sections	1 center 7.0 2 outer 5.4
Special features				strutted	strutted	
Ailerons						
Type		Plain	Plain	Plain	Plain	Plain
Span (total)	m	7.1	7.1	5.8	5.6	8.2
Area (total)	m^2	1.67	1.66	1.77	2.01	2.48
Mean chord	m	0.235	0.234	0.304	0.36	0.30
Max. deflection up	deg.	23	25	27	24.5	29.0
Max. deflection down	deg.	12.3	10	18	12.3	9.6
Mass balance degree		not available	52%	NIL	NIL	46%
Mass balance method		internal weight	internal weight	none	none	internal weight
Horizontal tail						
Span	m	2.88	2.88	3.69	3.00	3.71
Area of elevator and fixed tail	m^2	2.09	2.58	3.16	1.99	3.00
Area of elevator	m^2	0.93	1.10	1.40	0.94	1.44
Max. deflection up	deg.	25	25	23.5	24.3	26.6
Max. deflection down	deg.	25	25	23.5	24.3	26.6
Aerofoil section		Sym.	Sym.	Sym.	Sym.	Sym.
Mass balance degree		NIL	NIL	NIL	NIL	NIL
Mass balance method		—	—	—	—	—
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.97	3.94	5.04	3.45	4.36

Type designation		Skylark 2	Skylark 3B	Slingsby T-21B	Tandem Tutor T-31	Eagle 3 T-42
Elevator aerodynamic balance method		NIL	NIL	NIL	NIL	NIL
Elevator trimming method		control-lable tab	control-lable tab	none	none	control-lable tab
Horizontal tail volume coefficient		0.68	0.713	0.448	0.362	0.55
Special features			Balance weight connected to control system			Balance weight connected to control system
Vertical tail						
Area of fin and rudder	m^2	1.38	1.87	1.55	0.89	2.11
Area of rudder	m^2	0.70	0.89	1.20	0.70	0.89
Aspect ratio		1.34	1.32		1.58	1.27
Tail arm	m	4.45	4.40	5.55	3.96	4.82
Max. deflection	deg.	25	25	24.5	21.8	28.4
Aerofoil section		Sym.	Sym.	Sym.	Sym.	Sym.
Mass balance degree		NIL	NIL	NIL	NIL	NIL
Mass balance type		—	—	—	—	—
Aerodynamic balance		NIL	NIL			NIL
Special features				Horn	Horn	
Fuselage						
Max. width	m	0.62	0.62	1.12	0.65	0.79
Overall length	m	7.31	7.62	8.16	7.1	8.5
Max. cross section	m^2	0.44	0.44	not available	not available	0.70
Wetted surface area	m^2	not available	11.4	12.3	not available	15.8
Number seats and arrangement		1	1	2 sidebyside	2 tandem	2 tandem
Undercarriage type		fixed wheel and skid	fixed wheel and skid	fixed wheel and skid	fixed wheel and skid	fixed wheel and skid
Wheel diameter	cm	28	32	39	28	39
Special features						
Lift increasing devices		none	none	none	none	none
Drag producing devices						
Type		DFS type airbrakes	DFS type airbrakes	spoilers	none	DFS type airbrakes
Span (one surface)	m	1.01	1.16	0.90	—	1.06
Area (total)	m^2	0.387	0.437	0.247	—	0.48
% of span		13.8	12.8	10.9	—	12.6
Location, % of chord		44	50	38.6	—	41.4

Type designation	Skylark 2		Skylark 3B		Slingsby T-21B		Tandem Tutor T-31		Eagle 3 T-42	
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no	yes		yes		no		—		yes	
Weights										
Wings[1] kg	123		160		142		89		216	
Fuselage[2] kg	76		82		113		79		138	
Tailplane and elevator kg	10		11		12		8		18	
Empty weight[3] kg	209		253		267		176		372	
Instruments kg	3		3		3		3		6	
Other equipment (e.g. oxygen, radio) kg	0		0		0		0		0	
Equipped weight kg	212		256		270		179		378	
Max. load kg	96		102		205		197		184	
Max. permissible flying weight kg	308		358		475		376		562	
Wing loading kg/m²	23.0		22.2		19.6		23.8		26.4	
Design standards										
Airworthiness requirements to which aircraft has been built	B.C.A.R. semi aerobatic category		B.C.A.R. semi aerobatic category		B.C.A.R. semi aerobatic category		B.C.A.R. normal category		B.C.A.R. semi aerobatic category	
Date of issue of these requirements	1948		1957		1948		1948		1957	
Certificate of Airworthiness yes/no	yes		yes		yes		yes		yes	
Design flight envelope	V km/h	ULF	V km/h	ULF	V km/h	ULF	V km/h	ULF	V km/h	ULF
Manœuvre loads										
Point A	132	7.5	131	7.5	116	7.5	122	6.0	134	7.5
Point B	242	6.0	222	6.0	233	6.0	183	4.5	270	6.0
Point C	242	0	222	0	233	0	183	0	270	0
Point D	122	−3.8	120	−3.8	114	−3.8	86	−2.3	115	−3.8
Gust conditions (gradual gust)	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Upgust	148	20	131	20	130	20	122	15	134	20
Downgust	148	20	131	20	130	20	122	15	134	20
Limiting flight conditions	EAS		EAS		IAS		IAS		EAS	
Placard airspeed smooth conditions km/h	215		216		170		130		237	
Placard airspeed gusty conditions km/h	not applicable		131		not applicable		not applicable		134	

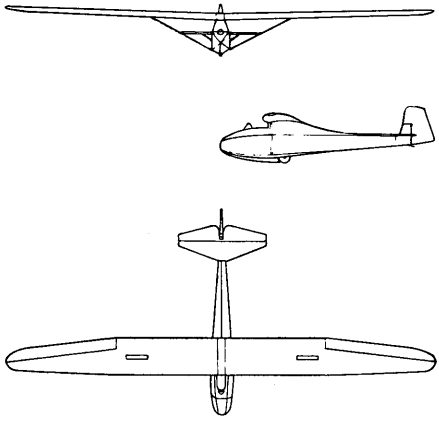
Type designation	Skylark 2		Skylark 3B		Slingsby T-21B		Tandem Tutor T-31		Eagle 3 T-42	
Aero-towing speed ..... km/h	132		131		120		96		134	
Winch launching speed ... km/h	111		131		102		89		134	
Cloud flying permitted yes/no	yes		yes		yes		no		yes	
Permitted aerobatic manœuvres.....	loop spin stall turn		loop spin		loop spin stall turn		none		loop spin stall turn	
Spinning permitted yes/no	yes		yes		yes		no		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	not available		not available		not available		not available		not available	
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) .. km/h	215		216		—		—		237	
Straight flight performance at flying weight of ..... kg	308		359		475		376		544	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	71	0.67	70	0.55	62	0.85	67	1.05	71	0.67
V for max. L/D	78	0.72	76	0.59	69	0.91	73	1.10	83	0.73
	133	2.0	141	2.0	102	2.0	102	2.0	140	2.0
Stalling speed ..... km/h	59		58		52		61		60	
Max. L/D.....	30		36		21		18.5		31.5	

[1] with struts, controls, flaps and brakes

[2] complete with rudder and fin, less instruments and equipment

[3] to include any fixed ballast

Manufacturer:
Slingsby Sailplanes Ltd.
Kirbymoorside, Yorkshire,
England
Designer:
Slingsby Sailplanes Ltd.



Slingsby Prefect

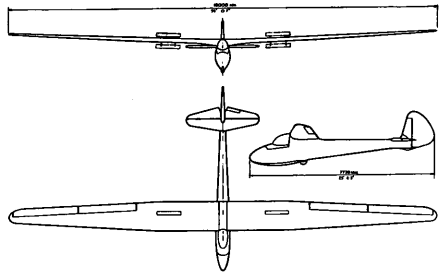
The Prefect is constructed of wood and is intended for gliding club intermediate training. For this purpose it is generally considered to have the correct degree of docility and controllability. It is also suitable for initial cross country flying.

Slingsby Prefect

Holzkonstruktion, vorgesehen für Schulung auf der Mittelstufe in Segelfluggruppen. Für diesen Zweck hat er nach allgemeiner Auffassung die richtige Mischung von Gutmütigkeit und Steuerbarkeit. Ebenfalls für Anfänger-Streckenflugerfahrung geeignet.

Slingsby Prefect

Construction de bois, prévue pour l'entraînement de degré moyen dans les groupes de vol à voile. On convient généralement qu'il présente le mélange de bonhomie et de manœuvrabilité exigé par ce but. Egalement propre à donner aux débutants l'expérience du vol à distance.



Slingsby Sky

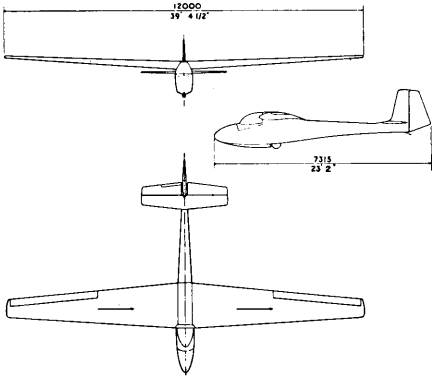
The Sky is a well-known high performance sailplane which was developed from the Gull 4, mainly by increasing the wing span by 3 m. The cockpit cover is made from "Perspex" and formed to its shape by the blowing process. The main structural materials are Sitka spruce and birch plywood. The main wing attachment is by the "three pin method" which is convenient for easy assembly. The position of the rudder pedals is adjustable in flight. This is the only British sailplane on which really extensive accurate performance tests have been carried out. These tests consisted of over 100 "partial glides" in selected weather conditions. This aircraft was the type in which Philip Wills won the 1952 World Gliding Competitions.

Slingsby Sky

Bekanntes Hochleistungsflugzeug, entwikkelt aus der Gull 4, hauptsächlich durch Vergrößerung der Spannweite um 3 m. Bedeckung der Pilotenkabine aus Perspex, das in der endgültigen Form geblasen wird. Hauptbaumaterial: Sitka-Rottannen- und Birkensperrholz. Hauptsächliche Befestigung der Flügel durch die «Dreinadelmethode», welche einen leichten Zusammenbau ermöglicht. Seitenruderpedale im Flug verstellbar. Einziges englisches Segelflugzeug, dessen Leistungen eingehend geprüft wurden. Die Testflüge bestanden in über 100 «Teilsegelflügen» unter bestimmten Wetterbedingungen. Philip Wills gewann mit dem Sky 1952 die Weltmeisterschaft.

Slingsby Sky

Planeur de haute performance connu, provenant du Gull 4, dont il se distingue surtout par une envergure de 3 m de plus. Le poste de pilotage est recouvert de Perspex, qui reçoit sa forme définitive par soufflage. Matériaux principaux: contre-plaqué de sapin rouge Sitka et de bouleau. Fixation principale des ailes par la méthode des trois aiguilles, qui permet un montage facile. La pédale du gouvernail de direction est réglable en vol. Seul planeur anglais dont les performances aient été minutieusement étudiées. Les vols d'essai consistèrent en plus de 100 «vols partiels à voile», dans des conditions météorologiques déterminées. Philip Wills gagna sur Sky le championnat mondial de 1952.



Slingsby Swallow

The Swallow was designed to meet the need for a small sailplane, yet having a better performance than that usually associated with sailplanes of this size. This performance has been achieved by employing low drag type airfoils, and the general aerodynamic cleaness is comparable with larger high performance sailplanes. It is intended for private owner and club use and for competitions in a restricted class (i. e. under 12 m wing span). In general the structure is of the standard type employed by Slingsby Sailplanes Ltd. At present the aircraft is undergoing flight trials.

Slingsby Swallow

Gebaut im Hinblick auf kleine Ausmaße, wobei bessere Leistungen erreicht wurden, als sie bei Flugzeugen dieser Größen üblich sind. Dies wurde erreicht durch die Verwendung von Tragflächentypen mit geringem Widerstand; die allgemein saubere aerodynamische Ausführung gleicht jener bei größeren Leistungsflugzeugen. Gebaut für Private und Gruppenbetrieb sowie für Wettkämpfe in einer beschränkten Klasse (Spannweite unter 12 m). Allgemeiner Aufbau nach der Standardausführung der Slingsby Sailplanes Ltd. Das Flugzeug wird gegenwärtig Flugversuchen unterworfen.

Slingsby Swallow

Construit pour avoir de petites dimensions, mais susceptible de performances supérieures à celles que l'on obtient d'ordinaire avec des planeurs de cette grandeur. On arriva à ce résultat en recourant à des types de surfaces portantes de faible résistance; l'exécution aérodynamique nette partout rappelle celle des planeurs de performance de plus grande taille. Construit pour les particuliers et les groupes et pour les concours d'une classe standard (envergure inférieure à 12 m). Dans l'ensemble, la construction est du type standard de Slingsby Sailplanes Ltd. Le planeur est soumis actuellement à des essais en vol.

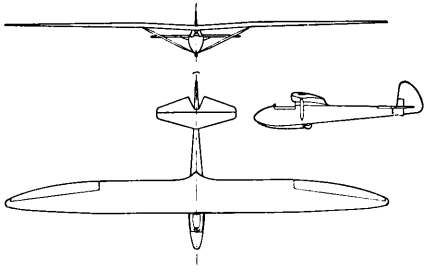
Type designation		Slingsby Prefect	Slingsby Sky	Slingsby Swallow
Designer(s)		Slingsby Sailplanes Ltd.		
Date of first flight of prototype		June 1948	September 1950	October 1957
Number produced		43	16	2
Wings				
Span	m	13.72	18.0	11.83
Area	m^2	14.25	17.37	12.88
Aspect ratio		13.2	18.7	10.9
Wing root chord	m	1.18	1.20	1.52
Wing tip chord	m		.62	.61
Standard mean chord ...	m	1.04	.96	1.09
Wing section, root		Gö 535	Gö 547	NACA 63_3618
Wing section, tip.....		symmetrical	NACA 2R, 12	NACA 4412
Dihedral	deg.	2.0	2.0	3.3
¼ chord sweepback	deg.			1.0
Aero. twist root/tip	deg.	7.0	5.0	3.04
Length of each section of wing	m	6.70	9.02	5.94
Ailerons				
Type		plain	plain	plain
Span (total)	m	7.01		5.87
Area (total)	m^2	2.04	2.90	1.47
Mean chord	m	.291		.250
Max. deflection up	deg.	22.9	27.8	24.4
Max. deflection down	deg.	11.7	13.9	12.0
Mass balance degree		nil	nil	nil
Mass balance method ...		none	none	none
Special features			2 ailerons p. wing	
Horizontal tail				
Span	m	2.82	3.00	2.83
Area of elevator and fixed tail	m^2	2.27	2.01	2.16
Area of elevator	m^2	1.04	.86	1.00
Max. deflection up	deg.	26.8	23.9	22.2
Max. deflection down	deg.	22.0	23.9	22.2
Aerofoil section		symmetrical	symmetrical	symmetrical
Mass balance degree		nil	nil	nil
Mass balance method ...		none	none	none
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.51	4.27	3.69
Elevator aerodynamic balance method.....		nil	nil	nil

Type designation		Slingsby Prefect	Slingsby Sky	Slingsby Swallow
Elevator trimming method		nil	controllable tab	controllable tab
Horizontal tail volume coefficient		.536	.515	.567
Vertical tail				
Area of fin and rudder	m^2	.77	1.15	1.41
Area of rudder	m^2	.70	.77	.70
Aspect ratio		1.93		1.30
Tail arm	m	4.11		4.01
Max. deflection	deg.	27.0	25.5	25.1
Aerofoil section		symmetrical	symmetrical	symmetrical
Mass balance degree		nil	nil	nil
Mass balance type		none	none	none
Aerodynamic balance		horn	none	none
Fuselage				
Max. width	m	.585		.622
Overall length	m	6.49	7.65	7.04
Wetted surface area	m^2			12.91
Number seats and arrangement		1	1	1
Undercarriage type		fixed wheel and skid	fixed wheel and skid	fixed wheel and skid
Wheel diameter	cm	28	28	32
Lift increasing devices				
Type		none	none	none
Drag producing devices				
Type		scissor type airbrakes	airbrakes mounted on hinges parallel to wing spar	scissor type airbrakes
General location		top and bottom of wing	top and bottom of wing	top and bottom of wing
Span (one surface)	m	.814	1.000	.997
Area (total)	m^2	.328	.650	.395
% of span		11.9	11.1	16.9
Location, % of chord		29.4		41.5
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.?		no	yes	yes
Weights				
Wings	kg	101.0		93.0
Fuselage	kg	68.3		83.9
Tailplane and elevator	kg	7.6	10.9	10.4
Empty weight	kg	176.9	252.2	187.3
Instruments	kg	1.4	3.2	3.2
Other equipment (e.g. oxygen, radio)	kg	0	0	0

Type designation	Slingsby Prefect		Slingsby Sky		Slingsby Swallow	
Equipped weight ..... kg	178.3		255.4		190.5	
Removable ballast ..... kg	0		0		0	
Max. load ..... kg	100.7		107.5		127.0	
Max. permissible flying weight ..... kg	279.0		362.9		317.5	
Wing loading ..... kg/m²	19.5		20.9		24.6	
Design standards						
Airworthiness requirements to which aircraft has been built	BCAR semi-aerobatic		BCAR semi-aerobatic		BCAR semi-aerobatic	
Date of issue of these requirements	1948		1948		1957	
Certificate of airworthiness yes/no	yes		yes		no	
Design flight envelope	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor
Manoeuvre accelerations (g)						
Point A	106	5	121	5	140	5
Point B	215	4	241	4	252	4
Point C	215	0	241	0	252	0
Point D	100	—2.5	114	—2.5	113	—2.5
Factor of safety.....	1.5		1.5		1.5	
Gust conditions (gradual gust)	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Upgust	120	20	134	20	140	20
Downgust.....	120	20	134	20	140	20
Factor of safety.....	1.5		1.5		1.5	
Limiting flight conditions						
Placard airspeed smooth conditions ..... km/h	167		182		224	
Placard airspeed gusty conditions ..... km/h	120		134		140	
Aero-towing speed ..... km/h	111		104		148	
Winch launching speed .. km/h	93		82		130	
Cloud flying permitted yes/no	yes		yes		yes	
Permitted aerobatic manoeuvres	loop, spin, stall turn		loop, spin, stall turn		loop, spin, stall turn	
Spinning permitted	yes		yes		yes	

Type designation	Slingsby Prefect		Slingsby Sky		Slingsby Swallow	
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) ..... km/h	not applicable		200		224	
Straight flight performance at flying weight of..... kg	258.6		362.9		272.2	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	59	.850	62	.658	67	.844
V for max. L/D	69		69		81	
	104	2.0	123	2.0	122	2.0
Stalling speed ..... km/h	56		54		58	
Max L/D.....	20.9		27.5		24.0	

Manufacturer:
Slingsby Sailplanes Ltd.
Kirbymoorside, Yorkshire,
England



Kite 1

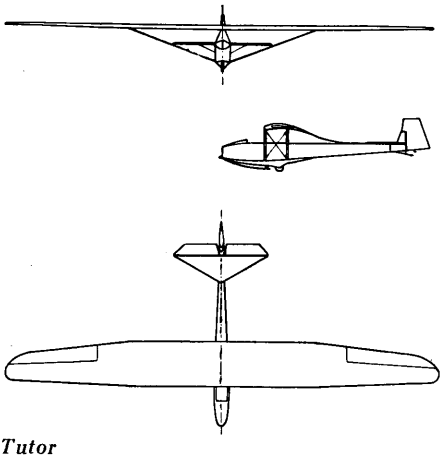
The Kite 1 was the first British built sailplane to have a semi-monocoque fuselage structure. The main structural materials are spruce and birch plywood. The wing has a single main spar and a strut; torsional strength is provided by a "D" type plywood covered nose box. A partial cockpit cover is provided, so that although the cockpit is of the open type, the drag due to this is small.

Kite 1

Erstes englisches Segelflugzeug mit Rumpf in Halbschalenbauweise. Wichtigste Baumaterialien: Rottannen- und Birkensperrholz. Flügel mit einem einzigen Hauptholm und einer Strebe; Torsionsfestigkeit wird gewährleistet durch einen sperrholzbeplankten Bugkasten. Trotzdem der Pilotensitz offen ist, besteht eine teilweise Überdeckung desselben, so daß der Widerstand klein wird.

Kite 1

Premier planeur britannique avec fuselage en demi-coque. Matériaux les plus importants: contre-plaqué de sapin rouge et de bouleau. Ailes avec longeron principal unique et un mât; la résistance à la torsion est garantie par un caisson de proue recouvert de contre-plaqué. Bien que le poste de pilotage soit ouvert, il est recouvert partiellement, de sorte que la résistance est minime.



Tutor

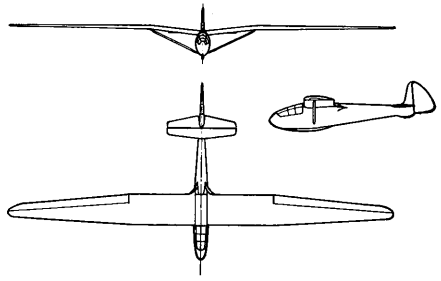
The Tutor is an intermediate training glider, but many cross country flights have been achieved. This aircraft was developed from the Kirby Cadet (a previous training glider made by Slingsby Sailplanes Ltd.). The wing is of the two spar type with two struts for each wing and the resulting structure has an exceptionally good strength/weight ratio. This wing was strength tested and 74 % overload was sustained before failure.

Tutor

Schulungsflugzeug für die Zwischenstufe, mit dem indessen schon viele Streckenflüge ausgeführt wurden. Entwickelt aus dem Kirby Cadet (einem früheren Schulungsflugzeug der Slingsby Sailplanes Ldt.). Zweiholmiger Flügel mit zwei Streben für jeden Flügel; aus dieser Bauweise ergibt sich ein äußerst gutes Verhältnis zwischen Festigkeit und Gewicht. Der Flügel wurde auf Festigkeit geprüft und ging erst bei 74 Prozent Überlastung zu Bruch.

Tutor

Planeur d'école pour le stade intermédiaire de l'entraînement, mais qui n'en a pas moins déjà servi à de nombreux vols de distance. Provient du Kirby Cadet (planeur d'école précédent de Slingsby Sailplanes Ltd.). Aile à deux longerons, avec deux mâts pour chaque aile; ce genre de construction donne un très bon rapport entre la résistance et le poids. La résistance de l'aile a été soumise à des essais, et il a fallu une surcharge de 74 % pour que l'aile se rompe.



Gull 1

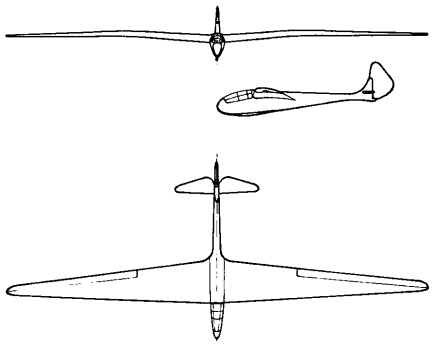
The Gull 1 was the first glider to make a flight across the English Channel, after a distance of 145 km had already been flown across England. As a result of employing airfoils of the NACA 4-digit series, with low profile at high speeds, this glider has good "penetration" performance. The structural materials are spruce and birch plywood.

Gull 1

Erstes Segelflugzeug, mit welchem der englische Kanal nach einem vorhergehenden Streckenflug von 145 km in England überflogen wurde. Gute Einflugeigenschaften dank der Verwendung von Tragflächen der NACA-4-digit-Serie mit günstigem Profil für hohe Geschwindigkeiten. Baumaterial: Rottannen- und Birkensperrholz.

Gull 1

Premier planeur avec lequel la Manche ait été traversée, et cela après qu'une distance de 145 km avait déjà été couverte en Angleterre. Bonnes qualités de vol grâce aux surfaces portantes de la série NACA-4-digit, avec profil favorable aux grandes vitesses. Matériaux: contre-plaqué de sapin rouge et de bouleau.



Petrel

The Petrel has a low wing loading and is particularly suitable for soaring in the rather weak thermals experienced in the British Isles. As the wing is of the cantilever type a high taper ratio was employed in order to keep the structure weight to a minimum. Initially, in the interests of performance, no tailplane was fitted and the longitudinal control was provided by an elevator only. On later aircraft the usual type of tailplane and elevator was fitted to provide inherent stability. The Petrel is built of spruce and birch plywood.

Petrel

Niedrige Flächenbelastung, besonders geeignet für Segelflug in der eher schwachen Thermik der britischen Inseln. Freitragender Flügel mit großem Schlankheitsverhältnis zur Reduktion des Gewichts. Anfänglich war im Interesse der Leistung keine Höhenflosse vorgesehen; die Kontrolle in der Längsrichtung erfolgte lediglich durch das Höhenruder. Bei den später gebauten Flugzeugen ist man auf die normale Ausführung von Höhenflosse und -ruder zurückgekommen, und es wurde damit eine bessere Festigkeit erreicht. Baumaterial: Rottannen- und Birkensperrholz.

Petrel

Faible charge alaire, particulièrement propre au vol à voile dans la thermique plutôt faible des îles Britanniques. Ailes en porte à faux à grand rapport d'allongement, en vue d'une réduction du poids. Tout d'abord, dans l'intérêt des performances, on n'avait pas prévu de stabilisateur; le contrôle de la direction longitudinale résultait du seul gouvernail de profondeur. Mais les exemplaires construits plus tard ont de nouveau un empennage de profondeur du type normal; ainsi, la résistance est améliorée. Matériaux: contre-plaqué de sapin rouge et de bouleau.

