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

OSTIV
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Wally Kahn
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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, particularly 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 Győr 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 Yugoslav 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, 14½% 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.

4
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/m²) 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 individuals, 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.
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 manoeuvrability is far better than earlier designs.
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 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.
par des couches de bois comprimé. Fuselage de construction normale en contreplaqué, section ovale. Le train se compose d'une roue fixe à demi enfondée 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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Mg 19a</th>
<th>Mg 19b</th>
<th>Mg 23</th>
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<tbody>
<tr>
<td><strong>Date of first flight of prototype</strong></td>
<td>20 March 1955</td>
<td>15 June 1954</td>
<td>25 June 1955</td>
</tr>
<tr>
<td><strong>Number produced</strong></td>
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<td>Mass balance method</td>
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<td>18° 40'</td>
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<td>Max. deflection down (deg)</td>
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<td>23</td>
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<td>Aerofoil section</td>
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<td>Mass balance method</td>
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<td>along nose</td>
<td>along nose</td>
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<td>Tail arm (form ¼ chord m.a.c. wing to ¼ chord m.a.c. tail) (m)</td>
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<td>Type designation</td>
<td>Mg 19a</td>
<td>Mg 19b</td>
<td>Mg 23</td>
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<td>wing-airbrakes Schemp-Hirth type</td>
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<td>32</td>
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<td>Location, % of chord</td>
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<td>49</td>
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<td>157</td>
<td>157</td>
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<td>Fuselage(^2)</td>
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<td>11</td>
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<td>nil</td>
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<tr>
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<td>179</td>
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<td>Max. permissible flying weight</td>
<td>480</td>
<td>480</td>
<td>360</td>
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</tbody>
</table>

\(^1\) With struts, controls, flaps and brakes.

\(^2\) Complete with rudder and fin, less instruments and equipment.

\(^3\) To include any fixed ballast.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Mg 19a</th>
<th>Mg 19b</th>
<th>Mg 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing loading</td>
<td>22.9</td>
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<td>25.3</td>
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</table>

**Design standards**

Airworthiness requirements to which aircraft has been built: BVS

Date of issue of these requirements: 1957

---

### Design flight envelope

#### Manoeuvre loads

<table>
<thead>
<tr>
<th>Point</th>
<th>V km/h</th>
<th>proof load factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>125</td>
<td>4</td>
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<tr>
<td>B</td>
<td>218</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>152</td>
<td>2</td>
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</table>

Factor of safety: 2

#### Gust loads

<table>
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<tr>
<th>Point</th>
<th>V km/h</th>
<th>V m/s</th>
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</thead>
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<tr>
<td>A</td>
<td>130</td>
<td>3.94</td>
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<tr>
<td>D</td>
<td>130</td>
<td>1.94</td>
</tr>
</tbody>
</table>

---

### Limiting flight conditions

- **Placard airspeed smooth conditions**: km/h
  - Mg 19a: 180
  - Mg 19b: 180
  - Mg 23: 180

- **Placard airspeed gusty conditions**: km/h
  - Mg 19a: 130
  - Mg 19b: 130
  - Mg 23: 130

- **Aero-towing speed**: km/h
  - Mg 19a: 80
  - Mg 19b: 80
  - Mg 23: 80

- **Winch launching speed**: km/h
  - Mg 19a: yes
  - Mg 19b: yes
  - Mg 23: yes

- **Cloud flying permitted**: yes
- **Permitted aerobatic manoeuvres**: no
- **Spinning permitted**: yes

---

### Straight flight performance

at flying weight of: kg

- Mg 19a: 480
- Mg 19b: 480
- Mg 23: 360

---

### No flap or brake

<table>
<thead>
<tr>
<th>V km/h</th>
<th>V m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **V for min. sink**: km/h
  - Mg 19a: 62
  - Mg 19b: 67
  - Mg 23: 75

- **V for max. L/D**: km/h
  - Mg 19a: 87.5
  - Mg 19b: 100
  - Mg 23: 120

---

### Stalling speed

- Mg 19a: 50
- Mg 19b: 55
- Mg 23: 60

### Max. L/D

- Mg 19a: 27.8
- Mg 19b: 27.8
- Mg 23: ~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 throughout the world. It is designed for home construction and approximately 200 H17's and 10 H17b's have been produced. The prototype first flew Sept. 1934; the H17b 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; tailplane 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 airspeed smooth conditions 160 km/h; aerotowing 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


Hütter H17b

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-seat 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.

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.

BN-1

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

BN-1

Neiva-B Monitor
Biplace en bois, à ailes haubanées, pour performances moyennes. Employé dans les clubs brésiliens pour la formation des débutants.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>BN-1</th>
<th>Neiva-B Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designers</td>
<td>José Carlos de Barros Neiva</td>
<td>J.C. Barros Neiva A.A. Barros</td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>1953</td>
<td>1945</td>
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<tr>
<td>Number produced</td>
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<td>15</td>
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<tr>
<td><strong>Wings</strong></td>
<td></td>
<td></td>
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<tr>
<td>Span m</td>
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<td>15.86</td>
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<td>Wing root chord m</td>
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<td>Wing tip chord m</td>
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<td>Gö 535</td>
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<td>235</td>
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<td>Point C</td>
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<td>Point D</td>
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<td>63</td>
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<td>Placard airspeed</td>
<td>220</td>
<td>235</td>
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<td>Straight flight performance</td>
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<td></td>
</tr>
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<td>No flap or brake</td>
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<tr>
<td>V for min. sink</td>
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<td>55</td>
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<td>V for max. L/D</td>
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<td>67</td>
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<td>Stalling speed</td>
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<td>52</td>
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<td>Max. L/D</td>
<td>30</td>
<td>21</td>
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</tbody>
</table>

**Denmark - Dänemark - Danemark**

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

**Designers:**
Knud Høgslund and F. T. Olsen

2G

The 2G 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

2G

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

2G

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 break-points, 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 Teknikkojen Ilmailu Kerho (Flying Club of the Technical University, 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

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-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


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 longérons; 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**

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 straighth 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-5c**

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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>PIK 3</th>
<th>PIK 3c</th>
<th>PIK 12</th>
<th>PIK 5c</th>
</tr>
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<tbody>
<tr>
<td>Date of first flight of prototype</td>
<td>1950</td>
<td>1956</td>
<td>1946</td>
<td></td>
</tr>
<tr>
<td>Number produced</td>
<td>4 (1 under construction)</td>
<td>2 (1 under construction)</td>
<td>24 (3 under construction)</td>
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**Wings**

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<tr>
<td>Span</td>
<td>m</td>
<td>13</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>13</td>
<td>13.1</td>
<td>20.8</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
<td>13</td>
<td>17.1</td>
<td>12.3</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
<td>1.5</td>
<td>1.32</td>
<td>1.5</td>
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<tr>
<td>Wing tip chord</td>
<td>m</td>
<td>0.5</td>
<td>0.45</td>
<td>0.75</td>
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<tr>
<td>Mean aerodynamic chord</td>
<td>m</td>
<td>1.0</td>
<td>0.88</td>
<td>1.30</td>
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<tr>
<td>Wing section, root</td>
<td>Gö 693</td>
<td>Gö 549</td>
<td>Gö 533</td>
<td>Gö 533</td>
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<tr>
<td>Wing section, mid</td>
<td>&quot; &quot; Laminarized</td>
<td>&quot; &quot;</td>
<td>&quot; &quot;</td>
<td>&quot; &quot;</td>
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<tr>
<td>Wing section, tip</td>
<td>Gö 693</td>
<td>&quot; &quot;</td>
<td>&quot; &quot;</td>
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<tr>
<td>Dihedral (underside)</td>
<td>deg.</td>
<td>2</td>
<td>2</td>
<td>2.5</td>
</tr>
<tr>
<td>¼ chord sweep</td>
<td>deg.</td>
<td>+0.9</td>
<td>+0.3</td>
<td>Inner —6.5</td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
<td>deg.</td>
<td>0</td>
<td>0</td>
<td>Inner 0.0</td>
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<tr>
<td>Length of each section of wing</td>
<td>m</td>
<td>6.53</td>
<td>7.53</td>
<td>7.83</td>
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**Ailerons**