Type designation	Kite 1	Tutor	Gull 1	Petrel
Designer(s)	Slingsby Sailplanes Ltd.			
Date of first flight of prototype	Aug. 1935	July 1937	April 1938	Dec. 1938
Number produced	24	73	9	3
Wings				
Span ..... m	14.2	13.2	15.3	17.3
Area ..... m^2	14.49	15.79	14.86	16.72
Aspect ratio	13.0	11.0	15.8	17.9
Wing root chord ..... m	1.16	1.38	1.20	1.74
Wing tip chord ..... m	0.40	0.73	0.55	0.35
Standard mean chord ... m	1.02	1.20	0.85	

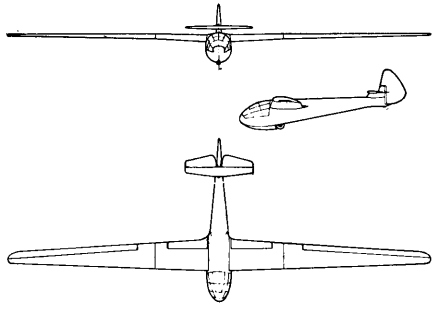
Type designation		Kite 1	Tutor	Gull 1	Petrel
Dihedral	deg.	gull	0.5	gull	gull
Aero. twist root/tip	deg.			3.5	
Wing dection (root)		Gö 535	Gö 426	NACA 4416	Gö 535
Ailerons					
Type		plain	plain	plain	plain
Span (total)	m		5.61		
Area (total)	m^2	2.64	2.01	3.16	3.24
Horizontal tail					
Area of elevator and fixed tail	m^2	2.51	1.99	1.76	
Area of elevator	m^2	1.07	0.94	0.91	
Aerofoil section		sym.	sym.	sym.	sym.
Vertical tail					
Area of fin and rudder	m^2	0.88	0.89	1.03	0.71
Area of rudder	m^2	0.79	0.70	0.74	0.54
Aerofoil section		sym.	sym.	sym.	sym.
Fuselage					
Max. width	m	0.60	0.56	0.60	0.56
Overall length	m	6.19	6.37	6.61	7.25
Number seats and arrangement		1	1	1	1
Undercarriage type		skid	fixed wheel and skid	skid	skid
Lift increasing devices					
Type		none	none	none	none
Drag producing devices					
Type		none	none	upper surface spoilers	none
Span	m			2×0.60	
Area	m^2			0. 143	
Weights					
Equipped weight	kg	140.5	159.5	172.5	199.5
Max. load	kg	84	99	111	90
Max. permissible flying weight	kg	224.5	258.5	283.5	289.5
Wing loading	kg/m^2	15.5	16.4	19.1	17.3
Design standards					
Airworthiness requirements to which aircraft has been built		BGA	BGA	BGA	BGA
Max. ultimate load factor	g	6	6	4.9	6

Type designation	Kite 1		Tutor		Gull 1		Petrel	
Limiting flight conditions								
Placard airspeed ..... km/h	113		145		129			
Aero-towing speed ..... km/h	97		113		97			
Winch launching speed .. km/h	80		106		80			
Permitted aerobatic manoeuvres	none		none		none		none	
Spinning permitted	no		no		no		no	
Straight flight performance								
at flying weight of...kg .	224.5		240.5		254		281	
	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	55	0.78	54	0.89	59	0.72	58	0.64
V for max. L/D	65		63		67		67	
Stalling speed	50		49					
Max. L/D	21		18		24		27	

Manufacturer:
Slingsby Sailplanes Ltd.
Kirbymoorside, Yorkshire,
England

Gull 2

The Gull 2 is a high performance two-seat sailplane with side-by-side seating arrangement and a large enclosed cockpit. It was completed just before the manufacture of civilian gliders ceased in 1940, so only one of this type was built. As the wing span is large, the wing is divided into three panels to facilitate transport. The wing loading being comparatively high, flaps are fitted for easier landing in restricted spaces. The main structural materials are spruce and birch plywood. The plywood on the wing surface forward of the main spar has the grain at 45° to the spar to provide adequate torsional stiffness. The fuselage is of the semi-monocoque type of structure.



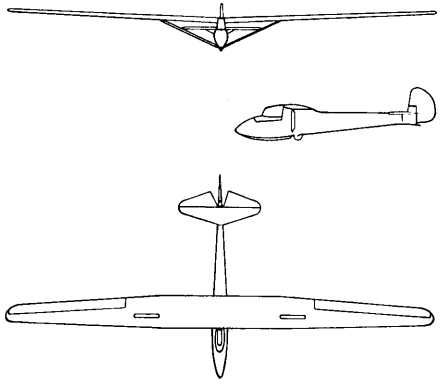
Gull 2

Zweisitziges Hochleistungsflugzeug mit Sitzanordnung nebeneinander und breitem, geschlossenem Pilotenraum. Vollendet unmittelbar vor der Einstellung des Baues ziviler Segelflugzeuge 1940; deshalb wurde nur ein Exemplar gebaut. Angesichts der großen Spannweite ist der Flügel in drei Teile geteilt, zwecks Erleichterung des Transports. Die Flächenbelastung ist relativ hoch; deshalb wurden für die Er-

leichterung der Landung auf kleinem Raum Landeklappen eingebaut. Hauptbaumaterial: Rottannen- und Birkensperrholz. Das Sperrholz auf der Flügeloberfläche vor dem Hauptholm hat seine Maserung in 45° zum Holm, zur Erzielung einer angemessenen Torsionsfestigkeit. Rumpf in Halbschalenbauweise.

Gull 2

Biplace de haute performance avec sièges l'un à côté de l'autre et un large poste de pilotage, fermé. Achevé en 1940, immédiatement avant que cesse la fabrication de planeurs civils; c'est pour cela qu'on n'en fabriqua qu'un exemplaire. A cause de la grande envergure, l'aile est divisée en trois parties, pour faciliter le transport. Charge alaire relativement élevée; c'est pourquoi des volets d'atterrissage ont été ajoutés pour que le planeur puisse se poser plus facilement sur un petit espace. Matériaux principaux: contre-plaqué de sapin rouge et de bouleau. Le contre-plaqué de la face supérieure de l'aile devant le longeron a sa veinure à 45° par rapport à celui-ci, de façon à obtenir une bonne résistance à la torsion. Fuselage construit en demi-coque.



Kite 2

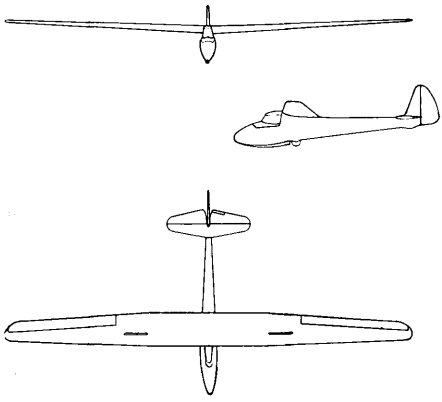
The Kite 2 was intended as a medium performance sailplane, mainly for use by gliding clubs. For easy rigging and economy, wing struts were fitted. The wing thickness was kept as low as practical, that is 12 % of the chord, thus at low speeds the total drag is no greater than for the usual cantilever type wing when airfoils of the NACA 4-digit series are employed. The tail arm is rather longer than for previous gliders of the same category, which gives improved control characteristics. The structural materials are spruce and birch plywood.

Kite 2

Vorgesehen als Flugzeug für mittlere Leistung, hauptsächlich für den Klubgebrauch. Aus Gründen der Wirtschaftlichkeit und der leichteren Montage wurden Streben angebracht. Die Flügeldicke wurde so klein als möglich gehalten, nämlich 12 Prozent der Flügeltiefe; deshalb ist bei kleiner Geschwindigkeit der Gesamtwiderstand nicht größer als für freitragende Flügel bei der Verwendung von Tragflächen der NACA-4-digit-Serie. Das Maß von einem Viertel mittlerer aerodynamischer Tiefe des Flügels bis zu einem Viertel aerodynamischer Tiefe Höhenleitwerk ist etwas länger als bei früheren Flugzeugen der gleichen Klasse; dadurch werden bessere Steuereigenschaften erzielt. Baumaterial: Rottannen- und Birkensperrholz.

Kite 2

Prévu comme planeur de performance moyenne, surtout pour l'usage des clubs. Parce que c'est plus économique, et pour faciliter le montage, il y a des mâts. L'épaisseur de l'aile a été gardée aussi faible que possible, soit 12 % de la profondeur; c'est pourquoi la résistance totale n'est pas, à petite vitesse, plus grande que dans le cas des ailes en porte à faux lorsqu'on emploie des surfaces portantes de la série NACA-4-digit. La mesure du quart de la profondeur aérodynamique moyenne de l'aile au quart de la profondeur aérodynamique moyenne de l'empennage de profondeur dépasse un peu le chiffre des planeurs antérieurs de la même classe; la manœuvrabilité s'en trouve améliorée. Fabriqué en contre-plaqué de sapin rouge et de bouleau.



Gull 4

The Gull 4 was developed from the Kite 2, the main differences are that wing and tailplane struts are not fitted and a larger fin is added. The result is better high speed performance and further improvement in stability.

Gull 4

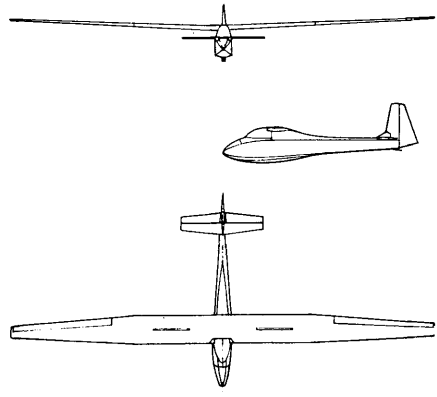
Entwickelt aus der Kite 2. Der Hauptunterschied besteht im Fehlen von Flügel- und Höhenflossenstreben; gleichzeitig wurde die Seitenflosse vergrößert. Daraus ergeben sich bessere Schnellflugeigenschaften und Verbesserungen in der Stabilität.

Gull 4

Développé à partir du Kite 2. La différence principale réside dans l'absence des mâts des ailes et du stabilisateur. En même temps, le plan fixe vertical a été agrandi. Il en résulte de meilleures propriétés pour le vol à haute vitesse et une stabilité accrue.

Skylark 1

This aircraft was the first British built glider to employ the NACA 6-series airfoils. In order that the necessary smooth wing surface could be achieved, thicker plywood, but of lower density wood, was used to cover the wing forward of the main spar. The result proved to be adequately free from waviness for its purpose; for a 50 mm sampling length, the departure of the surface from the "centre line average heigth" of the surface rarely exceeds 0.0125 mm. The aircraft has a moderately high aspect ratio and a high wing loading; it is therefore suitable for soaring in countries where strong convection currents occur. The type has been superseded by the Skylark 2 which is designed for British thermal conditions.



Skylark 1

Erstes englisches Segelflugzeug mit Tragflächen der NACA-6-Serie. Zur Erzielung einer ungestörteren Flügeloberfläche wurde dickeres, aber weniger dichtes Sperrholz verwendet, welches auf dem Vorderteil des Flügels vor dem Hauptholm zur Anwendung kommt. Daraus ergab sich annähernde Freiheit von Wellung an der Oberfläche. Auf einer Länge von 50 mm weicht die Oberfläche selten mehr als 0,0125 mm von einer angenommenen mittleren Durchschnittshöhe ab. Seitenverhältnis von mittlerer Größe und hohe Flächenbelastung, deshalb für Segelflug in Ländern mit starker Einstrahlung geeignet. Verdrängt vom Skylark 2, der für englische Thermikbedingungen gebaut ist.

Skylark 1

Premier planeur anglais avec surfaces portantes de la série NACA-6. Afin d'obtenir une surface supérieure d'aile moins per-

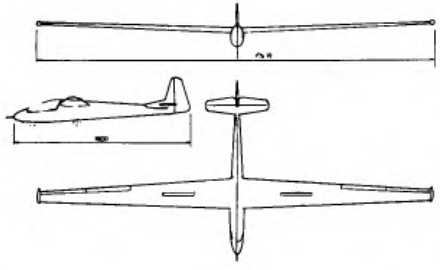
turbée, on a employé du contre-plaqué moins compact, mais plus épais, sur la partie antérieure de l'aile devant le longeron principal. On obtint ainsi une superficie à peu près franche de toute ondulation. Sur une longueur de 50 mm, la superficie s'écarte rarement de plus de 0,0125 mm de sa hauteur théorique moyenne. Rapport d'allongement de grandeur moyenne, grande charge alaire; ce planeur est par conséquent propre au vol à voile dans les pays de forte insolation. Peu à peu banni par le Skylark 2, bâti pour les conditions anglaises du vol thermique.

Type designation	Gull 2	Kite 2	Gull 4	Skylark 1
Date of first flight of prototype	1939	June 1956	Feb. 1948	March 1953
Number produced	1	8	4	2
Wings				
Span ..... m	19.9	15.2	15.0	13.7
Area ..... m^2	21.74	14.59	14.49	10.50
Aspect ratio	18.2	15.9	15.6	17.9
Wing root chord ..... m	1.30	1.20	1.20	0.91
Wing tip chord ..... m	0.56	0.60	0.60	0.38
Standard mean chord ... m		0.96		0.77
Dihedral ..... deg.	gull	2.0	2.0	2.4
Aero. twist root/tip ..... deg.		9.0		3.5
Wing section (root)		NACA 2412	Gö 549	63_3618
Ailerons				
Type	plain	plain	plain	plain
Span (total) ..... m				6.52
Area (total) ..... m^2	3.16	2.58	2.53	1.15
Horizontal tail				
Area of elevator and fixed tail ..... m^2	2.52	2.19	1.94	1.64
Area of elevator ..... m^2	1.18	1.07	0.75	0.73
Aerofoil section	sym.	sym.	sym.	sym.
Vertical tail				
Area of fin and rudder .. m^2	1.41	0.93	1.21	1.21
Area of rudder ..... m^2	1.13	0.84	0.75	0.59
Aerofoil section	sym.	sym.	sym.	sym.
Fuselage				
Max. width ..... m	1.22	0.56	0.61	0.58
Overall length ..... m	8.00	7.22	7.25	6.37
Number seats and arrangement	2 side by side	1	1	1
Undercarriage type	fixed wheel and skid	fixed wheel and skid	fixed wheel and skid	skid

Type designation		Gull 2		Kite 2		Gull 4		Skylark 1	
Lift increasing devices									
Type		plain flaps		none		none		none	
Span (total)	m	3.80							
Area (total)	m^2	1.03							
Drag producing devices									
Type		upper surface spoilers		upper surface spoilers		wing airbrakes		wing airbrakes	
Span		2×0.90							
Area	m^2	0.197							
Weights									
Equipped weight	kg	324		191		211.8		196.5	
Max. load	kg	186		104		105.7		105.5	
Max. permissible flying weight	kg	510		295		317.5		302	
Wing loading	kg/m^2	23.4		20.5		22.3		28.8	
Design standards									
Airworthiness requirements to which aircraft has been built		BGA		B.C.A.R. semi-aerobatic		B.C.A.R. semi-aerobatic		B.C.A.R. semi-aerobatic	
Date of issue of these requirements				1948		1948		1948	
Max. ultimate load factor	g	5.4		8.85		7.75		8.97	
Limiting flight conditions									
Placard airspeed	km/h	140		161		193		209	
Aero-towing speed	km/h	98		129		113		130	
Winch launching speed	km/h	98		113		113		111	
Permitted acrobatic manoeuvres		none		loop, stall turn		loop, stall turn		none	
Spinning permitted		no		yes		yes		no	
Straight flight performance									
at flying weight of	kg	487.5		276.5		297		272	
		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		67	0.74	60	0.81	68	0.79	69	0.75
V for max. L/D		77		69		74		78	
Stalling speed				54		56		64	
Max. L/D		27		22		24		27	

Hungary - Ungarn - Hongrie

Manufacturer:
Alagi Központi Kisérleti Üzem
Dunakeszi, Hungary



A-08 Sirály

The A-08 Sirály is a single-seat high performance sailplane with laminar-flow wings, designed for the 1956 World Gliding Competitions. The construction is of wood with plywood covering except for the control surfaces. The wing spars are of light metal. The sailplane holds several national records.

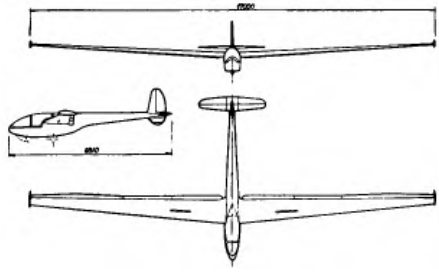
A-08 Sirály

Einsitziges Hochleistungsflugzeug mit Laminarflügel, konstruiert für die Weltmeisterschaften 1956. Holzkonstruktion mit Sperrholzbeplankung, mit Ausnahme der Leitwerksoberfläche. Flügelholme aus Leichtmetall. Der A-08 hält verschiedene Landesrekorde.

A-08 Sirály

Monoplace de haute performance, aile laminaire, construit pour les championnats de 1956. Structure en bois avec revêtement de contreplaqué, sauf en ce qui concerne la surface des commandes. Longerons d'aile en métal léger. Le A-08 détient plusieurs records nationaux.

Manufacturer:
Györ Soaring Club
Györ, Hungary



Györ 2

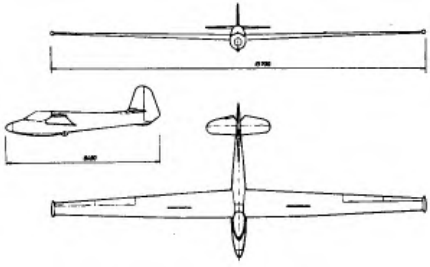
The Györ 2 is a single-seat high performance sailplane of all metal construction. It is fitted with ailerons and flaps of Junkers type and small wing tip bodies. The machine is designed for minimum sinking speeds at high cruising speeds.

Györ 2

Einsitziges Hochleistungsflugzeug in Ganzmetallkonstruktion. Querruder und Klappen vom Junkers-Typ, kleine Körper am Tragflächenende. Konstruiert für minimale Sinkgeschwindigkeit bei hoher Reiseflugleistung.

Györ 2

Monoplace tout métal pour hautes performances. Ailerons et volets du type Junkers, petits corps à l'extrémité de la surface portante. Prévu pour vitesse de descente minimum et rendement excellent en croisière.



Manufacturer:
Sportárutermelö V.
Esztergom, Hungary

R-22 S Super Futár

The R-22 S Super Futár high performance single-seat sailplane is a development of the Futár and Junius 18. It is highly manoeuvrable yet retains good inherent stability. It is suitable for competition and extended cloud flying. The type holds the Hungarian height record of over 7000 metres. A modified version of the Super Futár meets the requirements of the Standard Class sailplane.

R-22 S Super Futár

Einsitziges Hochleistungsflugzeug, entwikkelt aus dem Futár und Junius 18. Sehr wendig bei gleichzeitiger guter Stabilität, geeignet für Wettkämpfe und Wolkenflug. Der Super Futár hält den ungarischen Höhenrekord mit über 7000 m. Eine abgeänderte Ausführung entspricht den Bedingungen der Standardklasse.

R-22 S Super Futár

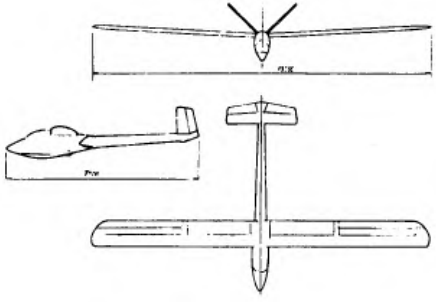
Monoplace de haute performance, provenant du Futár et du Junius 18. Très manœuvrable en même temps que très stable, convient aux concours et au vol dans les nuages. Le Super Futár détient le record hongrois d'altitude avec plus de 7000 m. Une version modifiée répond aux conditions de la classe standard.

Manufacturer:
Alagi Központi
Kisérleti Üzem
Dunakeszi, Hungary

R-23 Gébics

The R-23 Gébics is a single-seat training sailplane of very modern all metal construction. It is designed for moderate cost and intended for private owner or club

use. It can be used for advanced training, performance and blind flying, and simple aerobatics. Its performance at low speeds makes it suitable for operation in marginal conditions. The plane has made flights over 5000 metres.



R-23 Gébics

Einsitziges Schulungsflugzeug modernster Ganzmetallkonstruktion. Gebaut unter Berücksichtigung geringer Kosten und vorgesehen für die Verwendung durch Klubs und Private. Verwendbar für höhere Schulung, Leistungs- und Blindflug sowie einfache Kunstflugfiguren. Die Flugeigenschaften bei niedriger Geschwindigkeit ermöglichen die Ausnutzung schwacher Aufwinde. Es wurden Flüge über 5000 m damit durchgeführt.

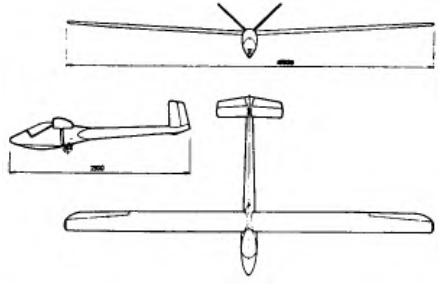
R-23 Gébics

Monoplace d'école tout métal de construction très moderne. Fabriqué de façon à coûter le moins possible et prévu pour être employé par les clubs et les particuliers. Apte à l'entraînement de niveau supérieur, au vol de performance, au vol sans visibilité, apte aussi aux figures d'acrobatie simples. Les qualités de vol à vitesse réduite permettent de tirer parti de faibles ascendances. Ce planeur a plusieurs fois dépassé 5000 m en vol.

Manufacturer:
Mechanikai Laboratorium
Dunakeszi, Hungary

R-24 Bibic

The R-24 Bibic medium performance single-seat sailplane is a developed version of the Gébics, having the same fuselage but a greater span laminar-flow wing with high aspect ratio. It is highly manœuvrable yet retains good inherent stability. It meets the requirements of the Standard Class sailplane. Both have V-tails, fuselage airbrakes and retractable wheels.



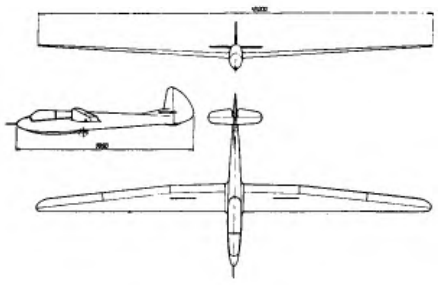
R-24 Bibic

Einsitzer für mittlere Leistung, entwickelt aus dem Gébics, mit gleichem Rumpf, aber einem Laminarflügel mit größerer Spann-

weite und beträchtlichem Seitenverhältnis. Sehr wendig bei gleichzeitiger guter Stabilität. Der Bibic entspricht den Bedingungen der Standardklasse. Gébics und Bibic weisen V-Leitwerk, Rumpf-Bremsklappen und einziehbares Rad auf.

R-24 Bibic

Monoplace de performance moyenne, provenant du Gébics, avec même fuselage, mais aile laminaire de plus grande envergure et de rapport d'allongement notable. Très maniable, et en même temps très stable, le Bibic répond aux conditions de la classe standard. Le Gébics et le Bibic ont des gouvernes en V, des volets de freinage au fuselage et une roue éclipsable.



Manufacturer:

OMRE Központi Javító Mühely

Mátyásföld, Hungary

M-30 Fergeteg

The M-30 Fergeteg was designed between 1942—44, but the prototype flew in 1950. It is a high performance tandem two-seat sailplane for competition flying or training. The main feature of this aircraft is the very good view of the second pilot and the outstanding performance at high speeds. The main constructional materials are spruce and plywood.

M-30 Fergeteg

Konstruiert 1942–1944, Erstflug des Prototyps aber erst 1950. Hochleistungs-Zweisitzer mit Tandemanordnung der Sitze, für Wettkampf und Schulung. Beachtenswert ist die gute Sicht für den zweiten Piloten und ausgezeichnete Leistung bei hoher Geschwindigkeit. Hauptsächliche Baumaterialien: Tannen- und Sperrholz.

M-30 Fergeteg

Construit de 1942 à 1944, mais le prototype n'a fait son premier vol qu'en 1950. Biplace de haute performance avec sièges en tandem, prévu pour concours et entraînement. Se distingue par la bonne visibilité assurée au second pilote et les excellentes performances à grande vitesse. Matériaux: surtout bois de sapin et contreplaqué.

Type designation	A-08 Sirály	Győr 2	R-22 S Super Futár	R-23 Gébics	R-24 Bibic	M-30 Fergeteg
Designer (s)	F. Zsebő	Á. Lampich	E. Rubik	E. Rubik	E. Rubik	L. Benicz-ky
Date of first flight of prototype	1956	1951	1957	1957	1958	1950 (designed 1942-44)
Number produced	4	1	12	1	1	5
Wings						
Span ..... m	17.6	17.00	15.70	13.00	15.00	18.00
Area ..... m^2	16.2	13.00	13.5	13.00	12.30	18.96
Aspect ratio	19.6	22.3	18.55	13.	18.3	17.1
Wing root chord ..... m	1.32	1.05	1.138	1.00	0.82	1.4
Wing tip chord ..... m	0.48	0.45	0.3	1.00	0.72	0.5
Mean aerodynamic chord (m.a.c.) ..... m	0.92	0.76	0.93	1.00	0.82	1.05
Wing section, root	NACA 64(3)-618 mod	NACA 23012	Gő-549 mod	Gő 549 mod	NACA 64(3)-618 mod	NACA 23012
Wing section, mid	NACA 64(3)-618 mod	NACA 23012	Gő-549 mod	Gő-549 mod	NACA 64(3)-618 mod	NACA 23012
Wing section, tip	NACA 64(3)-618 mod	NACA 23012	W-192	Gő-549 mod	NACA 64(3)-618 mod	NACA 23012
Dihedral ..... deg.	2	3	2.5	3	3	3
¼ chord sweep ..... deg.	0	4	0	0	0	–1
Aero. twist root/tip ..... deg.	–1.5	–	–3	0	–1	–3
Length of each section of wing ..... m	17.6	17.00	6.5	13.00	11.26	5.8
Ailerons						
Type	Frise	type Junkers	Frise	special slotted Frise	special slotted Frise	plain
Span ..... m	4.0	3.9	3.45	3.20	1.82	6.1
Area ..... m^2	0.72	0.78	0.725	1.02	0.58	2.15
Mean chord ..... m	0.18	0.2	0.21	0.32	0.32	0.35
Max deflection up ..... deg.	30	—	18	28	33	35
Max. deflection down ... deg.	20	—	12	14	22	15
Mass balance degree	100%	—	75%	75%	75%	NIL
Mass balance method ...	along nose	—	along nose	along nose	along nose	NIL
Horizontal tail						
Span ..... m	2.9	2.8	2.7	2.5 (projected)	2.5 (projected)	2.45
Area of elevator and fixed tail. ..... m^2	1.75	1.31	1.81	2.6	2.6	1.47
Area of elevator ..... m^2	0.80	0.75	0.74	1.15	1.15	0.82
Max. deflection up ..... deg.	30	—	20	35	35	30

Type designation	A-08 Sirály	Győr 2	R-22 S Super Futár	R-23 Gébics	R-24 Bibic	M-30 Fergeteg
Max. deflection down ... deg.	25	—	22	35	35	30
Aerofoil section	NACA 64–009	symm.	NACA 0009	9% symm.	9% symm.	NACA 0009
Mass balance degree	100%	NIL	NIL	75%	75%	NIL
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail) ..... m	4.00	4.35	3.64	4.80	4.80	3.95
Elevator aerodynamic balance method	NIL	NIL	NIL	NIL	NIL	NIL
Elevator trimming method	tab	tab	tab	spring-trim	spring-trim	tab
Horizontal tail volume coefficient	0.47	1.12	0.52			0.48
Special features				90° V-tail	90° V-tail	
Vertical tail						
Area of fin and rudder . m^2	1.73	0.81	1.52	V-tail	V-tail	2.97
Area of rudder ..... m^2	0.75	0.35	0.77	V-tail	V-tail	1.0
Aspect ratio	1.48	2.48	1.42	V-tail	V-tail	~1
Tail arm ..... m	4.35	4	3.92	V-tail	V-tail	4.2
Max deflection ..... deg.	30	—	25	V-tail	V-tail	30
Aerofoil section	NACA 64–009	symm.	NACA 0009	V-tail	V-tail	NACA 0009
Mass balance degree	NIL	NIL	NIL	V-tail	V-tail	NIL
Mass balance type	NIL	NIL	NIL	V-tail	V-tail	NIL
Aerodynamic balance ...	NIL	NIL	NIL	—	—	NIL
Fuselage						
Max. width ..... m	0.6	0.66	0.60	0.64	0.64	0.65
Overall length ..... m	7.6	6.81	6.48	7.50	7.50	7.95
Max. cross section ..... m^2	0.5	0.56	0.46	0.61	0.61	0.6
Wetted surface area .... m^2	8.5	9.1	9.72	7.9	7.9	13.0
Number seats and arrangement	1	1	1	1	1	tandem 2
Undercarriage type	retr. skid and wheel	retr. skid and wheel	skid and retr. or fixed wheel	retractable wheel	retractable wheel	skid and retractable wheel
Wheel diameter ..... cm	30	30	26	26	26	42
Special features	rubber-disc shock-absorber			torsion-rubber shock-absorber	torsion-rubber shock-absorber	
Design standards						
Airworthiness requirements to which aircraft has been built	German BVS	German BVS	German BVS	German BVS	German BVS	German BVS
Date of issue of these requirements	1939	1939	1939	1939	1939	1939
Certificate of airworthiness	yes	yes	yes	yes	no	yes
Any other certification .					experimental license	