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<th>PIK 5c</th>
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</thead>
<tbody>
<tr>
<td>Type (e.g. slotted, frise, inset hinge, plain)</td>
<td>Slotted</td>
<td>Slotted</td>
<td>Slotted</td>
<td>Slotted</td>
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<tr>
<td>Span</td>
<td>m</td>
<td>3.2</td>
<td>3.0</td>
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<tr>
<td>Area</td>
<td>m²</td>
<td>1.05</td>
<td>0.75</td>
<td>1.17</td>
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<tr>
<td>Mean chord</td>
<td>m</td>
<td>0.33</td>
<td>0.25</td>
<td>0.35</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
<td>25</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
<td>12.5</td>
<td>20</td>
<td>25</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td></td>
<td>NIL</td>
<td>NIL</td>
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**Horizontal tail**

<table>
<thead>
<tr>
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<th>PIK 12</th>
<th>PIK 5c</th>
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</thead>
<tbody>
<tr>
<td>Span</td>
<td>m</td>
<td>3.3</td>
<td>3.3</td>
<td>4.0</td>
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<tr>
<td>Area of elevator and fixed tail</td>
<td>m²</td>
<td>1.65</td>
<td>1.65</td>
<td>3.0</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>m²</td>
<td>0.75</td>
<td>0.75</td>
<td>1.35</td>
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<tr>
<td>Max. deflection up</td>
<td>deg.</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
<td>20</td>
<td>20</td>
<td>30</td>
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<tr>
<td>Aerofoil section</td>
<td>NACA 0011/0009</td>
<td>NACA 0011/0009</td>
<td>Symm.</td>
<td>NACA 0009</td>
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<tr>
<td>Mass balance degree</td>
<td></td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
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<tr>
<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)</td>
<td>m</td>
<td>3.75</td>
<td>3.75</td>
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23
<table>
<thead>
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<td>NIL</td>
<td></td>
<td>NIL</td>
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<tr>
<td>Elevator trimming method</td>
<td>Trim tab.</td>
<td>Trim tab.</td>
<td>Ground adjustable balance tab.</td>
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<td>Horizontal tail volume coefficient</td>
<td>0.475</td>
<td>0.540</td>
<td>0.445</td>
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<td><strong>Vertical tail</strong></td>
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<td>Area of fin and rudder ... m²</td>
<td>1.10</td>
<td>1.25</td>
<td>1.50</td>
<td>1.25</td>
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<td>Area of rudder ... m²</td>
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<td>Max. deflection ... deg.</td>
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<td>NIL</td>
<td>NIL</td>
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<td>Aerodynamic balance</td>
<td>Horn balance</td>
<td>Horn balance</td>
<td>Horn balance</td>
<td>Horn balance</td>
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<td><strong>Fuselage</strong></td>
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<tr>
<td>Max. width ... m</td>
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<td>0.56</td>
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<td>0.54</td>
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<td>6.6</td>
<td>7.4</td>
<td>6.4</td>
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<td>Max. cross section ... m²</td>
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<td>0.45</td>
<td>0.60</td>
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<td>Wetted surface area ... m²</td>
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<td>7.5</td>
<td>12.5</td>
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<td>Number seats and arrangement</td>
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<td>2 tandem</td>
<td>1</td>
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<td>Undercarriage type</td>
<td>Fixed wheel</td>
<td>Fixed wheel</td>
<td>Fixed wheel</td>
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<td>Wheel diameter ... cm</td>
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<td>30.0</td>
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<td><strong>Lift increasing devices</strong></td>
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<tr>
<td>Type</td>
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<td>None</td>
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<td><strong>Drag producing devices</strong></td>
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<tr>
<td>Type</td>
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<td>PIK Model Vented spoilers</td>
<td>PIK Model Vented spoilers</td>
<td>PIK Model Vented spoilers</td>
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<tr>
<td>General location</td>
<td>top and bottom surface</td>
<td>lower surface</td>
<td>upper surface</td>
<td>upper surface</td>
</tr>
<tr>
<td>Span ... m</td>
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<td>0.40</td>
<td>0.40</td>
<td>0.31</td>
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<tr>
<td>% of span (where applic.)</td>
<td>15.4</td>
<td>24</td>
<td>17.5</td>
<td>19.3</td>
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<tr>
<td>Location, % of chord (where applicable)</td>
<td>Upper 55</td>
<td>50</td>
<td>50</td>
<td>50</td>
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<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max permissible I.A.S. yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td>Type designation</td>
<td>PIK 3</td>
<td>PIK 3c</td>
<td>PIK 12</td>
<td>PIK 5c</td>
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<tr>
<td>------------------</td>
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<tr>
<td><strong>Weights</strong></td>
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<td>Wings</td>
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<td>115</td>
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<td>74</td>
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<td>Fuselage</td>
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<td>70</td>
<td>40</td>
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<td>Tailplane and elevator</td>
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<td>5</td>
<td>10</td>
<td>6</td>
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<td>165</td>
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<td>240</td>
<td>280</td>
<td>390</td>
<td>210</td>
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<td><strong>Design standards</strong></td>
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<tr>
<td>Airworthiness requirements to which aircraft has been built</td>
<td>BVS</td>
<td>BCAR</td>
<td>BVS</td>
<td>BVS</td>
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<td>1939</td>
<td>1948</td>
<td>1939</td>
<td>1939</td>
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<tr>
<td>Any other certification</td>
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<th>V km/h</th>
<th>n</th>
<th>V km/h</th>
<th>n</th>
<th>V km/h</th>
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<td>Point A</td>
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<td>128</td>
<td>5</td>
<td>105</td>
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<td>260</td>
<td>4</td>
<td>160</td>
<td>4</td>
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<td>Point C</td>
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<td>260</td>
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<td>200</td>
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<td>Point D</td>
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<td>-2</td>
<td>165</td>
<td>-2.5</td>
<td>138</td>
<td>-2</td>
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| Factor of safety (ultimate load/proof load) | 2 | 1.5 | 2 | 2 |

<table>
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<tr>
<th>Gust loads</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
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<tr>
<td>Point A</td>
<td>130</td>
<td>±10</td>
<td>146</td>
<td>±20</td>
<td>120</td>
<td>±10</td>
<td>120</td>
<td>±10</td>
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<td>Placard airspeed gusty</td>
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<td>110</td>
<td>90</td>
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<td>Winch launching speed</td>
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<td>PIK 3c</td>
<td>PIK 12</td>
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<tr>
<td>----------------------------------</td>
<td>-------</td>
<td>--------</td>
<td>--------</td>
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</tr>
<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Spinning permitted yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Foremost and aftmost e.g. positions for which compliance with regulations has been shown or is intended in % m.a.c. . . .</td>
<td></td>
<td></td>
<td></td>
<td>15—30</td>
</tr>
<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests . . . km/h</td>
<td>180</td>
<td>200 (approx.)</td>
<td>200</td>
<td>180</td>
</tr>
<tr>
<td>Straight flight performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at flying weight of . . . kg</td>
<td>230</td>
<td>260</td>
<td>375</td>
<td>210</td>
</tr>
<tr>
<td>No flap or brake</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{\text{for min. sink}}$</td>
<td>61</td>
<td>0.75</td>
<td>65</td>
<td>0.61</td>
</tr>
<tr>
<td>$V_{\text{for max. L/D}}$</td>
<td>72</td>
<td>0.80</td>
<td>75</td>
<td>0.70</td>
</tr>
<tr>
<td>$2.00 \times V_{\text{stall approx.}}$</td>
<td>110</td>
<td>1.80</td>
<td>110</td>
<td>1.40</td>
</tr>
<tr>
<td>Stalling speed . . . km/h</td>
<td>55</td>
<td>55</td>
<td>50</td>
<td>45</td>
</tr>
<tr>
<td>Max. L/D . . .</td>
<td>25</td>
<td>30</td>
<td>23</td>
<td>18</td>
</tr>
</tbody>
</table>
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, recht Eckigen 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**

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.

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 Sperrholzbeplan-

kung; Flügel und Rumpfende aus Holz mit Stoffbespannung.