Type designation		A-08 Sirály		Győr 2		R-22 S Super Futár		R-23 Gébics		R-24 Bibic		M-30 Fergeteg	
Design flight envelope *Manoeuvre loads*		V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n	V km/h	Proof load factor n
Point A		145	4.5	130	4	105	4	116	4	134	5	120	4
Point B		227	4.5	250	4	210	4	214	4	269	5	222	4
Point C		227	–2.25	260	0	235	0	166	–2	269	–2.5	248	0
Point D		138	–2.25	131	–2	115	–2	117	–2	156	–2.5	94.5	–2
Gust loads		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
		150	± 10	140	± 10	120	± 10	130	± 10	147	± 10	151	± 10
Limiting flight conditions													
Placard airspeed smooth conditions	km/h	250		260		220		235		300		240	
Placard airspeed gusty conditions	km/h	150		140		120		130		147		150	
Aero-towing speed	km/h	150		140		120		130		147		150	
Winch launching speed .	km/h	120		110		110		100		100		100	
Cloud flying permitted ..		yes		yes		yes		yes		yes		yes	
Permitted aerobatic manoeuvres		loops spins, stall turns		none		loops spins, stall turns		loops spins, stall turns		all		none	
Spinning permitted yes/no		yes		yes		yes		yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c. ...		28–36		—		32.5–39		29–35		29–35		31–36	
Lift increasing devices													
Type		NIL		Junkers flap		NIL		NIL		NIL		plain flap inboard of the droopable ailerons	
Span	m	—		9.0		—		—		—		2×2.5	
Area	m²	—		1.35		—		—		—		2×0.875	
Mean chord	m	—		0.2		—		—		—		0.35	
Max. deflection up	deg.	—		–3		—		—		—		10	
Max. deflection down ...	deg.	—		20		—		—		—		30	
Drag producing devices													
Type		DFS type		DFS type		DFS type		Fuselage airbrakes		Fuselage airbrakes		DFS type	
General location		top and bottom of wings						both sides of fuselage				top and bottom of wings	
Span	m	2×1.37		2×1.0		2×0.87		—		—		2×1.2	
Area	m²	4×0.18		4×0.11		4×0.122		0.6		0,6		4×0.11	

Type designation	A-08 Sirály	Győr 2	R-22 S Super Futár	R-23 Gébics	R-24 Bibic	M-30 Fergeteg
% of span	15.5	11.8	11.3	—	—	13.3
Location, % of chord	47	35	42	—	—	50
Is device intended to limit terminal velocity to max. permissible I.A.S.	yes	—	yes	yes	yes	yes
Weights						
Wings kg	180	140	120	84	90	186
Fuselage kg	105	67	74	65	65	134
Tailplane and elevator kg	10	8	9	9	9	10
Empty weight kg	295	215	230	158	164	330
Instruments kg	5	3	5	3	3	—
Other equipment (e.g.oxygen, radio) kg	10	10	5	8	8	—
Equipped weight kg	310	228	240	169	174	—
Removable ballast kg	—	—	—	—	—	—
Max. load kg	100	100	100	95	95	170
Max. permissible flying weight kg	410	328	340	264	270	500
Wing loading kg/m²	25.3	25.2	25.2	20	22	21.9/26.4
Terminal velocity with brakes opened at max. all up weight from flight tests km/h	250	—	215	190	~220	240
Straight flight performance						
at flying weight of kg	410	328	312	264	270	500

No flap or brake	A-08 Sirály V km/h	A-08 Sirály v m/s	Győr 2 V km/h	Győr 2 v m/s	R-22 S Super Futár V km/h	R-22 S Super Futár v m/s	R-23 Gébics V km/h	R-23 Gébics v m/s	R-24 Bibic V km/h	R-24 Bibic v m/s	M-30 Fergeteg V km/h	M-30 Fergeteg v m/s
V for min. sink	70	0.60	87	0.58	65	0.62	66	0.85	68	0.65	79	0.74
V for max. L/D	80	0.65	90	0.7	69	0.63	73	0.9	75	0.75	94	0.83
1.5 × V stall	93	0.95	105	0.91	92	1.0	78	0.98	84	0.84	98	0.86
1.75 × V stall	105	1.05	120	1.31	107	1.40	88	1.50	98	1.10	114	1.12
2.00 × V stall	124	1.50	138	1.93	122	2.0	104	2.0	112	1.40	130	1.50

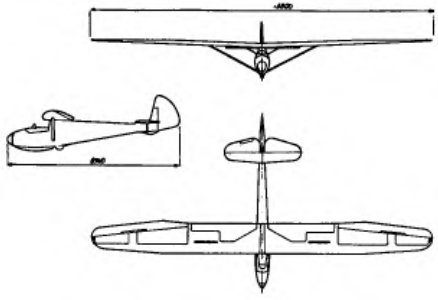
With −3° flap	Győr 2 V km/h	Győr 2 v m/s
	120	1.25
	150	2.19

	A-08 Sirály	Győr 2	R-22 S Super Futár	R-23 Gébics	R-24 Bibic	M-30 Fergeteg
Stalling speed with 20° flap		62				
Stalling speed km/h	62	69	61	52	56	65
Max. L/D	34.2	36.2	30.2	22.5	27.8	31.2

Hungary - Ungarn - Hongrie

Manufacturer:
Sportárutermelö Vállalat
Esztergom, Hungary

Designer: E. Rubik



R-08 Pilis

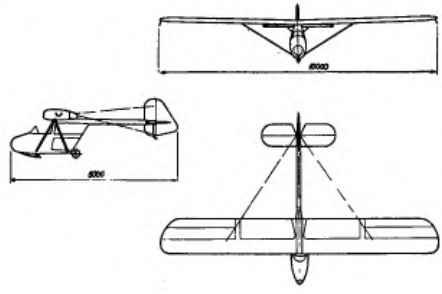
The R-08 Pilis is a single-seat high-wing training sailplane of conventional wooden construction. The wing is strut braced. It is in quantity production.

R-08 Pilis

Einsitziger Hochdecker, gebaut als Schulungsflugzeug in konventioneller Holzkonstruktion. Abgestrebter Flügel. Steht im Serienbau.

R-08 Pilis

Monoplace à aile haute, construit comme planeur d'école. Construction en bois conventionnelle. Ailes haubanées. Fabriqué en série.



R-16 Lepke

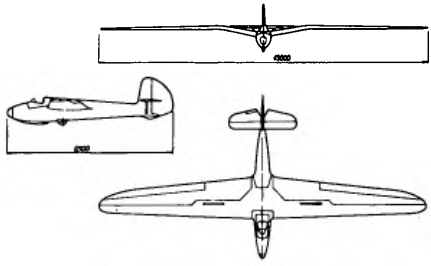
The R-16 Lepke is a strut braced high-wing primary trainer of wooden construction. It is designed for very low cost. It has been made unspinnable for safety in primary training. The wings can be folded backwards for transport.

R-16 Lepke

Abgestrebter Hochdecker für Anfängerschulung, in Holzkonstruktion. Gebaut für niedrige Gestehungskosten. Aus Sicherheitsgründen für die Schulung so konstruiert, daß Trudeln unmöglich ist. Die Flügel können für den Transport zurückgelegt werden.

R-16 Lepke

Planeur à aile haute haubanée pour débutants. Construit en bois, prévu pour la fabrication à bas prix. Par souci de sécurité des vols d'école, rendu incapable de tomber en vrille. Les ailes peuvent être repliées en arrière pour le transport.



R-17 Móka

The R-17 Móka is a single-seat sailplane designed for aerobatics. It is of very strong wooden construction.

R-17 Móka

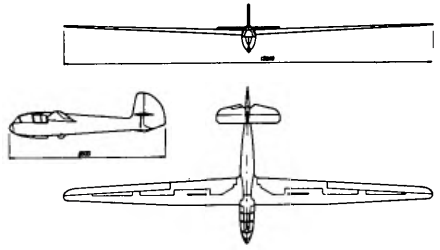
Einsitziges Flugzeug für Kunstflug. Starke Holzkonstruktion.

R-17 Móka

Monoplace d'acrobatie. Solide construction en bois.

R-22 Futár

Erstes Flugzeug einer Serie verschiedener R-22-Varianten. Einsitziges Flugzeug für mittlere Leistung in freitragender Bauweise, Holzkonstruktion. Bequemer Pilotensitz. Ausgezeichnete Flugeigenschaften, sehr gute Wendigkeit.

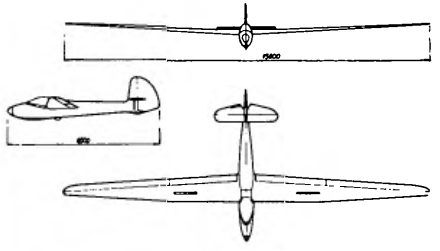


R-22 Futár

Premier d'une série de diverses variantes R-22. Monoplace pour performances moyennes, aile cantilever, construction en bois. Poste de pilotage commode. Les qualités de vol sont excellentes, la manœuvrabilité est très bonne.

R-22 Futár

The Futár is the first of a series of R-22 variants. It is a single-seat cantilever medium performance sailplane of wooden construction. The cockpit is very comfortable and the machine has excellent flying characteristics and manoeuvrability.



R-22 S Junius 18

The R-22 S Junius 18 is a single-seat high performance sailplane, with camber changing flaps and low drag fuselage, developed from the Futár. It is of wooden cantilever construction. A modified version of this type won second place at the 1954 Internationals at Leszno, Poland, and it holds many national records.

R-22 S Junius 18

Einsitziges Hochleistungsflugzeug, mit Luftbremsen zur Änderung der Wölbung und widerstandsarmem Rumpf. Entwickelt aus dem Futár. Freitragende Holzkonstruktion. Eine abgeänderte Version dieses Typs belegte an den internationalen Wettkämpfen in Leszno (Polen) 1954 den zweiten Platz. Hält verschiedene nationale Rekorde.

R-22 S Junius 18

Monoplace de haute performance, avec freins aérodynamiques pour changer la courbure et fuselage offrant un minimum de résistance. Provient du Futár. Construction cantilever en bois. Une version modifiée de ce type a obtenu la seconde place au classement des championnats internationaux de Leszno (Pologne) en 1954. Détient divers records nationaux.

Type designation	R-08 Pilis	R-16 Lepke	R-17 Móka	R-22 Futár	R-22S Junius 18
Date of first flight of prototype	1938	1949	1944	1944	1950
Number produced	210	65	3	8	60
Wings					
Span m	13.6	10.1	13.0	15.8	15.8
Area m^2	15.5	12.8	16.0	13.5	13.5
Aspect ratio	11.9	7.8	10.56	18.5	18.5
Wing root chord m	1.20	1.30	1.7	1.15	1.15
Wing tip chord m	0.75	1.30	0.8	0.30	0.30
Mean aerodynamic chord (m.a.c.) m	1.14	1.30	1.20	0.85	0.85
Dihedral deg.	1.5	4	inner 4° outer 0	2.5	2
Chord sweep deg.	0	0	0	outer 1.5	outer 1.5
Aero. twist root/tip deg.		—1.5	—3	—1.5	—1.5
Wing section (root)	Gö 533	Gö 549	NACA 23012	Gö 549	Gö 549
Ailerons					
Type	plain	special slotted-Frise	plain	plain	plain
Span m	3.75	2.6	4.4	4.5	4.5
Area m^2	1.2	1.42	1.0	1.28	1.28
Horizontal tail					
Area of elevator and fixed tail m^2	2.34	2.0	1.57	1.76	1.76
Area of elevator m^2	1.54	0.95	0.9	0.9	0.9
Aerofoil section	sym.	sym.	sym.	NACA 0009	NACA 0009

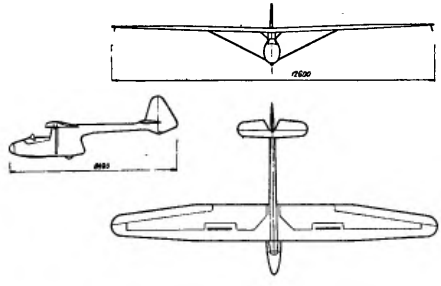
Type designation	R-08 Pilis	R-16 Lepke	R-17 Móka	R-22 Futár	R-22 S Junius 18
Vertical tail					
Area of fin and rudder ... m^2	1.18	1.25	1.62	1.62	1.62
Area of rudder ..... m^2	0.93	0.75	1.0	1.0	1.0
Aerofoil section	sym.	sym.	NACA sym.	NACA 0009	NACA 0009
Fuselage					
Max. width ..... m	0.59	0.58	0.62	0.62	0.62
Overall length ..... m	6.74	6.0	6.5	6.5	6.5
Max. cross section ..... m^2	0.605	0.70	0.53	0.53	0.52
Number seats and arrangement	1	1	1	1	1
Undercarriage type	skid and fixed wheel	skid and fixed wheel	skid and fixed wheel	skid and wheel	skid and wheel
Lift increasing devices					
Type	none	none	none	none	plain flap
Span ..... m	—	—	—	—	5.9
Area ..... m^2	—	—	—	—	1.65
Max. deflection up ..... deg.	—	—	—	—	10
Max. deflection down .... deg.	—	—	—	—	60
Drag producing devices					
Type	DFS type airbrakes top and bottom of wing	none	DFS type airbrakes top and bottom of wing	DFS airbrakes top and bottom of wing	DFS airbrakes top and bottom of wing
General location		—			
Span ..... m	2×1.20	—	2×1.24	2×1.0	2×1.0
Area ..... m^2	4×0.12	—	4×0.145	4×0.115	4×0.115
Weights					
Equipped weight ..... kg	163	90	280	173	180
Max. load ..... kg	90	70	90	100	100
Max. permissible flying weight ..... kg	253	160	370	273	280
Wing loading ..... kg/m^2	16.32	12.5	23.0	20.2	20.8
Design standards					
Airworthiness requirements to which aircraft has been built	German BVS	German BVS	German BVS	German BVS	German BVS
Date of issue of these requirements	1939	1939	1939	1939	1939
Max. ultimate load factor g	4	3	6	4	4

Type designation	R-08 Pilis		R-16 Lepke		R-17 Móka		R-22 Futár		R-22S Junius 18	
Limiting flight conditions										
Placard airspeed ..... km/h	180		120		400		220		220	
Aero-towing speed ..... km/h	110		—		130		120		120	
Winch launching speed ... km/h	100		80		110		100		100	
Permitted aerobatic manoeuvres	loops, stall turns		none		all		loops, stall turns		loops, stall turns	
Spinning permitted	yes		unspinnable		yes		yes		yes	
Straight flight performance										
at flying weight of ..... kg	253		160		370		273		280	
	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	65	0.9	52	1.0	74	0.88	71	0.79	68.5	0.75
V for max. L/D	70	1.02	58	1.15	93	1.10	78	0.87	72.5	0.78
Stalling speed ..... km/h	48		38		65		65		63	
Max. L/D	19		14		22.4		25		25.7	

Manufacturer:
Sportárutermelö Vállalat
Esztergom, Hungary

K-02b Szellö

The K-02b Szellö is a single-seat high-wing training sailplane of wooden construction. The wing is strut braced.



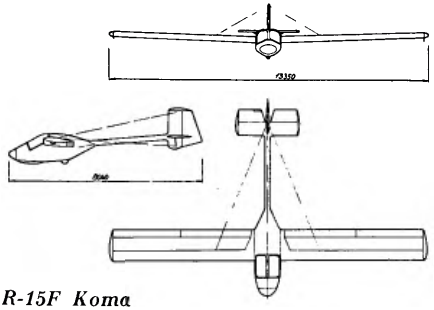
K-02b Szellö

Einsitziger Hochdecker, Schulungsflugzeug in Holzkonstruktion. Flügel abgestrebt.

K-02b Szellö

Monoplace à aile haute, planeur d'école en bois. Ailes haubanées.

Manufacturer:
Sportárutermelö Vállalat



R-15F Koma

The R-15F Koma side-by-side two-seat sailplane is designed for the safest primary training and the minimum initial cost. The Koma has a very rigid and robust construction, but with low weight. The machine is built in metal and wood. It is in quantity production.

R-15F Koma

Zweisitzer mit Sitzanordnung nebeneinander, konstruiert für sichere Anfängerschulung und niedrige Gestehungskosten. Starre, feste Konstruktion, aber mit niedrigem Gewicht. Ausgeführt in Metall und Holz. Steht in Serienproduktion.

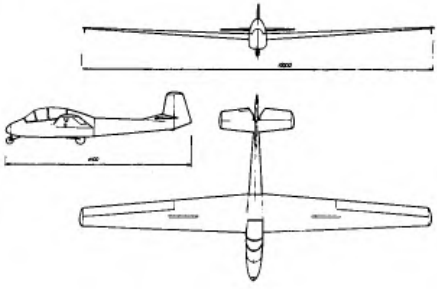
R-15F Koma

Biplace à sièges côte à côte, construit pour la formation des débutants en toute sécurité et la fabrication à bon marché. Construction rigide, solide, mais de poids minime. Fabriqué en métal et en bois. Produit en série.

Manufacturer:
Alagi Központi Kisérleti Üzem
Dunakeszi

Z-03B Ifjuság

The Z-03B Ifjuság is a medium performance two-seat training sailplane of mixed construction. The monocoque fuselage is of light metal and the wings are of wood. It is suitable for elementary aerobatic training.



Z-03B Ifjuság

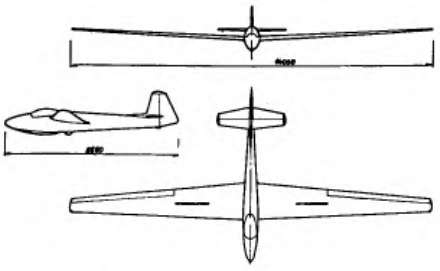
Zweisitziges Trainingsflugzeug für mittlere Leistung, in gemischter Konstruktion. Rumpf in Schalenbauweise aus Leichtmetall, Flügel aus Holz. Verwendbar für Kunstfluganfängerschulung.

Z-03B Ifjuság

Biplace d'entraînement pour performances moyennes, construction mixte. Fuselage en coque, en métal léger, ailes en bois. Propre à la formation de début à l'acrobatie.

Z-04 Béke

The Z-04 Béke is a single-seat medium performance sailplane designed for aerobatics and cloud flying. It has a light metal monocoque fuselage and wooden wings.



Z-04 Béke

Einsitziges Flugzeug für mittlere Leistung, gebaut für Kunstflug und Wolkenflug. Rumpf in Schalenbauweise aus Leichtmetall, Flügel aus Holz.

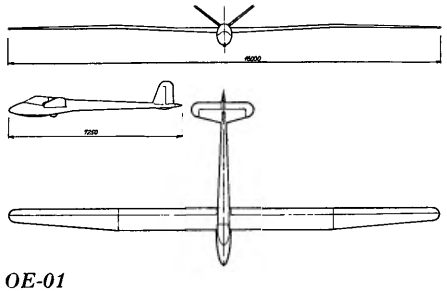
Z-04 Béke

Monoplace pour performances moyennes, propre à l'acrobatie et au vol dans les nuages. Fuselage en coque, en métal léger, ailes en bois.

Manufacturer:
OMRE Központi Javító Mühely
Mátyásföld

OE-01

The OE-01 is an experimental single-seat sailplane designed for very high performance and to make a study of laminar flow wings. It is fitted with a speed limiting tail parachute which can be retracted into the rear end of the fuselage.



OE-01

Einsitziges Versuchsflugzeug für Hochleistung und zum Studium von Laminarflügeln. Ausgerüstet mit geschwindigkeitsbeschränkendem Heckfallschirm, der in das hintere Ende des Rumpfes eingezogen werden kann.

OE-01

Monoplace d'essai pour hautes performances et l'étude des ailes laminaires. Equipé d'un parachute de queue pour restreindre la vitesse; ce parachute peut être rentré dans l'extrémité arrière du fuselage.

Type designation	K-02b Szellő	R-15F Koma	Z-03B Ifjuság	Z-04 Béke	OE-01
Designers	A. Kemény	E. Rubik	F. Zsebő	F. Zsebő	M. Papp E. Rubik
Date of first flight of prototype	1950	1948	1953	1955	1951
Number produced	78	65	70	1	1
Wings					
Span ..... m	12.6	13.35	15.0	14.0	18.0

Type designation		K-06 b Szellő	R-15 F Koma	Z-03 B Ifuság	Z-04 Béke	OE-01
Area	m^2	14.8	17.12	18.4	13.7	13.95
Aspect ratio		10.7	10.4	12.2	14.3	23.3
Wing root chord	m	1.05	1.29	1.6	1.4	0.9
Wing tip chord	m	0.75	1.29	0.75	0.52	0.40
Mean aerodynamic chord (m.a.c.)	m	1.17	1.29	1.23	0.98	0.775
Dihedral	deg.	1.5	2	4	3	inner 3 outer 0
Chord sweep	deg.	0	0	0	0	outer 3
Aero. twist root/tip	deg.	—2	0	—3	—2	—2.5
Wing section (root)		Gö 549	Gö 549 mod.	Gö 549	NACA 23015	laminar
Ailerons						
Type		Frise	special slotted-Frise	Frise	Frise	plain
Span	m	3.8	3.45	4.0	outer 2.0 inner 2.0	4.5
Area	m^2	1.15	0.725	1.33	outer 0.45 inner 0.55	1.9
Horizontal tail						
Area of elevator and fixed tail	m^2	1.5	2.32	2.56	1.87	2.08
Area of elevator	m^2	0.78	0.98	1.30	0.99	1.27
Aerofoil section		NACA 0009	sym.	sym.	sym.	sym.
Vertical tail						
Area of fin and rudder	m^2	1.2	1.85	1.40	1.25	114° V-tail
Area of rudder	m^2	0.7	1.0	0.96	0.75	—
Aerofoil section		NACA 0009	sym.	sym.	sym.	—
Fuselage						
Max. width	m	0.62	1.04	0.7	0.65	0.66
Overall length	m	6.49	8.04	8.1	6.82	7.25
Max. cross section	m^2	0.65	0.84	0.68	0.55	0.51
Number seats and arrangement		1	side-by-side 2	tandem 2	1	1
Undercarriage type		skid and wheel	skid and wheel	fixed wheel and nose wheel	skid and wheel	skid and wheel
Lift increasing devices						
Type		none	slotted flap	none	none	plain flap
Span	m	—	5.99	—	—	9.0
Area	m^2	—	2.39	—	—	1.94
Max. deflection up	deg.	—	0	—	—	0
Max. deflection down	deg.	—	45	—	—	60

Type designation	K-06 b Szellő	R-15 F Koma	Z-03 B Ifjuság	Z-04 Béke	OE-01
Drag producing devices					
Type	Rubik type top and bottom of wing	flap (at high deflection angles)	DFS type airbrakes top and bottom of wing	DFS airbrakes top and bottom of wing	tail parachute 1.1 m diam.
General location		—			tail cone
Span m	2×0.9	—	2×1.35	2×1.0	—
Area m^2	4×0.13	—	4×0.155	4×0.09	—
Weights					
Equipped weight kg	155	190	350	280	215
Max. load kg	90	170	170	90	100
Max. permissible flying weight kg	245	360	520	370	315
Wing loading kg/m^2	16.6	21	28.3	27.1	22.5
Designs standards					
Airworthiness requirements to which aircraft has been built	German BVS	German BVS	German BVS	German BVS	German BVS
Date of issue of these requirements	1939	1939	1939	1939	1939
Max. ultimate load factor g	4	3	4	6	4
Limiting flight conditions					
Placard airspeed km/h	180	150	220	400	220
Aero-towing speed km/h	110	120	130	150	125
Winch launching speed km/h	100	90	100	150	100
Permitted aerobatic manoeuvres	loops, stall turns	none	loops, stall turns	all	none
Spinning permitted	yes	unspinnable	yes	yes	yes
Straight flight performance					
at flying weight of kg	245	360	520	370	315

	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	56	0.84	62	1.05	71.5	1.09	83	1.0	75	0.65
V for max. L/D	62	0.93	68	1.12	84	1.13	90	1.04	80	0.68

Stalling speed km/h	45	56.5	66.6	70	62
Max. L/D	18.5	17.4	20.6	24	32.3

Italy - Italien - Italie

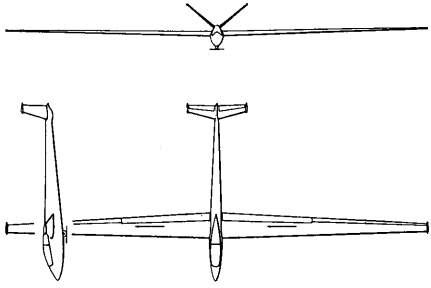
Mannfacturer: Aeroclub Vergiate
Vergiate (Varese), Italy

Eolo 3V-1

The Eolo is a high performance single-seater designed for competition flying. It has a high cruising speed, yet low stalling and landing speeds. It is of all wood construction and the wing is covered with thick birch plywood. There was provision in the first version of the prototype for 32 kg water ballast. The sailplane is stressed for 9 G.

Eolo 3 V-1

Hochleistungs-Einsitzer für Wettkämpfe. Hohe Reisegeschwindigkeit, aber zugleich kleine Abkipp- und Landegeschwindigkeit. Ganzes Flugzeug in Holzkonstruktion; Flügel mit dickem Birkensperrholz beplankt. Bei der ersten Ausführung war die Möglichkeit der Mitnahme von 32 kg Wasserballast vorgesehen. Der Eolo ist für Belastungen bis zu 9 G berechnet.



Eolo 3 V-1

Monoplace de haute performance pour concours. Grande vitesse de croisière, mais en même temps faible vitesse de décrochage et d'atterrissage. Tout le planeur est en bois; les ailes ont un revêtement épais de contreplaqué de bouleau. Sur la première version, il était prévu de pouvoir prendre 32 kg d'eau en guise de lest. L'Eolo est calculé pour supporter des charges allant jusqu'à 9 G.