Air 102


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

VMA 200

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Castel Mauboussin C-25 S</th>
<th>Castel Mauboussin C-311 P</th>
<th>Air-102</th>
<th>VMA 200 Milan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of seats and arrangement</td>
<td>2 side-by-side</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Span............... m</td>
<td>16.0</td>
<td>14.0</td>
<td>18.0</td>
<td>18.0</td>
</tr>
<tr>
<td>Length ............. m</td>
<td>7.23</td>
<td>6.60</td>
<td>8.0</td>
<td>8.10</td>
</tr>
<tr>
<td>Wing area .......... m²</td>
<td>20.0</td>
<td>14.7</td>
<td>18.0</td>
<td>18.26</td>
</tr>
<tr>
<td>Aspect ratio .......</td>
<td>12.8</td>
<td>13.3</td>
<td>18.0</td>
<td>17.74</td>
</tr>
<tr>
<td>Height ............. m</td>
<td>2.22</td>
<td>2.10</td>
<td>2.36</td>
<td>2.12</td>
</tr>
<tr>
<td>Taper ratio .......</td>
<td>0.42</td>
<td>0.36</td>
<td>0.2</td>
<td>0.25</td>
</tr>
<tr>
<td>Wing section: root tip</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty weight ....... kg</td>
<td>261</td>
<td>174</td>
<td>278</td>
<td>248</td>
</tr>
<tr>
<td>Load ............... kg</td>
<td>180</td>
<td>85</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Flying weight ...... kg</td>
<td>441</td>
<td>269</td>
<td>373</td>
<td>343</td>
</tr>
<tr>
<td>Wing loading ....... kg/m²</td>
<td>22.0</td>
<td>18.3</td>
<td>20.7</td>
<td>18.8</td>
</tr>
<tr>
<td>Placard airspeed ..... km/h</td>
<td>140</td>
<td>160</td>
<td>210</td>
<td>235</td>
</tr>
<tr>
<td>Aero-towing speed .... km/h</td>
<td>100</td>
<td>130</td>
<td>102</td>
<td>120</td>
</tr>
<tr>
<td>Placard airspeed (rough air) .... km/h</td>
<td>90</td>
<td>90</td>
<td>130</td>
<td>130</td>
</tr>
</tbody>
</table>

Straight flight performance

<table>
<thead>
<tr>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>62</td>
<td>0.73</td>
<td>69</td>
<td>0.83</td>
<td>60</td>
<td>0.75</td>
<td>62</td>
</tr>
<tr>
<td>70</td>
<td>0.80</td>
<td>80</td>
<td>0.96</td>
<td>70</td>
<td>0.8</td>
<td>69</td>
<td>0.81</td>
</tr>
<tr>
<td>80</td>
<td>0.97</td>
<td>90</td>
<td>1.18</td>
<td>80</td>
<td>1.0</td>
<td>80</td>
<td>1.01</td>
</tr>
<tr>
<td>100</td>
<td>1.44</td>
<td>100</td>
<td>1.5</td>
<td>100</td>
<td>1.7</td>
<td>100</td>
<td>1.62</td>
</tr>
<tr>
<td>120</td>
<td>2.23</td>
<td>120</td>
<td>2.5</td>
<td>120</td>
<td>2.75</td>
<td>120</td>
<td>2.4</td>
</tr>
</tbody>
</table>

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, revêtue 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 contrepliqué. Les ailes et l’extrémité du fuselage sont en bois avec entoilage.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Caudron C. 800 Epervier</th>
<th>Nord 1300</th>
<th>Nord 2000</th>
<th>SA. 104 Emouchet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of seats</td>
<td>2 side-by-side</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Date of 1st flight</td>
<td>Aug. 1945</td>
<td>Apr. 1946</td>
<td>June 1947</td>
<td>1950 (SA. 103: 1945)</td>
</tr>
<tr>
<td>Span</td>
<td>16.0</td>
<td>13.56</td>
<td>15.0</td>
<td>12.48</td>
</tr>
<tr>
<td>Length</td>
<td>8.35</td>
<td>6.15</td>
<td>7.26</td>
<td>6.74</td>
</tr>
<tr>
<td>Wing area</td>
<td>22.0</td>
<td>14.0</td>
<td>15.0</td>
<td>16.50</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>11.6</td>
<td>13.13</td>
<td>15.0</td>
<td>9.4</td>
</tr>
<tr>
<td>Height</td>
<td>2.36</td>
<td>1.68</td>
<td>1.60</td>
<td>2.0</td>
</tr>
<tr>
<td>Taper ratio</td>
<td>0.6</td>
<td>0.52</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Wing section: root tip</td>
<td>Gö 654</td>
<td>Gö 549</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empty weight</td>
<td>240</td>
<td>163</td>
<td>176</td>
<td>176</td>
</tr>
<tr>
<td>Load</td>
<td>180</td>
<td>95</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>Flying weight</td>
<td>420</td>
<td>258</td>
<td>271</td>
<td>271</td>
</tr>
<tr>
<td>Wing loading</td>
<td>19.1</td>
<td>18.4</td>
<td>18.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Placard airspeed</td>
<td>170</td>
<td>115</td>
<td>170</td>
<td>160</td>
</tr>
<tr>
<td>Aero-towing speed</td>
<td>90</td>
<td>90</td>
<td>110</td>
<td>90</td>
</tr>
<tr>
<td>Placard airspeed (rough air)</td>
<td>85</td>
<td>80</td>
<td>100</td>
<td>90</td>
</tr>
</tbody>
</table>