Type designation	3 V-1 Eolo
Designer	Ing. Giovanni Bruni
Date of first flight of prototype	Aug. 1955
Number produced	1
Wings	
Span ..... m	20.00
Area ..... m^2	16.00
Aspect ratio	25.0

Type designation		3 V-1 Eolo
Wing root chord	m	1.228
Wing tip chord	m	0.372
Mean aerodynamic chord (m.a.c.)	m	0.876
Wing section, root		65_3618
Wing section, mid		intermediate
Wing section, tip		65_1412
Dihedral	deg.	3.0
¼ chord sweep	deg.	0° 37′
Aero. twist root/tip	deg.	—2°
Special features		tip shapes
Ailerons		
Type (e.g. slotted, frise, inset, hinge, plain)		slotted
Span	m	2 × 6.36
Area	m^2	2 × 1.223
Max. deflection up	deg.	29
Max. deflection down	deg.	17° 30′
Mass balance degree		none
Mass balance method		none
Special features		Slotted internal and external ailerons. Internal ailerons (span 2.9 m) deflects downward with the flaps up to 31° 30′
Horizontal tail		V-tail
Span	m	2 × 1.828
Area of elevator and fixed tail	m^2	1.977
Area of elevator	m^2	2 × 0.756
Max. deflection up	deg.	42
Max. deflection down	deg.	42
Aerofoil section		63010
Mass balance degree		none
Mass balance method		none
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	5.00
Elevator aerodynamic balance method		NIL
Elevator trimming method		controllable tab
Horizontal tail volume coefficient		0.572

Type designation	3 V-1 Eolo
Vertical tail	V-tail
Area of rudder ..... m^2	2×0.635
Max. deflection ..... deg.	20
Fuselage	
Max. width..... m	0.716
Overall length ..... m	8.55
Max. cross section..... m^2	0.985
Number seats and arrangement	1
Undercarriage type	retractable wheel with brake
Wheel diameter ..... cm	33
Lift increasing devices	
Type (e.g. trailing edge flaps, fowler flaps, droopable ailerons, slotted flaps, split flaps)	slotted
Span ..... m	2×3.34
Area ..... m^2	2×1.075
Max. deflection up ..... deg.	2
Max. deflection down .... deg.	50
Drag producing devices	
Type	segmented surface brakes
General location	top and bottom of wing
Area ..... m^2	2×0.60
% of span (where applicable)	14
Location, % of chord (where applicable)	65
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.	yes
Weights	
Wings[1] ..... kg	220
Fuselage[2] ..... kg	95
Tailplane and elevator .. kg	16.5
Empty weight[3] ..... kg	329.5
Instruments ..... kg	15.5
Other equipment (e.g. oxygen, radio) ..... kg	20

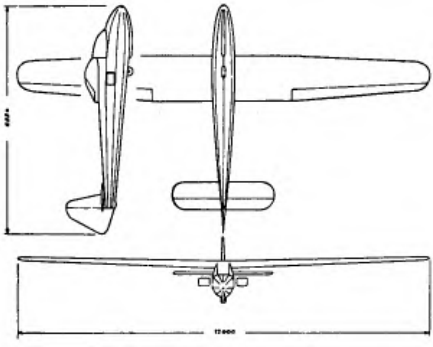
Type designation	3 V-1 Eolo
Equipped weight ..... kg	365
Max. load ..... kg	85
Max. permissible flying weight ..... kg	450
Wing loading ..... kg/m²	28.1
Design standards	
Airworthiness requirements to which aircraft has been built	Italian Civil Board
Certificate of airworthiness	yes
Limiting flight conditions	
Placard airspeed ..... km/h	230
Aero-towing speed ..... km/h	100–130
Cloud flying permitted yes/no	request of certification will be forwarded
Permitted aerobatic manoeuvres	
Spinning permitted yes/no	yes
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.....	16% and 33%
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limitting) ..... km/h	160
Straight flight performance	
at flying weight of ..... kg	450

	V km/h	v m/s
No flap or brake		
V for min. sink	92	0.79
V for max. L/D	96.5	0.82
1.5 × V stall	120	1.3
Stalling speed ..... km/h	60 no flap 40 full flaps	
Max. L/D	32.8	

[1] With struts, controls, flaps and brakes.
[2] Complete with rudder and fin, less instruments and equipment.
[3] To include any fixed ballast.

Italy - Italien - Italie

Manufacturer:
Centro di volo a vela del Politecnico di Torino (CVT),
Castello del Valentino, Torino



CVT-1 Zigolo

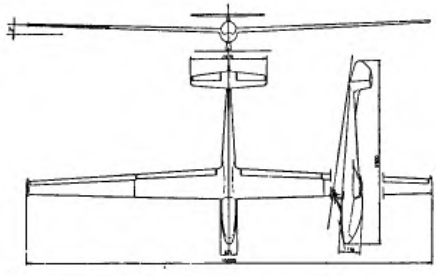
The Zigolo is a single-seater training sailplane of conventional design and normal cantilever all-wood construction. Single spar wing, plywood and fabric covered.

CVT-1 Zigolo

Einsitziges Schulungs-Segelflugzeug in konventioneller Bauweise; normale, freitragende Holzkonstruktion. Einholmiger Flügel, sperrholzbeplankt und stoffbespannt.

CVT-1 Zigolo

Planeur monoplace d'entraînement de structure conventionnelle. Construction cantilever normale en bois. Ailes à un seul longeron, recouvertes de contreplaqué et de toile.



CVT-2 Veltro

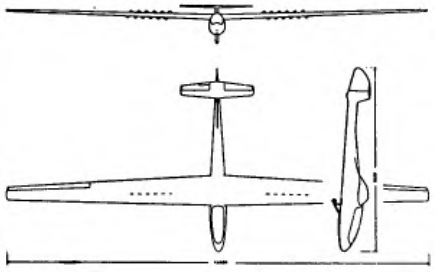
The Veltro is a single-seater high performance sailplane with laminar-flow wings and T-tail. The construction is of wood with plywood covering except for the control surfaces. Holds the Italian height and distance records.

CVT-2 Veltro

Einsitziges Hochleistungs-Segelflugzeug mit Laminarflügel und T-Leitwerk. Holzkonstruktion mit Sperrholzbeplankung, ausgenommen an der Oberfläche der Steuerorgane. Mit dem Veltro wurden die italienischen Höhen- und Streckenrekorde aufgestellt.

CVT-2 Veltro

Planeur monoplace de haute performance avec ailes laminaires et gouvernail en T. Construction de bois revêtue de contreplaqué, sauf à la surface des organes de commande. C'est sur le Veltro que furent conquis les records italiens d'altitude et de distance.



CVT-4 Strale

The Strale is a single-seater high performance sailplane with laminar-flow wings and T-tail developed from the «Veltro», the span being increased from 15 to 16.08 meters. The prototype is at present undergoing static tests and had not flown on 26.8.57.

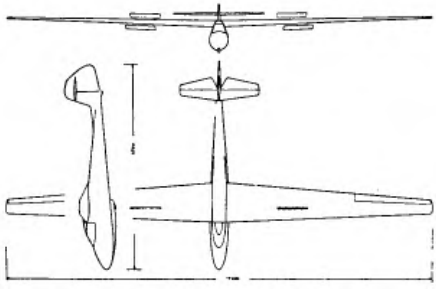
CVT-4 Strale

Einsitziges Hochleistungs-Segelflugzeug mit Laminarflügel und T-Leitwerk, entwickelt aus dem Veltro, wobei die Spannweite von 15 m auf 16,08 m vergößert wurde. Der Prototyp wird gegenwärtig den statischen Prüfungen unterzogen; bis zum 26. August 1957 erfolgten noch keine Flüge.

CVT-4 Strale

Planeur monoplace de haute performance avec ailes laminaires et gouvernail en T. Développé à partir du Veltro, dont l'envergure fut portée de 15 m à 16,08 m. Le prototype subit actuellement les épreuves statiques; jusqu'au 26 août 1957, il n'avait pas encore volé.

Manufacturer:
Ditta Nicolotti & Figli,
Corso Unione Sovietica, 77, Torino



M-100

The M-100 is a training and medium high-performance single-seater sailplane of conventional layout designed to a specification issued by the Aero Club of Italy. The winning design produced to this specification will be adopted as the standard Italian training sailplane. The prototype M-100 has recently completed flight testing. Fuselage is all wood, plywood covered; single spar wing, plywood and fabric covered.

M-100

Einsitziges Segelflugzeug für Schulung und mittlere Leistungsflüge in konventioneller Bauweise, konstruiert nach den vom italienischen Aero-Club festgelegten Bedingungen. Das Flugzeug, welches den gestellten Anforderungen am besten genügt, soll als italienisches Standard-Schulungsflugzeug

gebaut werden. Der Prototyp des M-100 beendete kürzlich seine Versuchsflüge. Rumpf in Holzbauweise, mit Sperrholz beplankt; einholmiger Flügel, sperrholzbeplankt und stoffbespannt.

M-100

Planeur monoplace d'entraînement et de moyenne performance, de structure conventionnelle, construit d'après les conditions prescrites par l'Aéro-Club d'Italie. Le planeur répondant le mieux aux exigences imposées est destiné à être construit en série comme planeur standard d'entraînement italien. Le prototype du M-100 a terminé récemment ses vols d'essai. Fuselage en bois revêtu de contreplaqué; ailes à un seul longeron, recouvertes de contreplaqué et de toile.

Type designation	CVT-1 Zigolo	CVT-2 Veltro	CVT-4 Strale	M-100
Manufacturer	Centro di volo a vela del Politecnico di Torino (CVT)			Ditta Nicolotti & Figli
Designers	Dott. Ing. Alberto and Piero Morelli			
Date of first flight of prototype	1954	1954		1957
Number produced	1	1	1	1
Wings				
Span m	12.0	15.0	16.1	14.0
Area m^2	14.0	12.5	13.3	12.25
Aspect ratio	10.0	18.0	19.4	16.0
Wing root chord m	1.34	1.17	1.17	1.30
Wing tip chord m	0.80	0.50	0.50	0.45
Mean aerodynamic chord (m.a.c.) m	1.19	0.88	0.88	0.95
Wing section, root	NACA 4415	64_2515	64_2515	63-613
Wing section, mid	NACA 4415			63-612,3
Wing section, tip	NACA 4415	64_1512	64_1512	NACA 4412
Dihedral deg.	2	2	2	1
¼ chord sweep deg.	0	0	0	0
Aero. twist root/tip deg.	—4	—4	0	—4
Length of each section of wing m	one section 12.0	three sections center: 7.0 outer: 4.0	two sections 8.0	two sections 7.0
Special features		Small tip bodies 70 cm length 12 cm diameter		
Ailerons				
Type	Frise	Slotted	Slotted	Frise
Span m	3.6	4.0	3.1	2.5
Area m^2	1.78	1.34	1.06	0.84
Mean chord m	0.3	0.25	0.22	0.20
Max. deflection up deg.	30	30	25	25
Max. deflection down deg.	30	15	25	25
Mass balance method	—	concentrated mass on tip	—	—

Type designation		CVT-1 Zigolo	CVT-2 Veltro	CVT-4 Strale	M-100
Horizontal tail					
Span	m	3.0	2.8	2.8	2.8
Area of elevator and fixed tail	m^2	2.3	1.4	1.4	1.56
Area of elevator	m^2	0.93	0.57	0.57	0.75
Max. deflection up	deg.	30	30	30	30
Max. deflection down	deg.	20	20	20	20
Aerofoil section		NACA 0009	NACA 64 009	NACA 64 009	NACA 64 009
Mass balance degree		—	—	—	—
Mass balance method		—	—	—	—
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.56	3.98	3.98	3.80
Elevator aerodynamic balance method		—	—	—	—
Elevator trimming method		—	—	trim tab	adjustable spring on control stick
Horizontal tail volume coefficient		0.5	0.51	0.48	0.52
Vertical tail					
Area of fin and rudder	m^2	0.98	0.67	0.70	1.20
Area of rudder	m^2	0.73	0.45	0.50	0.80
Aspect ratio		1.7	0.85	0.75	~ 1
Tail arm	m	4.0	3.96	4.02	4.05
Max. deflection	deg.	35	35	35	35
Aerofoil section		NACA 0009	NACA 64009 mod.	NACA 64009 mod.	NACA 64009 mod.
Mass balance degree		—	—	—	—
Mass balance type		—	—	—	—
Aerodynamic balance		—	—	—	horn balance
Fuselage					
Max. width	m	0.64	0.62	0.62	0.60
Overall length	m	6.55	6.9	7.03	6.70
Max. cross section	m^2	0.47	0.39	0.41	0.45
Wetted surface area	m^2	~ 13	~ 6	~ 8	~ 12
Number seats		1	1	1	1
Undercarriage type		fixed wheel + shock-absorbing skid	retractable skid + 2 aux. wheels	retractable skid + 1 aux. wheel	shock absorbing skid, wheel fixed to skid
Wheel diameter	cm	26	14	15	21
Lift increasing devices					
Type		none	slotted flap	none	none
Span	m		3.05		
Area	m^2		1.5		
Mean chord	m		0.25		

Type designation	CVT-1 Zigolo	CVT-2 Veltro	CVT-4 Strale	M-100
Max. deflection up .... deg.		0		
Max. deflection down .. deg.		60		
Drag producing devices				
Type	fuselage airbrakes	flap (at high deflection angles)	wing airbrakes	wing airbrakes (perforated rectangular plates)
General location	fuselage sides (under wing)		top and bottom of wings	top and bottom of wings
Span ..... m			1.60	1.00
Area ..... m^2	2×0.072		$\sim 4 \times 0.051$	4×0.12
Location, per cent of chord	30		43	40
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no	no	no	no	no
Weights				
Wings[1] ..... kg	82	111	119	
Fuselage[2] ..... kg	60	59	60	
Tailplane and elevator kg	9	6	6	
Empty weight[3] ..... kg	151	176	185	155
Instruments ..... kg	4	5	5	4
Equipped weight ..... kg	155	181	190	159
Removable ballast .... kg	—	—	—	—
Max. load ..... kg	95	85	90	98
Max. permissible flying weight ..... kg	250	266	280	257
Wing loading ..... kg/m^2	17.8	21.3	21.0	21
Design standards				
Airworthiness requirements to which aircraft has been built.....	Registro Aeronautico Italiano			
Date of issue of these requirements	1942	1942	1942	1942
Certificate of airworthiness yes/no	yes	yes		yes
Design flight envelope Manœuvre loads (ultimate load factor = N = 2 n)	V km/h / n (proof lead factor)	V km/h / n	V km/h / n	V km/h / n
Point A	85 / 4.5	122 / 4.5	122 / 4.5	117 / 4.5
Point B	180 / 3.38	200 / 3.38	200 / 3.38	180 / 3.38
Point C	180 / 0	200 / 0	200 / 0	180 / 0
Point D	105 / 2.25	120 / 2.25	120 / 2.25	120 / 2.25
Gust loads[4]				

Type designation	CVT-1 Zigolo		CVT-2 Veltro		CVT-4 Strale		M-100	
Limiting flight conditions								
Placard airspeed ..... km/h	180		200				180	
Aero-towing speed .... km/h	130		150				150	
Cloud flying permitted yes/no	yes		yes				yes	
Permitted aerobatic manœuvers.....							all normal (not inverted)	
Spinning permitted yes/no	yes		yes				yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in per cent m.a.c.	25% and 35%		25% and 35%				24% and 33%	
Max. airspeed with brakes fully opened ..... km/h	130		130				130	
Straight flight performance[5]								
at flying weight of .... kg	240		265					
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	60	0.75	60	0.5				
V for max. L/D	72	0.87	70	0.55				
			100	0.83				
			130	1.32				
			150	1.84				
With ...° flap ..... deg.								
Stalling speed ..... km/h	45		57					
Max. L/D	23		35					

[1] With controls, flaps and brakes.
[2] Complete with rudder and fin, less instruments and equipment.
[3] To include any fixed ballast.
[4] Gust loads are not considered in present R.A.I. Requirements.
[5] Measurements have not yet been made on the CVT-4 and the M-100.

Manufacturer;
S.A.I Ambrosini
Viale Maino 23, Milano

CVV 6 Canguro

The Canguro is an all-wood tandem two-seater. It participated in the 1952, 1954 and 1956 World Competitions.

CVV 6 Canguro

Zweisitzer mit Tandemanordnung, in Holzkonstruktion. Nahm an den Weltmeisterschaften 1952, 1954 und 1956 teil.

CVV 6 Canguro

Biplace avec sièges en tandem, construction de bois. Prit part au championnats du monde de 1952, 1954 et 1956.

Manufacturer:
Centro di volo a vela
del Politecnico di Milano
Piazza Leonardo da Vinci 32
Milano

CVV 7 Pinocchio

The Pinocchio is a single-seat sailplane constructed of wood. Originally it was fitted with a retractable wheel.

CVV 7 Pinocchio

Einsitziges Flugzeug in Holzkonstruktion. Ursprünglich mit einziehbarem Rad ausgerüstet.

CVV 7 Pinocchio

Monoplace construit en bois. Originairement, il avait une roue rétractable.

CVV 8 Bonaventura

The Bonaventura is a high performance tandem two-seater constructed of wood.

CVV 8 Bonaventura

Hochleistungs-Zweisitzer mit Tandemanordnung, in Holzkonstruktion.

CVV 8 Bonaventura

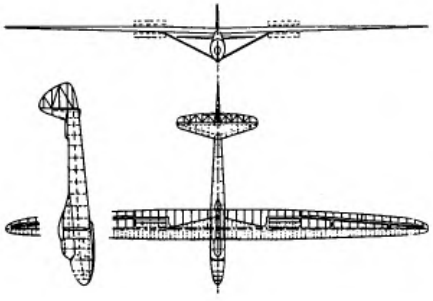
Biplace de haute performance avec sièges en tandem, construit en bois.

Type designation	CVV 6 Canguro	CVV 7 Pinocchio	CVV 8 Bonaventura
Designer(s)	Prof.ing. E. Preti	Prof.ing. E. Preti	Prof.ing. E. Preti
Date of first flight of prototype	1941	7.4.1952	29.12.1957
Number produced	52	1	1
Wings			
Span ..... m	19.20	18.50	19
Area ..... m^2	21.60	18	19.1
Aspect ratio	17	19	18
Wing root chord ..... m	1.80	1.50	1.50
Wing tip chord ..... m	0.55	0.47	0.60
Mean aerodynamic chord (m.a.c.) ..... m	1.12	0.99	1.05
Dihedral ..... deg.	2°30'	2°30'	2°20'
¼ chord sweep ..... deg.	—	—	—1°30'
Aero. twist root/tip ..... deg.	—8°12'	—6°8'	—5°
Wing section (root)	Gö 549 mod.	NACA 4415	NACA 65_3618
Ailerons			
Type	plain and frise	plain and frise	plain and frise
Span ..... m	13.40	10	9
Area ..... m^2	4.96	3.40	1.84
Horizontal tail			
Area of elevator and fixed tail ..... m^2	2.52	1.80	2.168
Area of elevator ..... m^2	1.16	0.86	1.214
Aero foil section	NACA M. 3	NACA M. 3	NACA series 00

Type designation		CVV 6 Canguro		CVV 7 Pinocchio		CVV 8 Bonaventura	
Vertical tail							
Area of fin and rudder ..	m^2	1.17		1.00		1.215	
Area of rudder	m^2	0.87		0.70		0.828	
Aerofoil section		NACA M. 3		NACA M. 3		NACA series 00	
Fuselage							
Max. width	m	0.62		0.60		0.63	
Overall length	m	8.00		7.75		7.91	
Max. cross section	m^2	0.52		0.43		0.48	
Number seats.....		2		1		2	
Undercarriage type		droppable wheels		fixed wheel		droppable wheels	
Lift increasing devices		none		none		none	
Drag producing devices							
Type		spoilers		spoilers		segmented spoilers	
General location		top and bottom of wing		top and bottom of wing		top and bottom of wing	
Span		1.80		2.40		4.20	
Area		0.62		0.61		1.11	
Weights							
Equipped weight	kg	280		222		295	
Max. load	kg	180		98		180	
Max. permissible flying weight.....	kg	460		320		475	
Wing loading	kg/m^2	21.30		17.80		23.80	
Design standards							
Airworthiness requirements to which aircraft has been built		Norme Registro aeronautico italiano		Norme Registro aeronautico italiano		Norme Registro aeronautico italiano	
Max. ultimate load factor	g	8		8		8	
Limiting flight conditions							
Placard airspeed	km/h	220		220		220	
Aero-towing speed	km/h	120		120		120	
Spinning permitted yes/no		yes		yes		yes	
Straight flight performance							
at flying weight of.....	kg	460		320		475	
		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		62	17.2	58	16.1	77	21.4
V for max. L/D		75	20.8	60	16.7	91	25.3
Max. L/D		30		33		36.7	

Netherlands - Niederlande - Pays-Bas

Manufacturer:
N. V. Vliegtuigbouw
Deventer, Netherlands



V-20

The V-20 is a medium performance single-seater of wooden construction with strut braced wing. Handling qualities are similar to the Olympia.

V-20

Einsitzer für mittlere Leistungen, in Holzkonstruktion mit abgestrebtem Flügel. Flugeigenschaften ähnlich wie bei der Olympia.

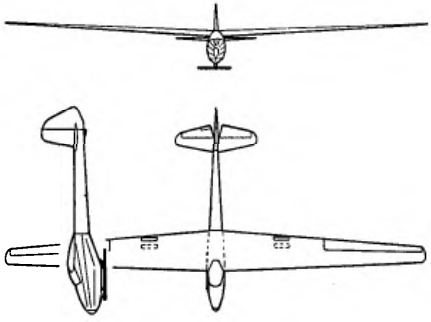
V-20

Monoplace pour performances moyennes, construction en bois, ailes haubanées. Qualités de vol pareilles à celles de l'Olympia.

Manufacturer:
J. Akerboom & J. Schmidt

T-10

The T-10 is a medium performance single-seat sailplane and is fully aerobatic. It has a two-spar cantilever wooden wing, 100 % plywood covered. The forward part of the fuselage is steel tube, fabric covered. The tail boom is dural.



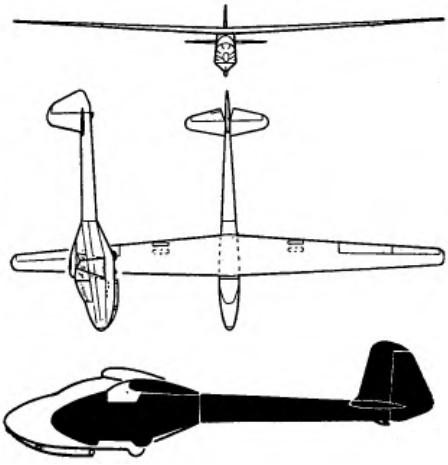
T-10

Voll kunstflugtauglicher Einsitzer für mittlere Leistungen. Freitragender, zweiholmiger Flügel in Holzbauweise, 100 % mit Sperrholz beplankt. Vorderteil des Rumpfes aus Stahlrohr, mit Stoffbespannung. Leitwerksträger aus Dural.

T-10

Monoplace pour performances moyennes, propre sans restrictions au vol de virtuosité. Ailes en bois cantilever à deux longerons, revêtues totalement de contre-plaqué. La partie antérieure du fuselage est en tubes d'acier avec entoilage. Les supports des gouvernes sont en dural.

Manufacturer:
J. K. Hœkstra
Katwijk, Netherlands



T-20

The T-20 is a tandem two-seat version of the T-10. It can be flown solo without using ballast, the second seat being on the centre of gravity.

T-20

Zweisitzige Ausführung des T-10 mit Tandemanordnung der Sitze. Kann ohne Ballast einsitzig geflogen werden, da sich der zweite Sitz im Schwerpunktzentrum befindet.

T-20

Version biplace du T-10, avec sièges en tandem. Peut être employé comme monoplace sans qu'il faille prendre du lest, le second siège se trouvant à la position moyenne du centre de gravité.

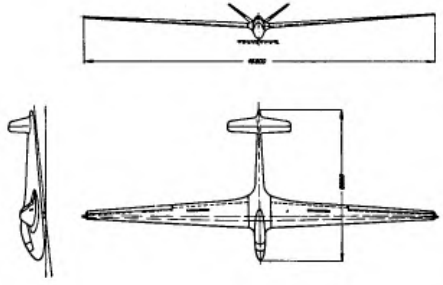
Type designation	V-20	T-10	T-20
Designer(s)	R.J.Snellen	J.Akerboom and J.Schmidt	J.Akerboom and J.Schmidt
Date of first flight of prototype	1939	1952	1954
Number produced	1	2	1
Wings			
Span ..... m	15.40	15.00	15.00
Area ..... m^2	14.10	15.00	15.00
Aspect ratio	16.8	15.00	15.00
Wing root chord ..... m	1.10	1.50	1.50
Wing tip chord ..... m		0.60	0.60
Wing section (root)	Gö 535	Gö 549 mod.	Gö 549 mod.
Ailerons			
Type	plain	plain	plain
Span ..... m	4.45	3.50	3.50
Area ..... m^2	0.99		
Horizontal tail			
Area of elevator and fixed tail ..... m^2	1.98		
Area of elevator ..... m^2	1.00		

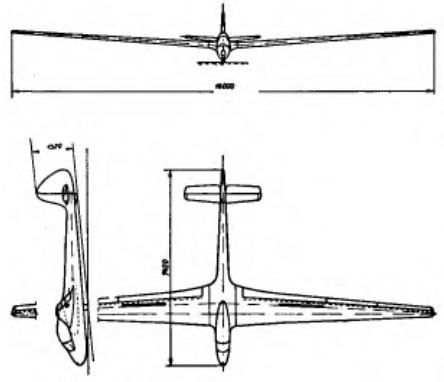
Type designation	V-20	T-10	T-20
Fuselage			
Max. width ..... m	0.50	0.60	0.75
Overall length ..... m	7.36	7.20	8.05
Number seats and arrangement	1	1	2 tandem
Undercarriage type	skid	fixed wheel and skid	fixed wheel and skid
Lift increasing devices			
Type	none	none	none
Drag producing devices			
Type	spoilers	DFS airbrakes	DFS airbrakes
General location	top of wing	top and bottom of wing	top and bottom of wing
Span	1.10	0.60	0.60
Weights			
Equipped weight ..... kg	191	190	210
Max. load ..... kg	79	90	190
Max. permissible flying weight ..... kg	270	200	400
Wing loading ..... kg/m²	18.0	18.7	26.7
Design standards			
Airworthiness requirements to which aircraft has been built	Netherlands category II	Netherlands category III	Netherlands category II
Date of issue of these requirements	Technische Voorschriften voor Zweefvliegtuigen 15th June 1953	15th June 1953	15th June 1953
Max. ultimate load factor g	7.0+	9.6	7.0
Limiting flight conditions			
Placard airspeed ..... km/h	180	200	200
Aero-towing speed ..... km/h	100	117	117
Winch launching speed .. km/h	95	100	100
Permitted aerobatic manoeuvres	none	all	none
Spinning permitted yes/no	no	yes	no
Straight flight performance			
at flying weight of ..... kg	250	200	400

	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	56	0.70	60	0.80	65	0.90
V for max. L/D	72		65		70	
Stalling speed	45–50		50		60	
Max. L/D	23		23		20	

Poland – Polen – Pologne

Manufacturer:
Zaktady Sprzetu Lotnictwa Sportowego





Jaskolka-L SZD-17X is a development of the Jaskolka-Z with laminar wings and a V tail. It is intended as a very high performance single-seater for record flying. It is of wooden cantilever construction.

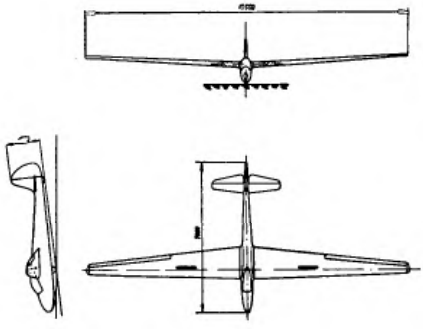
Jaskolka-L SZD-17X: Entwickelt aus der Jaskolka-Z, mit Laminarflügel und Schmetterlingsleitwerk. Das Flugzeug ist als Hochleistungs-Einsitzer für Rekordflüge vorgesehen. Es handelt sich um eine freitragende Holzkonstruktion.

Jaskolka-L SZD-17X: Provient du Jaskolka-Z, à aile laminaire et gouvernes papillon. L'appareil est un monoplace de haute performance pour vols de record. Construction cantilever en bois.

Jaskolka-Z SZD-8bis is a competition high performance single-seater of wooden construction with a cantilever wing. The wheel is semi-retractable. Nine international records have been established in the machine and it was flown in the 1956 World Gliding Competitions by the Polish and Belgian teams. It is in quantity production.

Jaskolka-Z SZD-8bis: Hochleistungs-Einsitzer für Wettkämpfe, in Holzkonstruktion mit freitragendem Flügel. Halbeinziehbares Rad. Mit diesem Flugzeug wurden neun internationale Rekorde aufgestellt; es wurde an den Weltmeisterschaften 1956 von der polnischen und belgischen Mannschaft geflogen. Die Jaskolka-Z wird in Serie hergestellt.

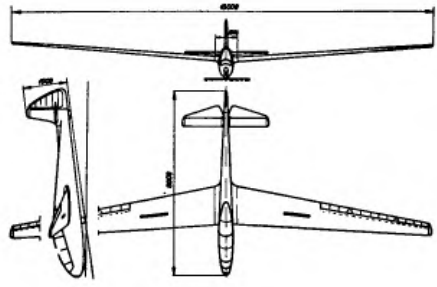
Jaskolka-Z SZD-8bis: Monoplane moyen de performance pour joutes et concours, construction de bois, aile cantilever. Roue demi-éclipsable. Avec ce planeur, on a établi neuf records internationaux; aux championnats du monde de 1956, l'équipe polonaise et l'équipe belge l'employaient. Le Jaskolka-Z est produit en série.



Mucha 100 SZD-12 is a medium high performance single-seat sailplane designed for moderate cost to provide training for very high performance sailplanes. It is of cantilever wooden construction.

Mucha 100 SZD-12: Mittlerer Hochleistungs-Einsitzer, besonders im Hinblick auf bescheidene Gestehungskosten konstruiert und als Trainingsflugzeug für eigentliche Hochleistungs-Segelflugzeuge vorgesehen. Freitragende Holzkonstruktion.

Mucha 100 SZD-12: Monoplace moyen de haute performance, spécialement construit en vue d'un prix de revient modéré, prévu pour l'entraînement à l'usage des planeurs de haute performance proprement dits. Construction cantilever en bois.

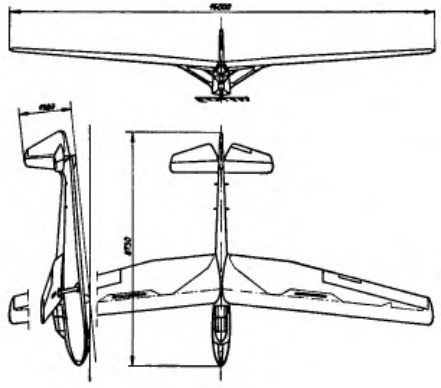


Bocian SZD-9bis is a two-seat high performance sailplane of wooden cantilever construction. Three international speed records have been established in the machine and it was flown in the 1956 World Gliding Competitions.

Bocian SZD-9bis: Zweisitziges Hochleistungsflugzeug in freitragender Holzkonstruktion. Mit dem Bocian wurden drei internationale Geschwindigkeitsrekorde aufgestellt; er wurde an den Weltmeisterschaften 1956 eingesetzt.

Bocian SZD-9bis: Planeur biplace de haute performance; construction cantilever en bois. Avec le Bocian, on a établi trois records internationaux de vitesse; a participé aux championnats du monde de 1956.

Czapla SZD-10bis is a two-seater training sailplane of wooden construction. The fuselage is flat-sided and the wing strut-braced. It is stressed for aerobatic training.



Czapla SZD-10bis: Zweisitziges Trainingsflugzeug in Holzkonstruktion, mit seitlich flachem Rumpf und verstrebtem Flügel. Für Kunstflugtraining geeignet.

Czapla SZD-10bis: Biplace d'entraînement en bois; fuselage plat latéralement et aile haubanée. Propre à l'entraînement à l'acrobatie.

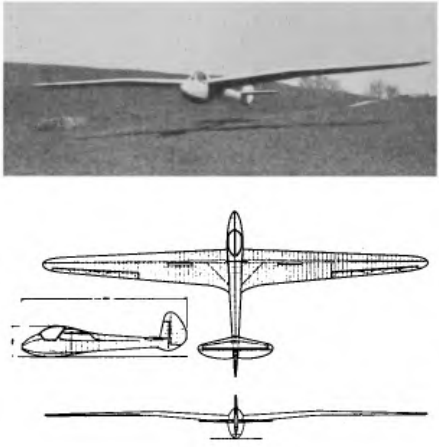
Type designation		Jaskolka-L SZD-17X	Jaskolka-Z SZD-8bis	Mucha 100 SZD-12	Bocian SZD-9bis	Czapla SZD-10bis
Designers		Szybowcowy Zaklad Doswiadczalny				
		T. Kostia J. Dyrek	T. Kostia Sandauer S. Wielgus Skarbinski	Okarmus Dyrek Badura	Wasilewski Zatwarnicki Sandauer	Zatwarnicki J. Kaniewska M. Gracz
Date of first flight of prototype		1956	1955	1953	1952	1953
Wings						
Span	m	16.0	16.0	15.0	18.1	16.0
Area	m^2	13.6	13.6	15.0	20.0	24.0
Aspect ratio		18.8	18.8	15	16.2	10.6
Wing root chord	m	1.43	1.55	1.50	1.73	1.80
Wing tip chord	m	0.38	0.38	0.50	0.50	1.00
Wing section, root		$65_2$512a	43 012 A	Gö-549	43 018A	Gö-549
Wing section, mid		$65_2$515a	43 012 A	Gö-549	43 012A	Gö-549
Wing section, tip		$65_2$515a	43 012 A	M-12	43 012A	Gö-549
Dihedral	deg.	4	4	4	4	4
¼ chord sweep	deg.	0	0	0	—5.5	—6.2
Aero. twist root/tip	deg.	1	1	0	2	3
Taper ratio	m		3.5	3	3.2	1.8

Type designation		Jaskolka-L SZD-17X	Jaskolka-Z SZD-8bis	Mucha 100 SZD-12	Bocian SZD-9bis	Czapla SZD-10bis
Ailerons						
Span	m	3.9	3.9	3.8	4.35	3.95
Area	m^2	1.79	1.83	1.94	2.94	3.66
Max. deflection up	deg.	30	30	35	30	24
Max. deflection down	deg.	15	15	17	10	17
Mass balance		along nose	nil	external weight	along nose	nil
Horizontal tail						
Span	m		2.92	3.25	3.30	3.85
Area of elevator and fixed tail	m^2	2.0	1.60	1.86	2.80	3.20
Area of elevator	m^2	0.80	0.64	0.83	1.25	1.56
Max. deflection up	deg.	23	30	25	30	30
Max. deflection down	deg.	23	23	17	22	30
Aerofoil section		NACA 0010	NACA 0009–0015	NACA 0012	NACA 0010–0012	NACA 0012
Elevator aerodynamic balance		nil	nil	nil	nil	nil
Elevator trim		nil	nil	tab	tab	tab
Horizontal tail volume coefficient			0.694	0.585	0.518	0.445
Special features		V tail				
Vertical tail						
Area of fin and rudder	m^2	V tail	1.14	1.27	1.51	1.60
Area of rudder	m^2	V tail	0.62	0.76	0.91	1.10
Max. deflection	deg.	V tail	30	30	30	30
Aerofoil section		V tail	NACA 0008	NACA 0012	NACA 0011–0012	NACA 0012
Aerodynamic balance		nil	nil	nil	nil	nil
Special features		V tail				
Fuselage						
Max. width	m					
Overall length	m	6.80	7.42	7.00	8.00	8.73
Number seats and arrangement		1	1	1	2 tandem	2 tandem
Undercarriage type		wheel	wheel with brake	fixed wheel with brake	fixed wheel with brake	fixed wheel with brake
Wheel diameter	cm	30	30	30	35	35
Lift increasing devices						
Type		split	slotted			
Area	m^2	1.17	1.89			
Max. deflection down	deg.	60	25			
Drag producing devices						
Type		SZD	SZD	SZD	SZD	SZD

Type designation		Jaskolka-L SZD-17X		Jaskolka-Z SZD-8bis		Mucha 100 SZD-12		Bocian SZD-9bis		Czapla SZD-10bis	
Area	m^2	0.24		0.47		0.38		0.625		0.54	
Weights											
Equipped weight	kg	340		270		185		330		280	
Removable ballast	kg	120 (water)		95 (water)							
Max. load	kg	80		90		105		170		160	
Max. permissible flying weight	kg	540		455		290		525		440	
Design flight envelope Manoeuvre loads		V km/h	n	V km/h	n	V km/h	n	V km/h	n	V km/h	n
Point A		165	7.9	140	7.0	121	10.5	138	10.5	101.5	7.86
Point B		250	3.85	250	3.5	250	5.25	250	5.25	160	3.94
Point C		250	0	250	0	250	0	250	0	160	0
Point D		250	–1.9	250	–1.75	250	–2.62	250	–2.62	160	–1.97
Gust loads		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A		186	10.0	140	11.0	121	15.6	138	15.7	101.5	12.2
Point B		250	4.0	250	4.0	250	3.1	250	3.4	160	2.7
Point C		250	0	250	0	250	0	250	0	160	0
Point D		250	–5.0	250	–4.0	250	–3.9	250	–4.3	160	–4.6
Limiting flight conditions											
Max. free flight airspeed clean configuration	km/h	250		250		220		200		160	
Max. speed with extended flaps or airbrakes	km/h	200 (airbrakes)		120 (flaps)		200 (airbrakes)		180 (airbrakes)		160 (airbrakes)	
Aero-towing speed	km/h	140		150		130		140		110	
Winch launching speed	km/h	120		120		94		115		100	
Cloud flying permitted		yes		yes		yes		yes		no	
Spinning permitted		yes		yes		yes		yes		yes	
Straight flight performance at flying weight of	kg	385		360		290		506		435	
No flap or brake		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		87	0.80	75	0.75	54	0.72	71	0.80	55	1.03
V for max. L/D		95	0.845	82	0.80	69	0.80	84	0.86	66	1.08
Stalling speed	km/h					47		52		40	
Max. L/D		31.2		28.5		24		26		17	

Switzerland - Schweiz - Suisse

Manufacturer:
W. Hegetschweiler
Moswey-Segelflugzeug-Werke
Horgen



Moswey III

The Moswey III, a single-seat sailplane of moderate span and performance, has been popular in Switzerland for some years and took a prominent part in the early postwar competitions. It is constructed of wood.

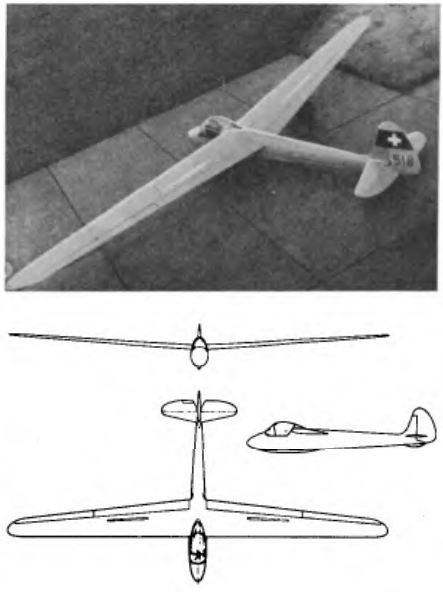
Moswey III

Einsitziges Flugzeug mittlerer Spannweite und Leistung, in der Schweiz längere Zeit sehr populär; spielte an den Wettkämpfen der Nachkriegszeit eine wesentliche Rolle. Holzkonstruktion.

Moswey III

Monoplace d'envergure et de performance moyennes, longtemps très populaire en Suisse. Joua un rôle notable dans les concours de l'après-guerre. Construction en bois.

Manufacturer:
Isler & Co.
Wildegg



WLM 1

The WLM 1 is a single-seater constructed of wood. When it appeared in 1947 it showed many new refinements, such as a fighter type canopy, slotted flaps and ailerons, a thin wing and many other well-considered details.

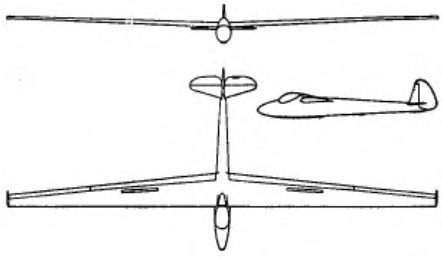
WLM 1

Einsitzer in Holzkonstruktion. Wies bei seinem Erscheinen 1947 eine Reihe neuer Verfeinerungen auf, z. B. eine Haube des Pilotensitzes nach dem Vorbild der Jagdflugzeuge, Spaltverwindungs- und Landeklappen, dünne Flügel und verschiedene wohlüberlegte Einzelheiten.

WLM 1

Monoplace construit en bois. Présentait lors de son apparition en 1947 toutes sortes de raffinements nouveaux, par exemple un capotage de siège de pilote emprunté aux avions de chasse, ailerons à fente et volets d'atterrissage, ailes minces et divers détails minutieusement étudiés.

Manufacturer:
R. Sägesser, Flugzeugbau
Herzogenbuchsee



WLM 2

The WLM 2 is a development of the WLM 1 and has a laminar wing, shell construction, increased span and is much heavier. The wing shell is made in two halves, the shell being a sandwich consisting of a spanwise layer of fir between two diagonal layers of plywood. The rear fuselage is the same construction. The gain in performance is considerable.

WLM 2

Entwickelt aus dem WLM 1, mit Laminarflügel, Schalenkonstruktion, vergrößerter Spannweite und erhöhtem Gewicht. Flügelschale in zwei Hälften gebaut; sie ist in Sandwichkonstruktion gehalten, mit einer Schicht Fichtenholz in Richtung der Spannweite zwischen zwei diagonalen Sperrholzschichten. Hinterer Teil des Rumpfes in gleicher Bauweise. Beträchtlicher Leistungsgewinn.

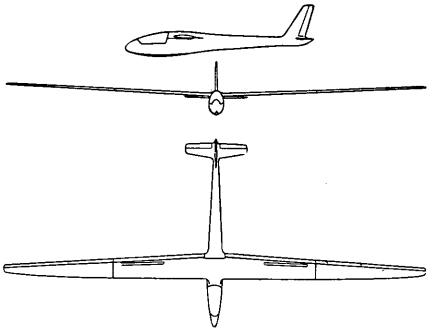
WLM 2

Provient du WLM 1, avec aile laminaire, construction en coque, plus grande envergure, poids plus élevé. La coque de l'aile est construite en deux moitiés, montée en sandwich, avec une couche de bois de pin dans la direction de l'envergure entre deux couches de contre-plaqué en diagonale. L'arrière du fuselage est construit de la même façon. Gain notable de performance.

Manufacturer:
A. Neukom
Neuhausen

Elfe M

The Elfe M is the end-product of many years' development. It started with the Elfe I with 9 m span, developing through 11 metres, 15.4 m, 16 m to the Elfe M with 17.5 m span. The last three Elfe were all based on a laminar wing designed by W. Pfenninger. Although the earlier Elfe PM-3 was in sandwich construction it was disappointingly heavy, so the Elfe M was built with more normal structures. The great care given to the aerodynamics of this sailplane has resulted in a normal minimum sinking speed and in an extraordinarily flat glide and good penetration.



Elfe M

Endprodukt einer langjährigen Entwicklung, die mit der Elfe 1 (9 m Spannweite) begann und über 11 m, 15,4 m und 16 m zur Elfe M mit 17,5 m Spannweite führte. Die letzten drei Elfe-Typen basierten auf einem von W. Pfenninger konstruierten Laminarflügel. Trotz der Sandwichkonstruktion der früheren Elfe PM-3 war jene enttäuschend schwer, so daß die Elfe M in normalerer Bauweise hergestellt wurde. Die große aerodynamische Sorgfalt des Flugzeugs ergab normale Sinkgeschwindigkeit, einen äußerst flachen Gleitwinkel und guten Einflug.

Elfe M

Résultat final d'un développement de plusieurs années, qui commença avec Elfe 1 (9 m d'envergure), puis passa à 11 m, 15,4 m, 16 m d'envergure, pour aboutir à 17,5 m avec Elfe M. Les trois derniers types de planeurs Elfe ont pour principe une aile laminaire construite par W. Pfenninger. Malgré la construction en sandwich, le planeur Elfe PM-3 antérieur était fâcheusement lourd, de sorte qu'on est revenu avec Elfe M à une construction plus normale. L'appareil a été si bien étudié au point de vue aérodynamique que sa vitesse de descente est normale, son angle de plané très faible, et ses qualités de vol excellentes.

Type designation	Moswey III	WLM 1	WLM 2	Elfe M
Manufacturer	W. Hegetschweiler Moswey-Segelflugzeug-Werke	Isler & Co.	R. Sägesser, Flugzeugbau	A. Neukom
Address	Horgen	Wildegg	Herzogenbuchsee	Neuhausen
Designer(s)	Georg Müller	WLM-Flugingenieure	WLM-Flugingenieure	W. Pfenninger A. Markwalder
Date of first flight of prototype	October 1943	July 1947	May 1954	June 1956
Number produced	14	3	1	1
Wings				
Span m	14.0	14.0	18.2	17.5
Area m^2	13.1	14.0	17.2	13.21
Aspect ratio	15.0	14.0	19.2	23.15
Wing root chord m	1.375	1.40	1.37	1.05
Wing tip chord m	0.485	0.60	0.50	0.30
Mean aerodynamic chord (m.a.c.) m	0.995	1.064	0.975	0.80
Wing section, root	Gö 535	NACA 23013	64A013 mod.	Laminar 13.3%
Wing section, mid	Gö 535	NACA 23013	64A013 mod.	Laminar 12.2%
Wing section, tip	Gö 535	NACA 23007	64A018 mod.	Laminar 10.5%
Dihedral deg.	gull wing	1.5	2	3

Type designation		Moswey III	WLM 1	WLM 2	Elfe M
¼ chord sweep	deg.	0	—1	—1	
Aero. twist root/tip	deg.	0	—1	—1	
Length of each section of wing	m	7.0	7.0	9.0	8.4+2×4.55
Ailerons					
Type		frise	slotted		
Span	m	3.17	3.25	6.25	17.5
Area	m^2	0.80	0.77	1.335	2.0
Mean chord	m	0.255	0.24	0.21	0.115
Max. deflection up	deg.	25	26	22	
Max. deflection down	deg.	10	12	10	
Mass balance degree			100%	100%	
Mass balance method			distributed balance	external balance weight	
Horizontal tail					
Span	m	2.78	2.80	3.0	2.54
Area of elevator and fixed tail	m^2	1.70	1.60	1.90	1.31
Area of elevator	m^2	0.81	0.69	0.95	0.47
Max. deflection up	deg.	25	26	30	30
Max. deflection down	deg.	25	18	20	40
Aerofoil section					laminar 9%
Mass balance degree			100%	100%	
Mass balance method			single weight	single weight	
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.05	4.05	4.25	5.2
Elevator aerodynamic balance method		horn	none	none	
Elevator trimming method		none	tab	tab	
Vertical tail					
Area of fin and rudder	m^2	0.78	0.95	1.20	0.905
Area of rudder	m^2	0.66	0.74	0.76	0.35
Tail arm	m	3.50	4.15	4.35	
Max. deflection	deg.	25	30	30	40
Aerofoil section					laminar 9%
Mass balance degree			partial		
Mass balance type			single weight		
Aerodynamic balance		horn	horn		
Fuselage					
Max. width	m	0.52	0.65	0.65	0.62
Overall length	m	6.0	7.0	7.7	7.8
Max. cross section	m^2	0.34	0.54	0.51	0.46
Number seats		1	1	1	1
Undercarriage type		skid, droppable wheels	skid, droppable wheels	skid, droppable wheels	

Type designation	Moswey III	WLM 1	WLM 2	Elfe M
Lift increasing devices				
Type	none	slotted camber flaps Ailerons also deflect to ½ flap travel	slotted camber flaps Ailerons deflect with flaps	
Span m	—	2 × 3.20	2 × 2.40	17.5
Area m^2	—	1.12	0.67	2.0
Mean chord m	—	0.35	0.28	0.115
Max. deflection up deg.	—	0	0	
Max. deflection down deg.	—	40	27	
Drag producing devices				
Type	airbrakes top and bottom of wing	airbrakes top and bottom of wing	airbrakes top and bottom of wing	airbrakes top and bottom of wing
Span m	1.05	1.56	1.35	1.8
Area (total) m^2	0.46	0.40	0.69	0.8
% of span				10.2
Location, % of chord	36	68	66	70
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.	yes	yes	yes	yes
Weights				
Wings kg	86	120	218	171
Fuselage kg				76
Tailplane and elevator kg				6
Empty weight kg				253
Instruments kg				7
Equipped weight kg	160	220	350	260
Max. load kg	90	90	100	117
Max. permissible flying weight kg	250	310	450	377
Wing loading kg/m^2	19.1	22.2	26.2	28.5
Design standards				
Airworthiness requirements to which aircraft has been built	Schweizerische Vorschrift über die Festigkeit der Segelflugzeuge		BCAR sect. E	
Date of issue of these requirements	March 1943	Sept. 1944	1948	
Certificate of airworthiness	yes	yes	yes	

Design flight envelope Manoeuvre loads	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor
Point A			—	5	130	5		
Point B	210	4	300	5	260	4		

Type designation	Moswey III		WLM 1		WLM 2		Elfe M	
Point C	210	0	300	0	260	0		
Point D	190	−2	280 160	−2 −3	112	−2.5		
Factor of safety	1.8		1.8		1.5			
Gust loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A	125	+10	160	+10	143	+20		
Point D	125	−10	160	−10	143	−20		
Limiting flight conditions								
Placard airspeed smooth conditions ..... km/h	210		300		200		214	
Placard airspeed gusty conditions ..... km/h	125		160		140			
Aero-towing speed smooth/gusty ..... km/h	150/125		270/160		200/140		180	
Winch launching speed .. km/h	125		160		100			
Cloud flying permitted ...	yes		yes		yes		yes	
Spinning permitted	yes		yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	30% and 39%		23.5% and 42%		32% and 42%			
Straight flight performance								
at flying weight of ..... kg	250		280		430		350	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	60	0.65	67	0.85	73	0.56	74	0.54
V for max. L/D	70	0.70	85	0.97	80	0.60	98	0.62
	75	0.77	90	1.04	108	0.98	114	0.77
	87.5	1.00	105	1.35	126	1.50	130	1.0
	100	1.40	120	1.80	144	2.20		
With flap			10°:65 3°:80	0.80 0.90				
V stall min. ..... km/h			40°:46		20°:60			
Stalling speed (no flap) .. km/h	~50		~60		~72		65	
Max. L/D	27.5		25		37		44	

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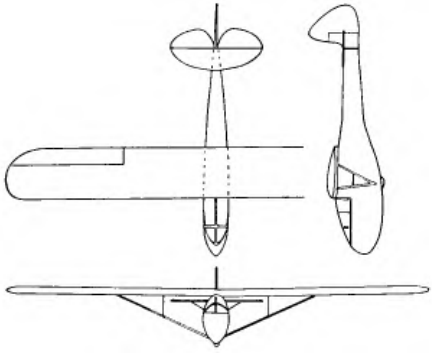
Manufacturer:
Briegleb Aircraft Company
El Mirage Field, Adelanto,
California



BG-6

The BG-6 is a single place utility training glider. The fuselage is of steel tube, fabric covered, while the wing is of wood construction with two spars and built up ribs, fabric covered; double strut braced. The tail is steel tube and channel, fabric covered.

BG-6

Einsitziges Schulungsflugzeug für allgemeinen Gebrauch. Rumpf aus Stahlrohr mit Tuchbespannung; Flügel in Holzkonstruktion, zweiholmig mit eingebauten Rippen, mit Tuchbespannung; doppelte Streben. Leitwerk aus Stahlrohr, stoffbespannt.

BG-6

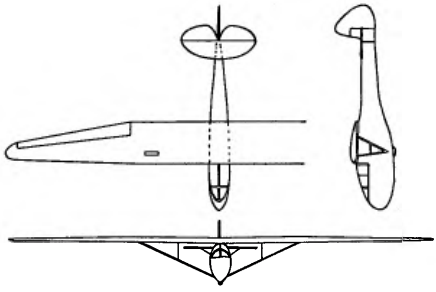
Monoplace d'école d'usage général. Fuselage en tubes d'acier entoilés; ailes en bois à deux longerons avec nervures rapportées, entoilage; doubles mâts. Gouvernails en tubes d'acier entoilés.

BG-7

The BG-7 is an improved design of the BG-6 utilising all the same parts except the wing is tapered from the strut outboard.

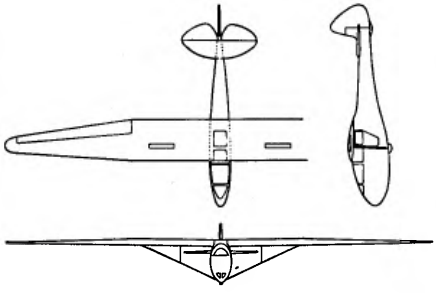
BG-7

Verbesserte Ausführung des BG-6, in allen Teilen gleich wie der Vorläufer, mit Ausnahme des Flügels, der von der Strebe nach außen verjüngt ist.



BG-7

Version améliorée du BG-6; ce planeur est tout pareil au précédent, sauf en ce qui concerne les ailes, amincies vers l'extérieur à partir du mât.



BG-8

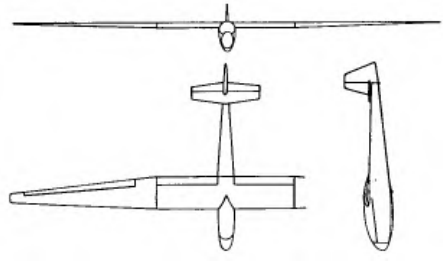
The BG-8 is a two-seat tandem medium performance sailplane developed from the BG-7 by increasing the size 25 %. It is constructed entirely of wood except for single steel tube struts and steel tube control system.