**Straight flight performance**

<table>
<thead>
<tr>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>0.78</td>
<td>65</td>
<td>0.78</td>
<td>65</td>
<td>0.78</td>
<td>65</td>
<td>0.78</td>
</tr>
<tr>
<td>75</td>
<td>0.96</td>
<td>75</td>
<td>0.96</td>
<td>75</td>
<td>0.96</td>
<td>75</td>
<td>0.96</td>
</tr>
<tr>
<td>90</td>
<td>1.45</td>
<td>90</td>
<td>1.45</td>
<td>90</td>
<td>1.45</td>
<td>90</td>
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<tr>
<td>100</td>
<td>2.86</td>
<td>100</td>
<td>2.86</td>
<td>100</td>
<td>2.86</td>
<td>100</td>
<td>2.86</td>
</tr>
</tbody>
</table>

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**


**WA 20 Javelot**

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

<table>
<thead>
<tr>
<th>Type designation</th>
<th>WA 20 Javelot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chief-designer</td>
<td>M. Collard</td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>1956</td>
</tr>
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</table>

**Wings**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>m</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
</tr>
<tr>
<td>Wing root chord</td>
<td>m</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>m</td>
</tr>
<tr>
<td>Wing section, root</td>
<td></td>
</tr>
<tr>
<td>Wing section, tip</td>
<td></td>
</tr>
<tr>
<td>Dihedral</td>
<td>deg.</td>
</tr>
<tr>
<td>¼ chord sweep</td>
<td>deg.</td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
<td>deg.</td>
</tr>
</tbody>
</table>

**Ailerons**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>m</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
</tr>
</tbody>
</table>

**Horizontal tail**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>m</td>
</tr>
<tr>
<td>Area of elevator and fixed tail</td>
<td>m²</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>m²</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td></td>
</tr>
<tr>
<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)</td>
<td>m</td>
</tr>
<tr>
<td>Elevator trimming method</td>
<td>tab</td>
</tr>
<tr>
<td>Horizontal tail volume coefficient</td>
<td></td>
</tr>
<tr>
<td>Type designation</td>
<td>WA 20 Javelot</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder m²</td>
<td>1.1</td>
</tr>
<tr>
<td>Area of rudder m²</td>
<td>0.62</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>1.6</td>
</tr>
<tr>
<td>Tail arm m</td>
<td>4.13</td>
</tr>
<tr>
<td>Max. deflection deg.</td>
<td>30</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
</tr>
<tr>
<td>Max. width m</td>
<td>0.64</td>
</tr>
<tr>
<td>Overall length m</td>
<td>1.1</td>
</tr>
<tr>
<td>Max. cross section m²</td>
<td>0.60</td>
</tr>
<tr>
<td>Number seats</td>
<td>1</td>
</tr>
<tr>
<td>Undercarriage type</td>
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<tr>
<td><strong>Lift increasing devices</strong></td>
<td>none</td>
</tr>
<tr>
<td><strong>Drag producing devices</strong></td>
<td>Göppingen airbrakes</td>
</tr>
<tr>
<td>Type</td>
<td></td>
</tr>
<tr>
<td>Span m</td>
<td>1.5</td>
</tr>
<tr>
<td>Area m²</td>
<td>0.72</td>
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<tr>
<td>% of span</td>
<td>19</td>
</tr>
<tr>
<td>Location, % of span</td>
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<tr>
<td><strong>Weights</strong></td>
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<tr>
<td>Empty weight kg</td>
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<td>Equipped weight kg</td>
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<tr>
<td>Max. load kg</td>
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</tr>
<tr>
<td>Max. permissible flying weight kg</td>
<td>330</td>
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<tr>
<td>Wing loading kg/m²</td>
<td>21.2</td>
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<td><strong>Design standards</strong></td>
<td>Norme air 2.104 (France)</td>
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<td>Airworthiness requirements to which aircraft has been built</td>
<td></td>
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<td><strong>Design flight envelope</strong></td>
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<td><strong>Manoeuvre loads</strong></td>
<td></td>
</tr>
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<td>Point A</td>
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<td>Point B</td>
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<tr>
<td>Point C</td>
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<tr>
<td>Point D</td>
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<td>Factor of safety</td>
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<td><strong>Limiting flight conditions</strong></td>
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<tr>
<td>Placard airspeed smooth conditions km/h</td>
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<td>Placard airspeed gusty conditions km/h</td>
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<td>Type designation</td>
<td>WA 20 Javelot</td>
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<td>----------------------------------------------------------------------------------</td>
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<tr>
<td>Aero-towing speed ........................................ km/h</td>
<td>140</td>
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<tr>
<td>Winch launching speed ................. km/h</td>
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<tr>
<td>Cloud flying permitted .................. yes</td>
<td></td>
</tr>
<tr>
<td>Permited aerobatic manoeuvres ............... none</td>
<td></td>
</tr>
<tr>
<td>Spinning permitted .......................... yes</td>
<td></td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.</td>
<td>30% and 44%</td>
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<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests ........ km/h</td>
<td>165</td>
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<tr>
<td><strong>Straight flight performance</strong></td>
<td></td>
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<tr>
<td>at flying weight of ............................... kg</td>
<td>312</td>
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<tr>
<td><strong>No flap or brake</strong></td>
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<tr>
<td>$V$ km/h</td>
<td>$V$ m/s</td>
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<tr>
<td>V for min. sink .......................................</td>
<td>75</td>
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<tr>
<td>V for max. L/D ..........................................</td>
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<td>100</td>
<td>1.2</td>
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<td>120</td>
<td>2.0</td>
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<td>Max. L/D ................................................</td>
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</table>