BG-8

Zweisitziges Flugzeug für mittlere Leistung, mit Tandemanordnung der Sitze, entwickelt aus dem BG-7 durch Vergrößerung um 25 %. Gänzlich aus Holz konstruiert, mit Ausnahme der Stahlrohrstreben und der Steuerführung durch Stahlrohre.

BG-8

Biplace pour performances moyennes, sièges en tandem; ce planeur provient du BG-7 agrandi de 25 %. Entièrement en bois, à l'exception des mâts en tubes d'acier et des tubes où passent les commandes, lesquels sont également en tubes d'acier.



BG-12

The BG-12 is a high performance sailplane utilising a type of wood construction similar to model building. There are no built up ribs; all ribs and bulkheads being cut from

plywood. The wing and fuselage are covered with 1/8" Douglas Fir plywood and the control surfaces are covered with 1/16" Poplar plywood. This sailplane may be assembled from kit form in less than 600 hours. A dive brake in the form of an aileron type flap was included in the design to restrict the terminal velocity to 160 mph. The prototype wing is being fibreglassed and contoured.

BG-12

Hochleistungsflugzeug in Holzkonstruktion, ähnlich jener beim Flugmodellbau. Keine eingebauten Rippen; alle Rippen und Spanten werden aus dem Sperrholz ausgeschnitten. Flügel und Rumpf sind beplankt mit 3-mm-Föhren-Sperrholz, die Teile des Leitwerks mit 1,6-mm-Pappel-Sperrholz. Aus Baukasten in weniger als 600 Arbeitsstunden herstellbar. Eine Sturzflugbremse in Form einer Querruderklappe beschränkt die Endgeschwindigkeit auf 255 km/h. Der Flügel des Prototyps wird schichtweise mit Fiberglas überzogen.

BG-12

Planeur de haute performance, construit en bois comme on fait les modèles réduits. Pas de nervures rapportées; toutes les nervures et cloisons sont découpées dans le contreplaqué. Les ailes et le fuselage sont revêtus de contreplaqué de pin sylvestre de 3 mm; les parties de l'empennage de contreplaqué de peuplier de 1,6 mm. Les pièces sont renfermées dans des boîtes de construction et le montage n'exige pas même 600 heures de travail. Un frein de piqué en forme d'aileron limite la vitesse à 255 km/h. L'aile du prototype est recouverte de couches de fibre de verre.

Type designation	BG-6	BG-7	BG-8	BG-12
Designer	William G. Briegleb			
Date of first flight of prototype	1939	1940	1941	1956[1]
Number produced	67 kits 9 complete	20 kits 3 complete	12 kits 3 complete	26 kits 2 complete
Wings				
Span ..... m	9.83	12.26	15.32	15.24
Area ..... m^2	10.86	11.43	17.65	12.91
Aspect ratio	8.9	13.1	13.1	17.9
Wing root chord ..... m	1.14	1.14	1.43	1.14
Wing tip chord ..... m	1.14	0.46	0.57	0.31
Mean aerodynamic chord (m.a.c.) ..... m	1.11	0.93	1.22	0.85
Wing section, root	NACA 4412	4412	4412	4415 R
Wing section, mid	NACA 4412	4412	4412	
Wing section, tip.....	NACA 4412	4412	4412	4406 R
Dihedral ..... deg.	3	3	3	1
Aero. twist root/tip ..... deg.			6	
Length of each section of wing ..... m	4.87	6.1	7.32	3 piece tips 5.18 each center section 4.88

Type designation		BG-6	BG-7	BG-8	BG-12
Ailerons					
Type		plain	plain	plain	plain
Span	m	2.6	3.5	4.26	4.26
Area	m^2	2 × 0.924	2 × 0.905	2 × 1.46	2 × 0.65
Max. deflection up	deg.	18	18	20	30
Max. deflection down	deg.	9	9	10	10
Horizontal tail					
Span	m	2.13	2.13	2.67	2.41
Area of elevator and fixed tail	m^2	1.47	1.47	2.23	1.57
Area of elevator	m^2	0.65	0.65	0.99	0.57
Max. deflection up	deg.	23	23	15	18
Max. deflection down	deg.	23	23	23	20
Aerofoil section		symmetrical	symmetrical	symmetrical	symmetrical
Tail arm (from ¼ chord m. a.c. wing to ¼ chord m. a.c. tail)	m	2.87	2.88	3.59	3.44
Elevator trimming method		spring on elevator control	spring on elevator control	trim tab	spring on elevator control
Vertical tail					
Area of fin and rudder	m^2	0.72	0.72	1.13	0.84
Area of rudder	m^2	0.58	0.58	0.95	0.65
Aspect ratio		3.09	3.09	3.09	3.57
Tail arm	m	3.16	3.16	3.95	3.83
Max. deflection	deg.	45	45	24	25
Aerofoil section		symmetrical	symmetrical	symmetrical	symmetrical
Fuselage					
Max. width	m	0.56	0.56	0.69	0.61
Overall length	m	4.88	4.88	6.12	5.87
Max. cross section	m^2	0.537	0.537	0.752	0.473
Number seats and arrangement		1	1	2 tandem	1
Undercarriage type		fixed wheel and skid	fixed wheel and skid	fixed wheel and skid	fixed wheel and shock mounted nose skid
Wheel diameter	cm	30.5	30.5	35.5	25.4
Lift increasing devices					
Type		none	none	none	trailing edge flaps
Span	m				4.27
Area	m^2				1.25
Mean chord	m				0.263
Max. deflection up	deg.				0
Max. deflection down	deg.				70

Type designation		BG-6		BG-7		BG-8		BG-12	
Drag producing devices									
Type		spoilers (pending approval by C.A.A.)		spoilers		spoilers		flaps aft portion of wing center section	
General location		top of wing		top of wing		top of wing			
Span	m	2 × 0.325		2 × 0.4		2 × 0.613		2 × 2.1	
Area	m^2	2 × 0.028		2 × 0.0375		2 × 0.075		2 × 0.575	
Weights									
Wings	kg	53.0		61.1		158.7		133.0	
Fuselage	kg	41.7		41.7		99.8		77.1	
Tailplane and elevator	kg	8.6		8.6		15.5		10.9	
Empty weight	kg	103.3		111.4		274.0		221.0	
Instruments	kg	1.7		3.6		6.1		3.8	
Other equipment (e.g. oxygen, radio)	kg	—		18.4		—		22.7	
Equipped weight	kg	105.0		133.4		280.1		247.5	
Removable ballast	kg	2.0		2.9		5.6		—	
Max. load	kg	86.0		90.7		176.3		93.5	
Max. permissible flying weight	kg	193.0		227.0		462.0		340.0	
Wing loading (max.)	kg/m^2	17.6		19.85		26.15		26.3	
Design standards									
Airworthiness requirements to which aircraft has been built		CAR 05		CAR 05		CAR 05		CAR 05	
Date of issue of these requirements		1940		1942		1942		1942	
Certificate of Airworthiness		yes		pending experimental		yes		pending experimental	
Any other certification		—				—			
Design flight envelope Manœuvre loads		V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor
Point A		91	4.7	96	5.3	119	5.3	222	7
Point B		127	4.7	145	5.3	179	5.3	258	7
Point C		127	—2.6	145	—3.0	179	—3.1	258	—5
Point D		96.5	—2.6	101	—3.0	128	—3.1	233	—5
Factor of safety		1.5		1.5		1.5		1.5	
Gust loads		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A		91	12.8	96	14	119	16.7	222	12,4
Point B		128	9.2	145	9.2	179	9.2	258	10.7
Point C		128	—9.2	145	—9.2	179	—9.2	258	—10.7
Point D		96.5	—12.2	101	—14	112	—13.4	233	—17.5

Type designation		BG-6		BG-7		BG-8		BG-12	
Limiting flight conditions									
Placard airspeed smooth conditions	km/h	116		129		145		217	
Placard airspeed gusty conditions	km/h	96.5		129		145		217	
Aero-towing speed	km/h	116		129		145		217	
Winch launching speed	km/h	80.5		96.5		104.5		121	
Cloud flying permitted		no		yes		yes		yes	
Permitted aerobatic manoeuvers		loops, snap, roll etc. inverted flight prohibited		rolls, loops, etc., inverted flight		rolls, loops, etc., inverted flight		rolls, loops, etc., inverted flight	
Spinning permitted		yes		yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.		30.2% and 36.5%		32.5% and 39.8%		37.6% and 42.3%		31% and 39%	
Terminal velocity with brakes opened at max. all up weight from flight tests	km/h							258	
Straight flight performance									
at flying weight of	kg	193		227		462		320	
No flap or brake		V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink		56	0.91	58	0.88	64	0.88	72	0.66
V for max. L/D		64	1.07	64	1.04	87	1.77	83	0.69
1,5 x V stall						91	1.05	96	0.84
1,75 x V stall						107	1.3	112	1.1
2,00 x V stall						122	1.8	128	1.5
With ...° flap	deg.							[2]	
Stalling speed	km/h	51		54		61		64 (no flap) 56 (with 70° flap)	
Max L/D		17		20		24		33	

[1] Wing first flight tested on steel tube fuselage in 1956.

[2] The BG-12 is still undergoing calibration. The flap was designed for use as a simple drag brake, but available performance data indicates possible use at 15° setting for thermal soaring.

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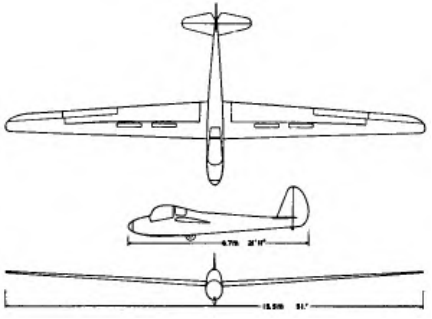
Manufacturer:
Schweizer Aircraft Corporation
Elmira, New York



Schweizer 1-21

The 1-21 is a high performance single-seat sailplane of all metal construction with a cantilever wing. There is provision for water ballast.

Schweizer 1-21

Einsitzer für Hochleistungsflüge in Ganzmetallkonstruktion mit freitragendem Flügel. Zur Mitführung von Wasserballast vorgesehen.

Schweizer 1-21

Monoplace pour hautes performances, construction tout métal, ailes en porte-à-faux. Peut emporter de l'eau en guise de lest.

Schweizer 1-23

The 1-23 is a high performance single-seater designed for quantity production. It is of all metal construction.

Schweizer 1-23

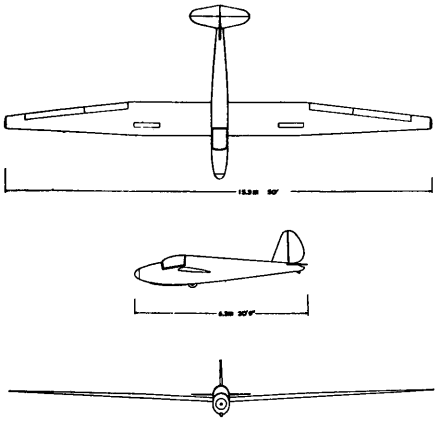
Einsitzer für Hochleistungsflüge, gebaut im Hinblick auf Serienproduktion, in Ganzmetallbauweise.

Schweizer 1-23

Monoplace pour hautes performances, prévu pour la construction en série, tout métal.

Schweizer 1-23D

The 1-23D is basically similar to the 1-23 standard. The span has been increased two metres and the aspect ratio brought up to 15.6 to meet the performance demands of competition flying.



Schweizer 1-23D

Grundsätzlich das gleiche Flugzeug wie der 1-23, aber mit um zwei Meter vergrößerter Spannweite. Die Flügelstreckung wurde damit auf 15,6 gebracht und die Anforderungen für wettkampfmäßige Flüge verbessert.

Schweizer 1-23 D

En principe, le même planeur que le 1-23, mais l'envergure est de 2 m de plus. L'allongement a passé ainsi à 15,6 ce qui améliore les qualités de l'appareil pour les vols de concours.

Schweizer 1-23B

The 1-23B is a 1-23 standard with the wing extended to have the same planform as the 1-23D. Spars are extended but otherwise unchanged; the skin is the same as the standard. The rudder is the 1-23 standard type.

Schweizer 1-23B

Der 1-23B ist ein 1-23 mit verlängerten Flügeln zur Erreichung der gleichen Grundfläche wie der 1-23D. Die Holme wurden verlängert, sonst aber nicht abgeändert; Oberfläche gleich wie bei der Standardausführung. Seitenruder ebenfalls wie beim 1-23.

Schweizer 1-23 B

Le 1-23 B n'est autre que le 1-23, mais avec des ailes allongées pour obtenir la même surface horizontale qu'avec le 23 D. Les longerons ont été allongés, mais n'ont pas subi d'autre modification. Superficie semblable à l'exécution standard. Empennage de direction pareil à celui de 1-23.

Schweizer 1-23C

The 1-23C is similar to the 1-23B except it has a heavy spar and heavier skins. Both B and C have slightly different ailerons than the D.

Schweizer 1-23C

Entspricht dem 1-23B, aber mit schwererem Holm und schwererer Beplankung. Beim 23B und C sind die Verwindungsklappen gegenüber dem D leicht abgeändert.

Schweizer 1-23 C

Correspond au 1-23 B, mais le longeron et le revêtement sont plus lourds. Les ailerons des types 23 B et C diffèrent un peu du type D.

Schweizer 1-23E

The 1-23E is a 1-23D with extended tips, 17.3 metre span, heavier skin and a set of dive brakes.

Schweizer 1-23E

Entspricht einem 1-23D mit verlängerten Flügelspitzen, 17,3 m Spannweite, schwererer Beplankung und Ausrüstung mit Sturzflugbremsen.

Schweizer 1-23 E

Correspond au 1-23 D dont on aurait allongé les bouts d'aile. Envergure 17,3 m; revêtement plus lourd, équipé de freins de piqué.

Schweizer 1-23F

This is a 1-23D with heavier skins and butt joints in the heavy skins. It has E tips and a special wing finish to improve aerodynamic smoothness. Skid gear is an optional installation on all 1-23 models.

Schweizer 1-23F

Ein 1-23D mit schwererer Beplankung und Stoßverbindung derselben. Flügelspitzen wie beim E und besondere Oberflächenbehandlung der Flügel zur Verbesserung der aerodynamischen Eigenschaften.

Schweizer 1-23 F

C'est le 1-23 D mais avec un revêtement plus lourd et des joints renforcés. Bouts d'aile comme sur le type E; superficie des ailes traitée spécialement pour en améliorer les qualités aérodynamiques.

Schweizer 1-24

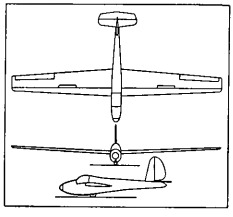
The 1-24 is an experimental high performance single-seater of aluminum alloy and with a cantilever wing. It is designed by E. Schweizer and H. Burr.

Schweizer 1-24

Einsitzer für Hochleistungsflüge, Versuchsmodell, aus Aluminiumlegierung und mit freitragendem Flügel. Konstruiert von E. Schweizer und H. Burr.

Schweizer 1-24

Monoplace pour hautes performances, modèle d'essai en alliage d'aluminium, ailes en porte-à-faux. Construit par E. Schweizer et H. Burr.



Schweizer 1-26

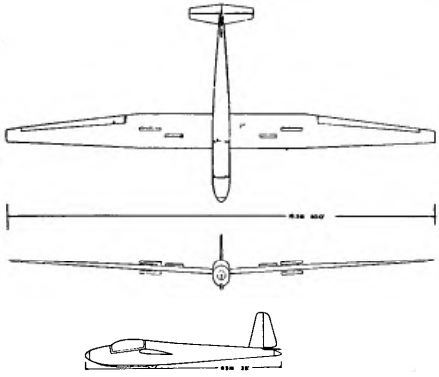
The 1-26 is a medium performance single-seater which is sold primarily in kit form for home construction. The fuselage is of steel tube with fabric covering, wings of aluminum alloy and tail of aluminum alloy, fabric covered.

Schweizer 1-26

Einsitzer für mittlere Leistung, meist als Baukasten für den Selbstbau im Verkauf. Rumpf aus Stahlrohr mit Stoffbespannung, Flügel und Leitwerk aus Aluminiumlegierung mit Stoffbespannung.

Schweizer 1-26

Monoplace de performance moyenne, vendu en général dans des boîtes de construction pour être monté par l'acheteur. Fuselage en tubes d'acier avec entoilage, ailes et empennage en alliage d'aluminium avec entoilage.



Schweizer 2-25

Zweisitzer für Hochleistungsflüge in Ganzmetallbauweise. Der 2-25 wurde in Bishop (Kalifornien) für die Forschungsflüge in hohen Wellen eingesetzt und nahm an den Weltmeisterschaften in Camphill und St-Yan teil.

Schweizer 2-25

The 2-25 is a high performance two-seater of all metal construction. The sailplane was used at Bishop, California, for research on mountain waves and flew in the International Competitions at Camphill and St-Yan.

Schweizer 2-25

Biplace tout métal pour hautes performances. Le 2-25 a été utilisé à Bishop (Californie) pour des vols d'onde relevant de la recherche scientifique et a pris part aux championnats mondiaux de Camphill et de St-Yan.

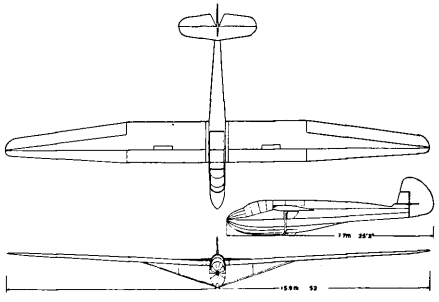
Type designation	1-21	1-23	1-23D	1-24	1-26	2-25
Designer (s)	Schweizer Aircraft Corporation			E. Schweizer H. Burr	Schweizer Aircraft Corporation	
Date of first flight of prototype	1947	1948	1952	1953	1954	1954
Number produced	2	20	16	1	85	1
Wings						
Span m	15.5	13.4	15.3	16.9	12.2	18.3
Area m^2	15.3	13.8	14.9	16.7	14.9	21.5
Aspect ratio	15.75	12.9	15.6	17.1	10.0	15.6
Wing root chord m	1.37	1.22	1.22	1.53	1.61	1.46
Wing tip chord m	0.61	0.61	0.43	0.51	0.85	0.51
Mean aerodynamic chord (m.a.c.) m	1.0	1.07	1.0	1.8	1.24	1.25
Wing section, root	NACA 23012	NACA 43012	NACA 43012A	NACA 43012A	NACA 43012A	NACA 43012A
Wing section, mid	NACA 43012A	—	—	NACA 43009	—	—
Wing section, tip	NACA 23009	NACA 23009	NACA 23009	NACA 23009	NACA 43012A	NACA 23009

Type designation		1-21	1-23	1-23D	1-24	1-26	2-25
Dihedral	deg.	3.5	3.5	3.5	3.5	3.5	3.5
Taper ratio		2.25	2.00	2.85	3.00	1.89	2.85
Aero. twist root/tip	deg.	2.0	2.5	2.5	2.5	2.5	2.50
Ailerons							
Type		Plain differential	Plain differential	Plain differential	Plain differential	Plain differential	Plain differential
Span	m	4.04	3.55	3.66	2.26	2.29	4.35
Area	m^2	1.84	1.55	1.68	1.56	1.20	2.30
Mean chord	m	0.238	0.15	0.15		0.258	0.261
Max. deflection up	deg.	36	36	36	36	36	36
Max. deflection down	deg.	18	18	18	18	18	18
Mass balance degree		none	100%	100%	100%	none	100%
Mass balance method		—	arm balance	arm balance	arm balance	arm balance	arm balance
Horizontal tail							
Span	m	2.60	2.14	2.14	2.60	2.29	2.74
Area of elevator and fixed tail	m^2	1.62	1.41	1.41	1.62	1.72	1.83
Area of elevator	m^2	0.73	0.62	0.62	0.73	0.85	0.84
Max. deflection up	deg.	23	23	25	25	25	30
Max. deflection down	deg.	23	23	25	25	25	30
Aerofoil section		S.A.C.	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical
Mass balance degree		NIL	NIL	NIL	NIL	NIL	NIL
Mass balance method		NIL	NIL	NIL	NIL	NIL	NIL
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.7	3.97	3.97	3.97	3.97	5.01
Elevator aerodynamic balance method		NIL	NIL	NIL	NIL	NIL	NIL
Elevator trimming method		None	spring bungee	spring bungee	adj. static balance	spring bungee	spring bungee
Vertical tail							
Area of fin and rudder	m^2	1.10	0.85	0.99	1.14	1.21	1.35
Area of rudder	m^2	0.67	0.41	0.52	0.7	0.65	0.65
Tail arm	m	3.95	3.62	3.62	3.62	3.5	4.7
Max. deflection	deg.	30	30	30	30	30	30
Aerofoil section		S.A.C.	symmetrical	symmetrical	symmetrical	symmetrical	symmetrical
Mass balance degree		NIL	NIL	NIL	NIL	NIL	NIL
Mass balance type		NIL	NIL	NIL	NIL	NIL	NIL
Aerodynamic balance		NIL	NIL	NIL	NIL	NIL	NIL
Fuselage							
Max. width	m	0.61	0.58	0.58	0.58	0.58	0.72
Overall length	m	6.72	6.25	6.25	6.49	6.45	8.53
Max. cross section	m^2	0.553	0.536	0.536	0.536	0.566	0.709
Number seats and arrangement		1	1	1	1	1	2
Undercarriage type		fixed wheel with brake	fixed wheel with brake	fixed wheel with brake	fixed wheel with brake	fixed wheel with brake	tandem fixed wheel with brake

Type designation		1-21	1-23	1-23D	1-24	1-26	2-25
Lift increasing devices							
Type		None	None	None	None	None	None
Drag producing devices							
Type		Double spoiler-brake (top and bottom of wing) additional single spoiler (top of wing)	Single spoiler (double spoiler optional)	Double spoiler	Double spoiler	Single spoiler	DFS airbrakes; single spoiler
Area	m^2	1.42	0.95	0.95	1.06	0.52	
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.		No	No	No	No	No	No
Weights							
Wings	kg	152	112	134	152	105	246
Fuselage	kg	57	46	52	74	54	98
Tailplane and elevator	kg	6	4	4	4	3	6
Equipped weight	kg	214	175	190	265	162	332
Removable ballast	kg	118 (water)	None	None	None	None	None
Max. load	kg	236	125	150	100	100	175
Max. permissible flying weight	kg	450	300	340	365	260	507
Wing loading max.	kg/m^2	29.4	21.7	22.8	21.8	17.5	24.9
Design standards							
Airworthiness requirements to which aircraft has been built		CAR 05	CAR 05	CAR 05	CAR 05	CAR 05	CAR 05
Certificate of airworthiness			ATC1G1	ATC1G1		ATC1 G 10	
Any other certification (e.g. experimental license, permit to fly)		experimental			experimental		experimental
Limiting flight conditions							
Placard airspeed	km/h	240	208	212	206	185	215
Aero-towing speed	km/h	215	186	176	185	153	195
Winch launching speed	km/h	138	112	109	119	96	124

Type designation	1-21		1-23		1-23D		1-24		1-26		2-25	
Cloud flying permitted yes/no	yes		yes		yes		yes		yes		yes	
Permitted aerobatic manœuvres					no restrictions							
Spinning permitted yes/no	yes		yes		yes		yes		yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c. ...			26% and 36%		26% and 36%				25% and 34.5%			
Straight flight performance												
at flying weight of ..... kg	300		268		290		365		260		509	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	61	0.66	58	0.70	55	0.61	61	0.61	56	0.82	56	0.67
V for max. L/D	72	0.69	77	0.79	77	0.73	77	0.72	79	0.97	74	0.70
Stalling speed ..... km/h	58		53		53		58		45		58	
Max L/D	29		27		30		30		23		30	

Manufacturer:
Schweizer Aircraft Corporation
Elmira, New York



SGS 2-8 (TG-2)

The TG-2 is a medium performance two-seat training sailplane. Fuselage is of steel tube, fabric covered. The monospar wing is of aluminum alloy, fabric covered, and single strut braced. Tail is aluminum alloy, fabric covered.

SGS 2-8 (TG-2)

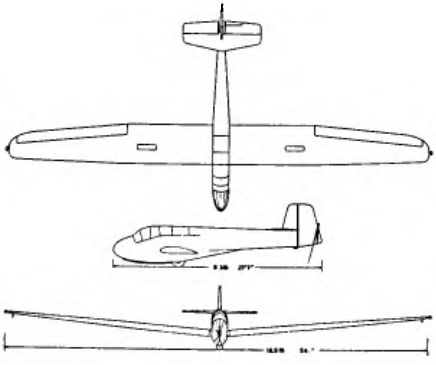
Zweisitziges Trainingsflugzeug für mittlere Leistung. Rumpf aus Stahlrohr, mit Stoffbespannung. Einholmiger Flügel aus Aluminiumlegierung, stoffbespannt, gestützt durch eine Strebe. Leitwerk aus Aluminiumlegierung, stoffbespannt.

SGS 2-8 (TG-2)

Biplace d'entraînement pour performances moyennes. Fuselage à carcasse de tubes d'acier et entoilé. Aile à longeron unique en alliage d'aluminium, entoilée, avec un seul mât de cellule. Empennage en alliage d'aluminium, entoilé.

SGS 2-12 (TG-3 A)

The TG-3 A was designed as a training sailplane for use by the military. The wood wings are of single spar cantilever construction and fabric covered. Fuselage is steel tube, fabric covered; tail wood and fabric covered.



SGS 2-12 (TG-3 A)

Der TG-3 A wurde als Trainingsflugzeug für militärische Zwecke konstruiert. Holzflügel in einholmiger, freitragender Konstruktion, stoffbespannt. Rumpf aus Stahlrohr, stoffbespannt. Leitwerk aus Holz, stoffbespannt.

SGS 2-12 (TG-3 A)

Construit comme planeur d'entraînement pour des buts militaires. Aile cantilever en bois, à longeron unique, entoilée. Fuselage à carcasse en tubes d'acier, entoilé. Empennage en bois, entoilé.

SGU 1-19

The 1-19 is a utility single seater with strut braced two-spar wood wing. Fuselage is steel tube with fabric covering. Tail is of aluminium and steel construction.

SGU 1-19

Einsitzer für den allgemeinen Gebrauch, mit zweiholmigem Holzflügel, gestützt durch Streben. Rumpf aus Stahlrohr mit Stoffbespannung. Das Leitwerk ist eine Konstruktion aus Aluminium und Stahl.

SGU 1-19

Monoplace pour l'emploi général. Aile haubanée en bois, à deux longerons. Fuselage à carcasse en tubes d'acier, entoilé. L'empennage est construit en alliage d'aluminium et acier.

SGU 1-20

The 1-20 is similar to the 1-19 except that the span has been increased by one meter.

SGU 1-20

Der 1-20 ist dem 1-19 sehr ähnlich. Der einzige Unterschied besteht in der Vergrößerung der Spannweite um einen Meter.

SGU 1-20

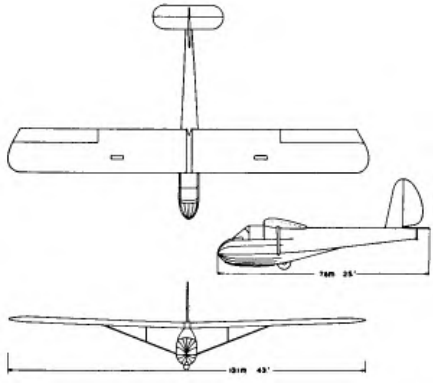
Pratiquement identique avec le 1-19, il se distingue de celui-ci par l'envergure agrandie d'un mètre.

SGU 2-22

The 2-22 is a two-seat utility training glider with a monospar wing of aluminum alloy braced by a single strut. Fuselage is of steel tube, fabric covered. Tail aluminum alloy and steel with fabric covering.

SGU 2-22

Biplace d'entraînement pour l'emploi général. Aile à longeron unique en alliage d'aluminium. Fuselage à carcasse en tubes d'acier, entoilé. Empennage en alliage d'aluminium et acier, entoilé.



SGU 2-22

Zweisitziges Trainingsflugzeug für den allgemeinen Gebrauch. Einholmiger Flügel aus Aluminiumlegierung, gestützt durch eine Strebe, Rumpf aus Stahlrohr, stoffbespannt. Leitwerk aus Aluminiumlegierung und Stahl, mit Stoffbespannung.

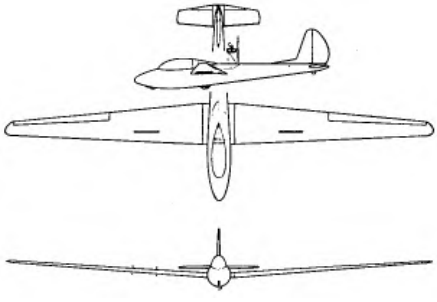
Type designation	TG-2	TG-3A	1-19	1-20	2-22
Designers	Schweizer Aircraft Corporation				
Date of 1st flight of prototype	1938	1942	1944	1946	1945
Number produced	57	114	57	2	55
Wings					
Span ..... m	15.9	16.5	11.2	13.1	13.1
Area ..... m^2	19.9	22.0	15.8	16.9	19.5
Aspect ratio	12.6	12.3	7.9	10.15	8.8
Wing root chord ..... m	1.53	1.53	1.45	1.45	1.53
Wing tip chord ..... m	0.61	0.92	1.45	0.92	1.53
Wing section, root	NACA 4412	NACA 4416	NACA 43012 A	NACA 43012 A	NACA 43012 A
Wing section, tip	NACA 4412	NACA 4412	NACA 43012 A	NACA 43012 A	NACA 43012 A

Type designation	TG-2	TG-3A	1-19	1-20	2-22
Dihedral ..... deg.	3.0	4.5	1.5	1.5	1.5
Aero. twist root/tip ..... deg.	6.0	3.0	3.0	4.0	3.0
Taper ratio	2.5	1.7	1.0	1.6	1.0
Ailerons					
Type	plain differential				
Span ..... m	4.64	4.68	2.70	3.40	3.11
Area ..... m^2	3.95	3.23	2.30	2.17	2.70
Horizontal tail					
Span ..... m	2.90	3.05	2.36	2.36	2.36
Area of elevator and fixed tail ..... m^2	2.22	2.76	1.91	1.91	1.91
Area of elevator ..... m^2	0.96	1.22	0.86	0.86	0.86
Vertical tail					
Area of fin and rudder .. m^2	1.45	1.56	1.21	1.21	1.21
Area of rudder ..... m^2	1.20	1.06	0.65	0.65	0.65
Fuselage					
Max. width ..... m	0.61	0.65	0.61	0.61	0.72
Overall length ..... m	7.70	8.27	6.6	6.6	7.63
Number seats and arrangement	2 tandem	2 tandem	1	1	2 tandem
Undercarriage type	fixed wheel with brake	fixed wheel with brake	fixed wheel	fixed wheel	fixed wheel with brake
Lift increasing devices	none	none	none	none	none
Drag producing devices					
Type	spoilers	spoilers	none	none	spoilers
General location	top of wing	top and bottom of wing			top of wing
Weights					
Equipped weight ..... kg	205	355	145	175	205
Max. permissible flying weight ..... kg	390	555	250	285	380
Wing loading ..... kg/m^2	19.6	25.2	15.8	16.9	19.5
Design standards					
Airworthiness requirements to which aircraft has been built	CAR 05		CAR 05	CAR 05	CAR 05
Certificate of airworthiness	ATC No. 5	Military	ATC G 17	Experimental	ATC G 18

Type designation	TG-2		TG-3A		1-19		1-20		2-22	
Limiting flight conditions										
Placard airspeed ..... km/h	129		177		134		134		160	
Aero-towing speed ..... km/h	115		145		120		120		145	
Winch launching speed .. km/h	87		100		96		96		111	
Cloud flying permitted ..	yes		yes		yes		yes		yes	
Spinning permitted	yes		yes		yes		yes		yes	
Straight flight performance										
at flying weight of ..... kg	390		545		250		285		380	
	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	63	0.78			53	1.10	56	0.94	60	1.07
V for max. L/D	74	0.88			68	1.19	69	1.19	76	1.22
Max. L/D	23		24 approx.		16		16		17	

United States - Vereinigte Staaten - Etats-Unis

Manufacturer:
Nelson Speciality Corp.
San Leandro, California



Nelson PG-185B Hummingbird

The Hummingbird is a two-seat high performance powered sailplane with a 42 HP Nelson Engine which is completely retractable. It is of all metal construction.

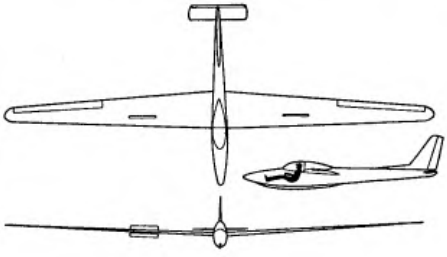
Nelson PG-185B Hummingbird

Zweisitzer Hochleistungs-Motorsegler mit 42-PS-Nelson-Motor (vollständig einziehbar). Ganzmetallkonstruktion.

Nelson PG-185B Hummingbird

Motoplaneur biplace de haute performance, avec moteur Nelson de 42 CV entièrement éclipsable. Construction tout métal.

Manufacturer:
Perl-Nelson
907 California Way,
Livermore, California



Perl PG-130 Penetrator

The Penetrator is a single-seat high performance sailplane of all wood construction. The forward part of the wing is filled with styrofoam plastic and special attention has been given to the wing finish.

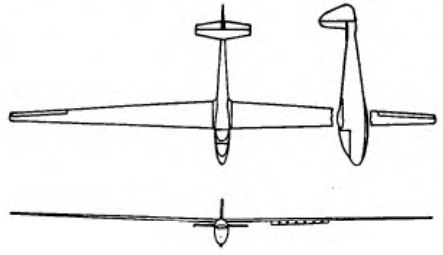
Perl PG-130 Penetrator

Einsitziges Hochleistungsflugzeug in Holzkonstruktion. Der vordere Teil des Flügels ist mit Schaumplastik gefüllt; besondere Aufmerksamkeit wurde der Bearbeitung der Flügeloberflächen geschenkt.

Perl PG-130 Penetrator

Monoplace de haute performance construit en bois. La partie antérieure de l'aile est remplie d'écume isolante; les surfaces des ailes ont été travaillées avec un soin tout particulier.

Manufacturer:
Harland Ross and
Richard Johnson



RJ-5

The RJ-5 is one of the first high performance sailplanes featuring a laminar aerofoil. The fuselage is of plywood semimonocoque construction. The wing spar is aluminum; leading edge and ailerons are of wood; the aft section of the wing is fabric covered. The sailplane is the holder of the International Distance Record.

RJ-5

Eines der ersten Hochleistungsflugzeuge mit laminarem Tragflügel. Rumpf aus Sperrholz in Halbschalenbauweise. Flügelholm aus Aluminium; Flügelvorderkante und Querruder aus Holz. Der hintere Teil des Flügels ist stoffbespannt. Dieses Flugzeug hält den internationalen Distanzrekord.

RJ-5

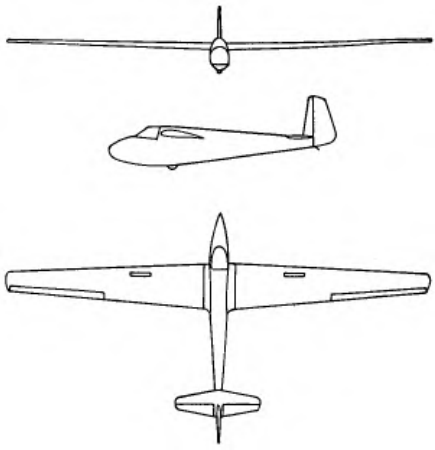
L'un des premiers planeurs de haute per-

formance à surface portante laminaire. Fuselage de contreplaqué construit en demi-coque. Le longeron de l'aile est en aluminium; le bord d'attaque des ailes et les ailerons sont en bois. La partie arrière de l'aile est entoilée. Ce planeur détient le record international de distance.

Manufacturer: Homebuilt

Cherokee II

The Cherokee II is a single-seat medium performance sailplane designed for amateur home construction at minimum cost. It is of all wood construction and utilises the "stick and gusset" method of assembly. It is fabric covered.



Cherokee II

Einsitziges Flugzeug für mittlere Leistung, konstruiert für den Selbstbau bei geringen Kosten. Holzkonstruktion, sehr einfach im Zusammenbau, stoffbespannt.

Cherokee II

Monoplace de performance moyenne, prévu pour la fabrication individuelle à bas prix. Construction de bois, de montage très simple, entoilée.

Type designation	Nelson PG-185B Hummingbird	Perl PG-130 Penetrator	RJ-5	Cherokee II
Designer(s)	HarryPerl-aircraft Ted Nelson-engine	Harry N. Perl	Ross-Johnson	Stanley A. Hall
Date of first flight of prototype	May 1949	April 1953	July 1950	1956
Number produced	7	1	1	~ 80 under construction
Wings				
Span ..... m	16.46	14.63	16.75	12.2
Area ..... m^2	17.25	12.08	11.6	11.6
Aspect ratio	15.73	17.75	24.0	12.8
Wing root chord ..... m	1.52	1.27	1.07	1.37
Wing tip chord ..... m	0.57	0.51	0.305	0.55
Mean aerodynamic chord (m.a.c.) ..... m	1.15	0.92	0.746	
Wing section, root	Gö 549	Gö 549	63_2-615	Gö 549
Wing section, mid	Gö 549	Gö 549	63_2-615	Gö 549
Wing section, tip	Gö 676	Gö 676	63_2-615	Gö 549

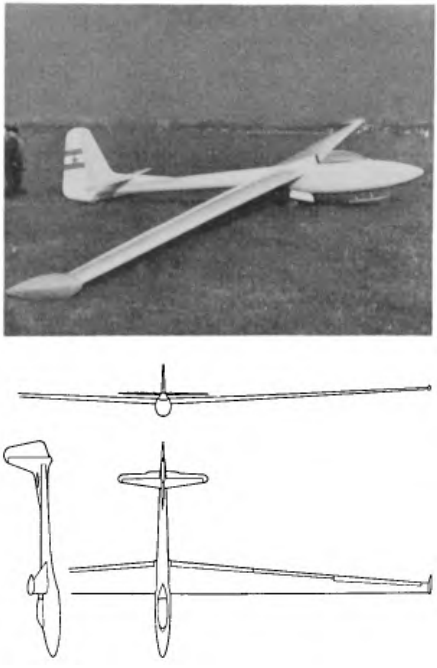
Type designation		Nelson PG-185B Hummingbird	Perl PG-130 Penetrator	RJ-5	Cherokee II
Dihedral	deg.	3.	2.	2.5	2.
¼ chord sweep	deg.	0.5	0.5	0	—0.5
Aero twist root/tip	deg.	2.	0	—3.0	0.
Length of each section of wing	m	7.62	7.315	8.375	
Special features		styrofoam filled leading edge	styrofoam filled leading edge "D" section	waviness ≤ ±.004 inches in 2.0 inches on leading edge	
Ailerons					
Type		plain	inset hinge	upper surface hinge	
Span	m	4.26	2.37	2.13	2.72
Area	m^2	2.50	1.17		1.09
Mean chord	m	0.29	0.24	0.14	
Max deflection up	deg.	28	30	22	30
Max. deflection down	deg.	14	15	15	15
Mass balance degree		full	full	nil	nil
Mass balance method		nose counterweight	nose counterweight	—	—
Horizontal tail					
Span	m	2.64	1.85	2.44	2.44
Area of elevator and fixed tail	m^2	1.74	0.93	1.17	1.34
Area of elevator	m^2	—	—	0.56	0.65
Max. deflection up	deg.	25	23	15	25
Max. deflection down	deg.	25	23	15	25
Aerofoil section		NACA 0009	NACA 0009	(non-descript)	sym.
Mass balance degree		full	full	nil	ni'
Mass balance method		counterweight	counterweight	—	—
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	4.4	4.I	3.38	3.4
Elevator aerodynamic balance method		all-movable tail tab	all-movable tail tab	none	none
Elevator trimming method		tab	tab	none	none
Special features		NACA all-movable tail	NACA all-movable tail		
Vertical tail					
Area of fin and rudder	m^2	1.3	1.04	0.92	0.94
Ares of rudder	m^2	0.5	0.4	0.58	0.706
Aspect ratio		1.45	1.25	2.3	2.18
Tail arm				3.78	3.86
Max. deflection	deg.	25	28	30	30
Aerofoil section		NACA 0009	NACA 0009	(non-descript)	sym.
Mass balance degree		nil	nil	nil	nil
Mass balance type		none	none	none	none
Aerodynamic balance		none	none	none	none

Type designation	Nelson PG-185B Hummingbird	Perl PG-130 Penetrator	RJ-5	Cherokee II
Fuselage				
Max. width ..... m	0.8	0.56	0.56	0.61
Overall lenght ..... m	7.45	6.34	6.34	6.55
Max. cross section ..... m^2				0.545
Number seats and arrangement	2 tandem	1	1	1
Undercarriage type	single main wheel, steerable nose wheel	shock-mounted skid	skid; dropable wheels	fixed wheel
Wheel diameter ..... cm	41. (main) 26. (nose)	—		
Special features	retractable engine			
Lift increasing devices				
Type	none	none	none	none
Drag producing devices				
Type	spoilers-upper brakes-lower	spoilers-upper brakes-lower	airbrakes-bottom of wing and 0.25 c simple flap	spoilers
Span ..... m	0.9	0.8	2.13	
Area ..... m^2	0.3	0.21	0.39	
Location, % of chord (where applicable)	32	33	50	
Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no	no	yes	no	
Weights				
Wings ..... kg	164	136	168	71
Fuselage ..... kg	93	69	50	63
Tailplane and elevator ... kg	12	8	4	6
Empty weight ..... kg	269	213	222	140
Instruments ..... kg	7	4.5	2	2
Other equipment (e.g. oxygen, radio) ..... kg	76	—	—	—
Equipped weight ..... kg	352	217.5	224	142
Removable ballast ..... kg	—	9	—	—
Max. load ..... kg	193	100	~116	86
Max. permissible flying weight ..... kg	545	326.5	~340	228
Wing loading ..... kg/m^2	31.7	27.1	27.1	19.6
Design standards				
Airworthiness requirements to which aircraft has been built	CAAM 05 CAR 05	CAAM 05 CAR 05		CAR Part 5 (CAR Part 3, utility category)

Type designation	Nelson PG-185B Hummingbird		Perl PG-130 Penetrator		RJ-5		Cherokee II	
Date of issue of these requirements	June 1st, 1940 revised June 1942		June 1st, 1940 revised June 1942				1956	
Certificate of Airworthiness	—		—		—		—	
Any other certification	experimental		experimental		experimental		experimental	
Design flight envelope	V km/h	n	V km/h	n	V km/h	n	V km/h	n
Manoeuvre loads								
Point A	133	5.43	124	5.6			122	4.4
Point B	249	5.43	225	5.6			183	4.4
Point C	249	—3.43	225	—3.6			183	—1.76
Point D	149.	—3.43	140	—3.6				
Safety factor	1.5		1.5				1.5	
Limiting flight conditions								
Placard airspeed smooth conditions km/h	225		203		193		167	
Placard airspeed gusty conditions km/h	225		203		129		113	
Aero-towing speed km/h	—		176		129			
Winch launching speed km/h	—		128		113		113	
Cloud flying permitted	yes		yes		no		yes	
Permitted aerobatic manoeuvres	loops		loops		none		loops inverted flying	
Spinning permitted	yes		yes		no		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.	18.1 and 32.2		20.0 and 31.5		30. MGC normal			
Straight flight performance								
at flying weight of kg	545		326.5		309		228	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink	77	1.0	71	0.64	72.5	0.52	68	0.8
V for max. L/D	93	1.07	83.5	0.70	80.5	0.53	76	0.85
					92	0.64	85	1.0
					107	0.98	100	1.05
					120	1.22		
Stalling speed km/h	63		60		61		58	
Max L/D	~25		33		40		24	

Yugoslavia - Jugoslawien - Yougoslavie

Manufacturer:
Ikarus
Avijaticarski put 10, Zemun



Meteor

The Meteor is a single-seat high performance sailplane of all-metal construction. The fuselage of semi-monocoque structure is built in two main sections to facilitate repairs. The rear section of the fuselage is straight tapered with stringers and a stressed skin. There is a wheel type control and the cockpit cover is fully detachable. The prototype is presently undergoing a research program; it is not in series production.

Meteor

Einsitziges Hochleistungsflugzeug in Ganzmetallkonstruktion. Der Rumpf in Halbschalenbauweise ist zur Erleichterung von Reparaturen in zwei Hauptteilen hergestellt. Der hintere Teil des Rumpfes ist gerade verjüngt mit Längsversteifung und selbsttragender Haut. Radkontrolle, Pilotensitz ganz abnehmbar. Der Prototyp befindet sich gegenwärtig in einem Forschungsprogramm; eine Serie wurde nicht hergestellt.

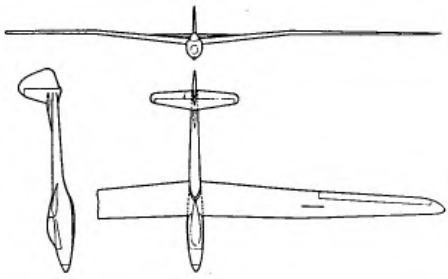
Meteor

Monoplace de haute performance, tout métal. Le fuselage en demi-coque est fabriqué en deux parties, pour faciliter les réparations. La partie arrière s'amincit en ligne droite, avec des renforcements longitudinaux et un revêtement travaillant. La roue est contrôlable, le siège du pilote peut être tout à fait enlevé. Ce prototype est compris actuellement dans un programme de recherches; il n'a pas été produit en série.

Manufacturer:
Institute Branko Ivanus
(formerly Letov)
Celovska cesta, Ljubljana

Orao II c

The Orao II c is a single-seat high performance sailplane. The rear part of the wooden fuselage is of sandwich structure (filled with balsa and spruce). The main wing spar is of light alloy; the wing is plywood covered.



Orao II c

Einsitziges Hochleistungsflugzeug. Hinterer Teil des Holzrumpfes im Sandwichbau (gefüllt mit Balsa und Föhrenholz). Flügel-Hauptholm aus einer leichten Legierung; Flügel sperrholzbeplankt.

Orao II c

Monoplace de haute performance. La partie arrière du fuselage en bois est construite en sandwich (remplissage avec du balsa et du pin sylvestre). Le longeron principal de l'aile est en alliage léger; l'aile est recouverte de contreplaqué.

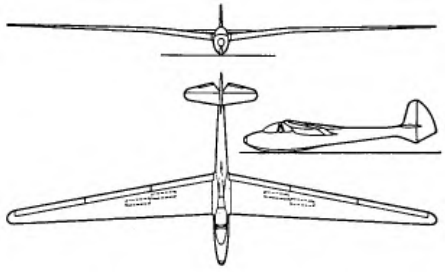
Manufacturer: Ikarus

Košava

The Košava is a tandem two-seat high performance sailplane of wooden construction. It won the World Gliding Competitions in 1954 and holds a number of National Records.

Košava

Zweisitziges Hochleistungsflugzeug mit Tandemanordnung der Sitze. Holzkonstruktion. Gewann die Weltmeisterschaft 1954 und hält zahlreiche Landesrekorde.



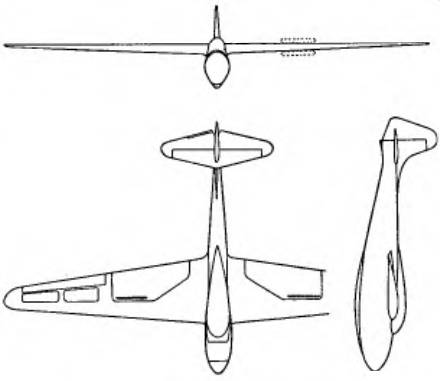
Košava

Biplace de haute performance avec sièges en tandem. Construction en bois. A gagné le Championnat du monde 1954 et détient de nombreux records nationaux.

Manufacturer:
Savezni Vazduhoplovni Centar
Vršac

Mačka

The Mačka is a single-seat aerobatic sailplane.



Mačka

Einsitziges Flugzeug für Kunstflug.

Mačka

Monoplace d'acrobatie.

Manufacturer:
20 Maj, Ivo-Lola Ribar 43

Ilindenka-1

(No information was given on the Ilindenka-1 other than that which appears in the table.)

Type designation	Meteor	Orao IIc	Košava	Mačka	Ilindenka-1
Designer	Obad, Cijan and Mazovec	B. Cijan S. Obad	Ilic, Kisovec and Karapandzic	M. Ilic	M. Ilic
Date of first flight of prototype	1955	1954	1952	1957	1953
Number produced					
Wings					
Span ..... m	20.0	19.0	19.1	10.0	15.16
Area ..... m^2	16.0	17.8	21.1	10.0	14.2
Aspect ratio	25.0	20.3	17.3	10.0	16.20
Wing root chord ..... m	1.24	1.32	1.8	1.58	1.40
Wing tip chord ..... m	0.36	0.57	0.415	0.431	0.48
Mean chord ..... m	1.02				
Wing section, root	$63_2616.5$	Gö 549 R	Gö 549-M		Gö 549-M
Wing section, mid	$63_2616.5$	Gö 682			
Wing section, tip	$63_2616.5$	RAF 34	CAGI 731-M		CAGI 731-M
Dihedral ..... deg.	2		7	1.2	2.5
¼ chord sweep ..... deg.			—4.57	1.2	0.4
Aero. twist root/tip ..... deg.	0 —1.5 0	3	—4	—1.3	—4.5
Taper ratio ..... m	0.29	43	0.23	0.273	0.345
Special features	wing "salmons"				

Type designation		Meteor	Orao IIc	Košava	Mačka	Ilindenka-1
Ailerons						
Type		plain	plain		Frise	
Span	m	6.35	4.26		3.90	3.70
Area	m^2	0.99	1.15		0.74	0.66
Mean chord	m				0.19	
Max. deflection up	deg.	30	24	28	32	25
Max. deflection down	deg.	15	16	16	20	14
Mass balance degree					100%	
Mass balance method		balance-weight				
Special features		inner section of ailerons deflected as flaps				
Horizontal tail						
Span	m	3.4	3.36	3.60	2.60	2.90
Area of elevator and fixed tail	m^2	1.47	1.79	2.50	1.50	1.64
Area of elevator	m^2	0.60	0.78	1.00	0.706	0.80
Max. deflection up	deg.	25			27	28
Max. deflection down	deg.	15			20	17
Aerofoil section			NACA 0010	NACA 0007	NACA 0012-MR NACA 0009-MR	NACA 0009-M
Mass balance degree					100%	
Mass balance method		bobweight				
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)	m	3.7	4.15	4.6	3.41	4.07
Elevator aerodynamic balance method		unshielded horn balance	unshielded horn balance		unshielded horn balance	unshielded horn balance
Elevator trimming method		all movable tail	all movable tail	tab	tab	external sealed tab
Horizontal tail volume coefficient		0.443	0.45	0.493	0.511	0.502
Special features		bobweight and spring stabilizer				
Vertical tail						
Area of fin and rudder	m^2	1.34	1.27	1.80	0.986	1.30
Area of rudder	m^2	0.74	0.86	0.87	0.501	0.66
Aspect ratio					1.76	1.82
Tail arm	m	4.6		4.9	3.45	4.15
Max. deflection	deg.	30	30	25	30	30
Aerofoil section				NACA 0008	NACA 0009-MR	NACA 0009-M
Aerodynamic balance			horn		unshielded horn balance	unshielded horn balance
Special features		dorsal fin			dorsal fin	

Type designation	Meteor	Orao IIc	Košava	Mačka	Ilindenka-1
Fuselage					
Max. width ..... m	0.58	0.60	0.62	0.612	0.61
Overall length ..... m	8.05			5.67	
Max. cross section ..... m^2		0.46		0.568	0.53
Wetted surface area ..... m^2		9.29		9.90	
Number seats and arrangement	1	1	2 tandem	1	1
Undercarriage type	retractable front skid and retractable wheel	skid		skid	
Wheel diameter ..... cm	40				
Special features	wheel brakes				
Lift increasing devices					
Type	trailing edge flaps and droopable inner ailerons (sealed)	trailing edge flaps			
Span ..... m	2×3.0				
Area ..... m^2	0.486				
Max. deflection up ..... deg.	11		10		
Max. deflection down .... deg.	20				
Drag producing devices					
Type	modified DFS airbrakes	modified DFS airbrakes	airbrakes	Schemp-Hirth airbrakes	Schemp-Hirth airbrakes
Span ..... m	1.06	1.170			
Area ..... m^2	1.32	0.842			2×0.375
% of span	10				
Location, % of chord	55		50		40
Is device intended to limit terminal velocity (vertical dive) to max. permissible IAS, yes/no	yes	yes			
Weights					
Wings[1] ..... kg	221	226	216	83	115
Fuselage[2] ..... kg	144	121	108	54	65
Tailplane and elevator ... kg	11	9	12	10	7
Empty weight[3] ..... kg	376	356	336		187
Instruments ..... kg	10				10
Other equipment (e.g. oxygen, radio) ..... kg	19	9	36		
Equipped weight ..... kg	405	365	372	157	197

Type designation	Meteor		Orao IIc		Košava		Mačka		Ilindenka-1	
Max. load ..... kg	100		90		203		100		113	
Max. permissible flying weight ..... kg	505		455		575		260		310	
Wing loading (max.) ..... kg/m²	31.5		25.5		27.2		26.0		21.8	
Design standards										
Airworthiness requirements to which aircraft has been built	BCAR Section E		Bauvorschriften für Segelflugzeuge				BVS			
Date of issue of these requirements	1 March 1948		1939				1939			
Certificate of airworthiness	yes		yes							
Design flight envelope Manoeuvre loads	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor	V km/h	proof load factor
Point A	153	5.0	128	5.0	65	4.3		6.5	52.5	5.6
Point B	252	4.0	220	5.0	88	4.5		6.5	74	5.7
Point C	252	1.0	220	1.0	230	1.0		1.0	230	1.0
Point D	144	–2.5	184	–2.75	118	–2.5		–3.25	102	–2.85
	1.5		1.8				2.0		2.0	
Gust loads	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
Point A	171	20.0								
Point B	252	7.4								
Point C	252	–2.48								
Point D	171	–20.0								
Limiting flight conditions										
Placard airspeed smooth conditions ..... km/h	250		220				450			
Placard airspeed gusty conditions ..... km/h	125		150							
Aero-towing speed ..... km/h	150		150				200			
Winch launching speed ... km/h			100							
Cloud flying permitted ...	yes		yes				yes			
Permitted aerobatic manoeuvres	semi aerobatic		none				full aerobatic		loops rolls	
Spinning permitted	yes		yes				yes		yes	
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.									25.8% and 38.0%	

Type designation	Meteor		Orao IIc		Košava		Mačka		Ilindenka-1	
Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) ..... km/h	230		220		230		250		230	
Straight flight performance at flying weight of ..... kg					555		240		287	
No flap or brake	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s	V km/h	v m/s
V for min. sink			75	0.60	75	0.66	74.5	0.98	66.5	0.70
V for max. L/D	~90		85	0.65	87	0.72	83.0	1.07	74.5	0.75
1.5 × V stall			110	1.10						
1.75 × V stall			140	2.0						
With ....° flap ..... deg.					5°					
					120	1.2				
					150	1.95				
Stalling speed ..... km/h	67						62.5			
Max. L/D	~42		36		33.5		21.5		27.5	

[1] With struts, controls, flaps and brakes.
[2] Complete with rudder and fin, less instruments and equipment.
[3] To include any fixed ballast.

Manufacturer:
Institute Branko Ivanus
(formerly Letov)

Jadran

The Jadran is a single-seat amphibian sailplane.

Jadran

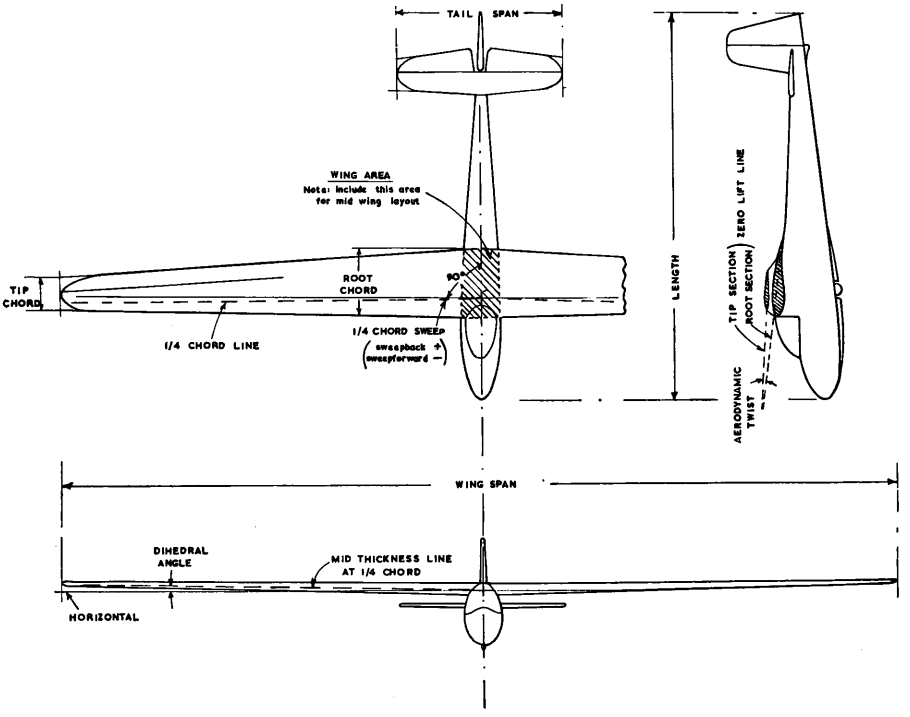
Einsitziges Amphibien-Segelflugzeug.

Jadran

Planeur amphibie monoplace.

Wings: span 15.0 m; area 13.25 m²; aspect ratio 17; root wing section Gö 549.
Weights: empty 195 kg; max. permissible flying weight 280 kg.
Limiting Flight Conditions: placard airspeed 200 km/h; aerotowing speed 150 km/h.
Performance: min. sink 0.75 m/s at 60 km/h; max. L/D 25 at 75 km/h.

Definition of terms



Wings

Area(s). High wing. Plan area of complete wing. Mid or low wing. Plan area of wings outside the fuselage together with the imaginary plan area inside the fuselage bounded by the projection of leading and trailing edges to the plane of symmetry. (Shaded area in diagram.)

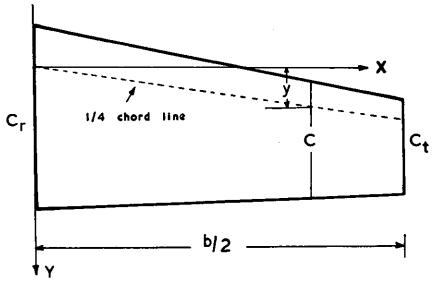
$$\textit{Aspect Ratio} = \frac{\text{span}^2}{\text{wing area}} = \frac{b^2}{S}$$

Mean Aerodynamic Chord (m. a. c.)

$$= \frac{\text{wing area}}{\text{span}} = \frac{S}{b} = \overline{C}$$

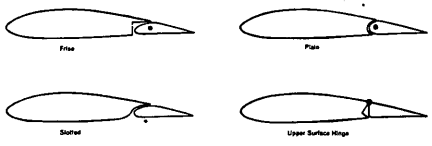
Location of m. a. c. 1/4 chord point, behind

$$\text{wing root } 1/4 \text{ chord point} = \frac{2\int_{o}^{b/2} cy\,dx}{S}$$



$$\text{Taper Ratio} = \frac{\text{root chord}}{\text{tip chord}} = \frac{C_r}{C_t}$$

Ailerons



Mass Balance. An aileron is mass balanced by adding weight to it ahead of the hinge line.

Method. This mass may be:

a) Distributed along the leading edge. This is particularly applicable to frise and slotted ailerons.

b) Concentrated in one or more places on the end of an arm. This arm may or may not be concealed inside the wing.

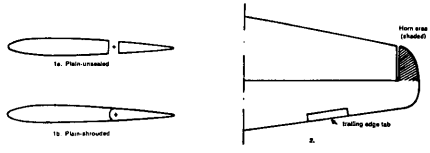
c) Installed in a horn balance.

Degree. If the aileron is completely statically balanced about its hinges this may be called 100 % static balance. If only half of the natural out-of-balance moment is compensated this may be denoted as 50 % static balance, etc.

Horizontal Tail

Mass Balance. Definition of method (e. g. distributed mass along elevator leading edge) is the same as for aileron. An additional method sometimes used is by a mass on a projecting arm installed remotely from the elevator and operating through the control system. Degree may also be specified as percentage static balance defined, as for the ailerons, as the moment about the hinge line of the balance weights as a percentage of the out of balance moment of the control surface.

Aerodynamic Balance. Most elevators have no aerodynamic balance (unbalanced) (Fig. 1 a and b).



Some have horn balance (Fig. 2). Horn balance may be combined with anti-balance tabs geared to move in the same sense as the elevator. Balance tabs moving in the opposition sense (ligthening the control) are more common on heavier aircraft.

1/4 Chord Point, m. a. c. Calculated in the same way as for the wing. *Tail arm* is then the distance between these two points.

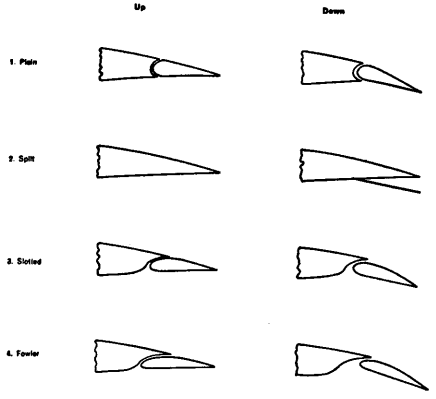
$$\text{Tail Volume Coefficient} = \frac{\text{horizontal tail area including elevators} \times \text{tail arm}}{\text{wing area} \times \text{mean chord}} = \frac{S'\,l'}{S\,\overline{C}}$$

Fuselage

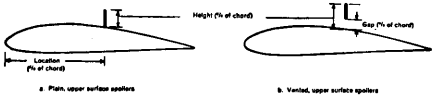
Wetted surface area. Surface area exposed to the airflow, including the area of canopies and skids, if fitted. In the case of an open cockpit the area of the opening is included.

Lift Increasing Devices. This includes all trailing edge flaps, and also ailerons if these can be "drooped" (i. e. set down symmetrically at a positive angle to the normal neutral position).

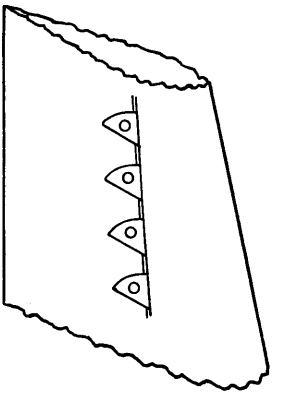
Flaps inboard of the ailerons are classified, so far as possible, into the following groups.



Drag Producing Devices. These are classified into wing, fuselage and tail brakes. Dimension and location of wing brakes:



Descriptions are chosen from the following, so far as possible:
Plain upper (or lower) surface spoilers
Vented upper (or lower) surface spoilers
Perforated upper (or lower) surface spoilers
DFS type airbrakes (i. e. vented upper and lower surface spoilers)
Segmented upper (or lower) surface brakes



Segmented surface brakes

Design Flight Envelope

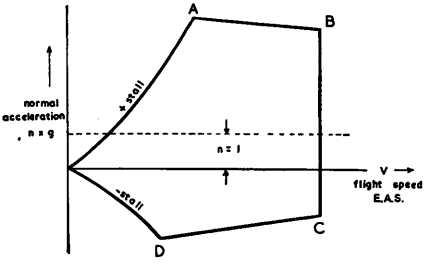
This is specified in terms of two sets of design loads

a) applied by the pilot during manœuvres involving application of normal acceleration by use of the elevators;

b) arising from encounters with vertical gusts at various forward speeds.

Different requirements may call for different design cases but four design points are common. These arise from two or more design flight speeds, at each of which positive and negative manœuvre accelerations or gust velocities have to be considered. Typical "envelopes" resulting from these cases are as follows;

a) Manœuvre cases



Note: V_A = flight speed at which an upwards acceleration $n_A \times g$ will just stall the wing
V_D = stall speed for downward acceleration.

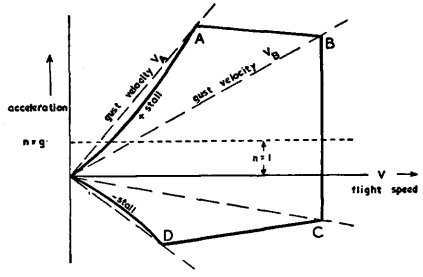
Speeds V_B and V_C (which need not be the same) are the design diving speeds and associated positive and negative design manœuvre loads.

Requirements may be specified as "Proof loads" with an associated factor of safety (usually 1.5 or 2). The structure must be able to withstand its design proof load without permanent deformation exceeding a safe small value. Alternatively they may be specified as ultimate loads (proof load $\times$ factor of safety) at which the structure just fails.

b) Gust cases

Gust cases may be specified at one or more flight speeds: up or down gusts are usually considered. The effect of the gust is to produce an incidence change in the wing which developes a normal acceleration of magnitude depending on the flight speed in relation to the stall speed in straight level flight.

If high speed and low speed gusts are specified, the latter is usually associated with a flight speed at which the wing will just stall. This determines a maximum rough air speed and associated maximum design load. An envelope can thus be drawn as follows:



Übersetzung technischer Ausdrücke

Traduction des termes techniques

Type designation / Typenbezeichnung / Désignation du type
Manufacturer / Herstellerwerk / Fabricant
Address / Adresse / Adresse
Designer(s) / Konstrukteur(e) / Auteur(s) du projet
Date of 1st flight of prototype / Erster Flug des Prototyps / Premier vol du prototype
Number produced / Bisher gebaute Stückzahl / Nombre d'exemplaires déjà produits

Wings / Flügel / Ailes (voilure)

Span / Spannweite / Envergure
Area / Flächeninhalt / Surface
Aspect ratio / Flügelstreckung / Rapport d'allongement
Wing root chord / Flügeltiefe an der Flügelwurzel / Profondeur de l'aile près du fuselage
Wing tip chord / Flügeltiefe an der Flügelspitze / Profondeur de l'aile à l'extrémité

Mean aerodynamic chord (m.a.c.) / Mittlere aerodynamische Tiefe / Profondeur aérodynamique moyenne
Wing section, root / Profil, Flügelwurzel / Profil de l'aile près du fuselage
Wing section, mid / Profil, Flügelmitte / Profil de l'aile au milieu
Wing section, tip / Profil, Flügelspitze / Profil de l'aile à l'extrémité
Dihedral / V-Stellung / Dièdre
¼ chord sweep / Pfeilung bei ¼ Flügeltiefe / Flèche à ¼ de la profondeur de l'aile
Aerodynamic twist root, tip / Aerodynamischer Schränkungswinkel / Angle de décalage aérodynamique des ailes
Taper ratio / Trapezverhältnis / Rapport de conicité
Length of each section of wing / Länge jedes Tragflächenabschnitts / Longueur de chaque section d'aile
Special features / Besonderheiten / Particularités à signaler

Ailerons / Querruder / Ailerons

Type (e.g. slotted, frise, inset hinge, plain) / Typ (z.B. Spaltquerruder, Frise, Einsatzscharniere, Wölbungsklappen) / Type (p.ex. à fente, à charnière, à volets de courbure, etc.)
Span / Spannweite / Envergure
Area / Flächeninhalt / Surface
Mean chord / Mittlere Tiefe / Profondeur moyenne
Max. deflection up / Maximaler Ausschlag nach oben / Braquage maximum vers le haut
Max. deflection down / Maximaler Ausschlag nach unten / Braquage maximum vers le bas
Mass balance degree / Gewichtsausgleichsgrad / Degré d'équilibrage
Mass balance method / Art des Gewichtsausgleichs / Méthode d'équilibrage

Horizontal tail / Höhenleitwerk / Empennage de profondeur

Span / Spannweite / Envergure
Area of elevator and fixed tail / Flächeninhalt von Höhenruder und Höhenflosse / Surface du gouvernail de profondeur et du stabilisateur
Area of elevator / Flächeninhalt Höhenruder / Surface du gouvernail de profondeur
Max. deflection up / Maximaler Ausschlag nach oben / Braquage maximum vers le haut
Max. deflection down / Maximaler Ausschlag nach unten / Braquage maximum vers le bas
Aerofoil section / Tragflügel-Querschnitt / Section de l'empennage
Mass balance degree / Gewichtsausgleichsgrad / Degré d'équilibrage
Mass balance method / Art des Gewichtsausgleichs / Méthode d'équilibrage
Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail) / Maß von ¼ mittlerer aerodynamischer Tiefe des Flügels bis ¼ mittlerer aerodynamischer Tiefe Höhenleitwerk / Distance entre le point au quart de la profondeur de l'aile et le point au quart de la profondeur du gouvernail de profondeur
Elevator aerodynamic balance method / Flächenausgleich des Höhenruders, Art / Méthode de compensation aérodynamique du gouvernail de profondeur
Elevator trimming method / Art der Höhenruder-Trimmung / Méthode de réglage du gouvernail de profondeur
Horizontal tail volume coefficient / Rauminhaltskoeffizient des Höhenleitwerks / Coefficient volumétrique de l'empennage de profondeur

Vertical tail / Seitenleitwerk / Empennage de direction

Area of fin and rudder / Flächeninhalt von Seitenflosse und Seitenruder / Surface du plan de dérive et du gouvernail de direction
Area of rudder / Flächeninhalt Seitenruder / Surface du gouvernail de direction
Aspect ratio / Streckung / Allongement

Tail arm / Maß von ¼ mittl. aerodyn. Tiefe (maT) des Flügels bis ¼ maT des Seitenleitwerks / Distance entre le point au quart de la profondeur de l'aile et le point au quart de la profondeur du gouvernail de direction
Max. deflection / Maximaler Ausschlag / Braquage maximum
Aerofoil section / Profil / Profil de l'empennage
Mass balance degree / Gewichtsausgleich / Degré d'équilibrage
Mass balance type / Art des Gewichtsausgleichs / Type d'équilibrage
Aerodynamic balance / Flächenausgleich / Compensation aérodynamique

Fuselage / Rumpf / Fuselage

Max. width / Größte Breite / Largeur maximum
Overall length / Länge über alles / Longueur hors tout
Max. cross section / Größter Querschnitt / Section maximum
Wetted surface area / Oberflächeninhalt / Superficie horizontale
Number seats and arrangement / Anzahl Sitze und Anordnung / Nombre et disposition des sièges
Undercarriage type / Fahrgestell, Art / Type de train d'atterrissage
Wheel diameter / Rad-Durchmesser / Diamètre des roues

Lift increasing devices / Auftriebserhöhende Elemente / Dispositifs hypersustentateurs

Type (e.g. trailing edge flaps, fowler flaps droopable ailerons, slotted flaps, split flaps)/ Typ (z.B. Landeklappen, Fowlerklappen, verstellbare Querruder, Spaltklappen, Spreizklappen) / Type (volets d'atterrissage, ailerons réglables, ailes à fente, etc.)
Span / Spannweite / Envergure
Area / Flächeninhalt / Surface
Mean chord / Mittlere Tiefe / Profondeur moyenne
Max. deflection up / Maximaler Ausschlag nach oben / Braquage maximum vers le haut
Max. deflection down / Maximaler Ausschlag nach unten / Braquage maximum vers le bas

Drag producing devices / Widerstandsvergrößernde Elemente / Dispositifs de freinage aérodynamique

Type (e.g. spoilers, wing airbrakes, tail parachute, fuselage airbrakes) / Typ (z.B. Störklappen, Bremsklappen an den Flügeln, Heck-Fallschirm, Rumpf-Bremsklappen) / Type (volets de freinage, parachute de poupe, etc.)
General location (e.g. top of wing, bottom of wing, fuselage) / Anordnung (z.B. Flügelspitze, Flügelunterseite, Rumpf) / Aménagement (aux bouts d'aile, à l'attache des ailes, au fuselage, etc.)
Span / Spannweite / Envergure
Area / Flächeninhalt / Surface
% of span (where applicable) / Spannweite in % (wenn anwendbar) / Envergure en % (si la question se présente)
Location, % of chord (where applicable) / Anordnung, % der Tiefe (wenn anwendbar / Emplacement, en % de la profondeur (si la question se présente)
Is device intended to limit terminal velocity (vertical dive) to max. permissible IAS? / Kann diese Einrichtung zur Beschränkung der Endgeschwindigkeit (Sturzflug) auf die höchste erlaubte angezeigte Eigengeschwindigkeit verwendet werden? / Le dispositif est-il destiné à limiter la vitesse de piqué au maximum admissible?

Weights / Gewichte / Poids

Wings[1] / Flügel[1] / Ailes[1]
Fuselage[2] / Rumpf[2] / Fuselage[2]
Tailplane and elevator / Höhenflosse und Höhenruder / Gouvernails de profondeur et de direction

Empty weight[3] / Leergewicht[3] / Poids à vide[3]
Instruments / Instrumente / Instruments
Other equipment (e.g. oxygen, radio) / Weitere Ausrüstung (z.B. Sauerstoff, Funkgerät) / Autre équipement (oxygène, radio, etc.)
Equipped weight / Rüstgewicht / Poids de l'avion équipé
Removable ballast / Abwerfbarer Ballast / Lest
Max. load / Höchstgewicht / Charge maximum
Max. permissible flying weight / Zugelassenes Flug-Höchstgewicht / Poids en vol maximum autorisé
Wing loading / Flächenbelastung / Charge alaire

Design standards / Bauvorschriften / Prescriptions de construction
Airworthiness requirements to which aircraft has been built / Zulassungsbestimmungen, nach welchen das Flugzeug gebaut wurde / Conditions de navigabilité auxquelles l'aéronef doit répondre
Date of issue of these requirements / Ausgabedatum der Zulassungsbestimmungen / Date à laquelle ces conditions ont été formulées
Certificate of Airworthiness (yes/no) / Lufttüchtigkeitszeugnis (ja/nein) / Certificat de navigabilité (oui ou non)
Any other certification (e.g. experimental license, permit to fly) / Weitere Zulassungen (z.B. Versuchszulassung, Flugerlaubnis) / Autres certificats (admis pour expérience, admis à voler, etc.)

Design flight envelope / Begrenzung der Leistungen im Flug / Etendue des possibilités de vol
Manœuvre loads / Manöverbeanspruchung / Facteurs de charge par la manœuvre
Gust loads / Böenbeanspruchung / Facteurs de charge par les rafales

Limiting flight conditions / Beschränkungen des Flugzustandes / Limitations imposées au vol
Placard airspeed smooth conditions / Erlaubte Fluggeschwindigkeit, normale Flugbedingungen / Vitesse autorisée dans des conditions normales
Placard airspeed gusty conditions / Erlaubte Fluggeschwindigkeit, böige Flugbedingungen / Vitesse autorisée en cas de rafales
Aero-towing speed / Geschwindigkeit im Flugzeugschlepp / Vitesse autorisée pour le remorquage
Winch launching speed / Geschwindigkeit bei Windenstart / Vitesse autorisée pour le lancement au treuil
Cloud flying permitted (yes/no) / Wolkenflugbewilligung (ja/nein) / Le vol dans les nuages est-il permis? (oui ou non)
Permitted aerobatic manoeuvers / Kunstflug, bewilligte Figuren / Manœuvres aérobatiques permises
Spinning permitted? (yes/no) / Trudeln erlaubt? (ja/nein) / La vrille est-elle autorisée? (oui ou non)
Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c. / Vorderste und hinterste Schwerpunktlage, welche nach Vorschrift zugelassen oder vorgesehen ist, in % der mittleren aerodynamischen Tiefe / Positions extrêmes du centre de gravité (en % de la profondeur) qui sont admises ou prescrites

Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) / Endgeschwindigkeit mit ausgefahrenen Bremsen bei maximalem Fluggewicht, durch Prüfflug erflogen (falls Bremsen geschwindigkeitsbeschränkend wirken) / Vitesse limite avec les freins sortis au maximum, le poids en vol étant maximum, telle qu'elle résulte des essais (si les freins limitent la vitesse)

Straight flight performance at flying weight of ... kg / Leistungen im Geradeausflug bei einem Fluggewicht von ... kg / Performances en vol horizontal avec un poids en vol de ... kg

No flap or brake / Ohne Klappen und Bremsen / Pas de volets ni de freins

V for min. sink / V bei bester Gleitgeschwindigkeit / V pour la vitesse de descente minimum

V for max. L/D / V bei bester Gleitzahl / V pour le meilleur angle de plané

With ...° flap / Mit ...° geöffneten Klappen / Avec les volets ouverts de ...°

Stalling speed / Abkippgeschwindigkeit / Vitesse critique

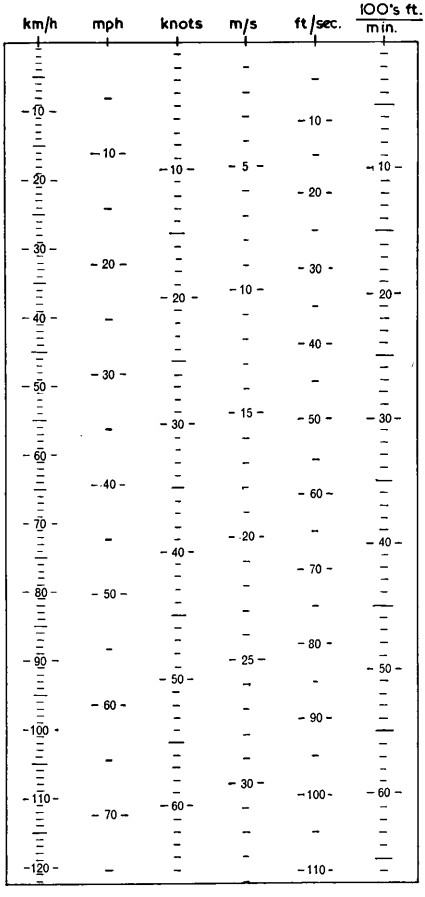
Max. L/D / Beste Gleitzahl / Meilleur angle de plané

[1] with struts, controls, flaps and brakes / mit Streben, Steuerung, Klappen und Bremsen / avec contrefiches, commandes, volets et freins

[2] complete with rudder and fin, less instruments and equipment / vollständig mit Seitenruder und Seitenflosse, ohne Instrumente und Ausrüstung / complet avec plan de dérive et gouvernail de direction, mais sans les instruments et l'équipement

[3] to include any fixed ballast / einschließlich festen Ballasts / y compris le lest fixe

Conversion of Units



To convert	Into	Multiply by
Lengths:		
Metres (m)	Feet (ft)	3.281
Centimetres (cm)	Inches (in.)	0.394
Kilometres (km)	Nautical Miles	0.5396
Kilometres	Miles	0.621
Feet	Metres	0.3048
Inches	Centimetres	2.540
Nautical Miles	Kilometres	1.853
Miles	Kilometres	1.609
Miles	Nautical Miles	0.869
Areas:		
Metres^2	Feet^2	10.764
Centimetres^2	Inches^2	0.155
Feet^2	Metres^2	0.093
Inches^2	Centimetres^2	6.452
Weights:		
Kilograms (kg)	Pounds (lb)	2.205
Pounds	Kilograms	0.454
Pressures:		
kg/m^2	lb/ft^2	0.205
lb/ft^2	kg/m^2	4.882
Speeds:		
km/hr	miles/hr (mph)	0.62
km/hr	knots	0.54
m/sec	ft/sec	3.28
knots	mph	1.15
100's ft/min	knots	0.987

ADVERTISEMENTS

LIGHTWEIGHT OXYGEN EQUIPMENT

NORMALAIR are now producing a range of lightweight oxygen equipment for use in light aircraft, small transport aircraft and gliders. Both portable sets and fixed installations are in production, component design allowing wide variation of layout to suit individual requirements.

A feature common to all the equipment in this range is very low weight. For example, a fixed installation of 750 litres capacity weighs as little as 12¾ lb. complete. Provision is made in all cases for the selection of different flow rates, the actual rates being determined by adjustment during manufacture.

Items of this equipment were fitted in the Slingsby sailplane which won the multi-seat championship in the 1956 World Gliding Championships. Several of the sailplanes competing in the forthcoming World Championships in Poland will be similarly equipped. An illustrated catalogue of this equipment is available on request.

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SAAB ANNOUNCES

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SAAB 91 D SAFIR

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new constant speed propeller	Hartzell or McCauley
new brakes	Goodyear Single Disc
new 25-amp. generator	50-amp. generator also available to accommodate extra electrical and radio equipment
new rudder trim	adjustable during flight

Weight empty has been reduced by 45 kg for extra payload or equipment.

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