**Manufacturer:**  
Société des Ateliers d'aviation Louis Breguet  
24, rue Georges-Bizet, Paris XVIe

*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 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


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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Breguet 901S</th>
<th>Breguet 902</th>
<th>Breguet 904</th>
<th>Breguet 905</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer</td>
<td>J. Cayla</td>
<td>R. Jarraud</td>
<td>R. Jarraud</td>
<td></td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>1956</td>
<td>1957</td>
<td>May 1956</td>
<td>1958</td>
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<tr>
<td>Number produced</td>
<td>1</td>
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**Wings**

<table>
<thead>
<tr>
<th></th>
<th>Breguet 901S</th>
<th>Breguet 902</th>
<th>Breguet 904</th>
<th>Breguet 905</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span m</td>
<td>17.32</td>
<td>18.0</td>
<td>20.04</td>
<td>15.0</td>
</tr>
<tr>
<td>Area m²</td>
<td>15.0</td>
<td>21.6</td>
<td>20.0</td>
<td>11.25</td>
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<tr>
<td>Aspect ratio</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Wing root chord m</td>
<td>1.478</td>
<td></td>
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<tr>
<td>Wing tip chord m</td>
<td>0.492</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wing section</td>
<td>NACA 63 series</td>
<td>NACA 63 series</td>
<td>NACA 63 series</td>
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<tr>
<td>Dihedral deg.</td>
<td>V-tail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aero. twist root/tip deg.</td>
<td>slotted</td>
<td>slotted</td>
<td>slotted</td>
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</tbody>
</table>

**Ailerons**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>slotted</td>
<td>slotted</td>
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</table>

**Horizontal tail**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Area of elevator and fixed tail m²</td>
<td>2.07</td>
<td>3.10</td>
<td>2.30</td>
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<tr>
<td>Area of elevator m²</td>
<td>1.18</td>
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<td>Breguet L-14</td>
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<td></td>
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</tr>
<tr>
<td>Elevator aerodynamic balance method</td>
<td>nil</td>
<td></td>
<td></td>
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</table>

**Vertical tail**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of fin and rudder m²</td>
<td>1.72</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of rudder m²</td>
<td>0.95</td>
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<td></td>
<td></td>
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<tr>
<td>Aerofoil section</td>
<td>Breguet L-14</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Aerodynamic balance</td>
<td>nil</td>
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**Fuselage**

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<th></th>
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</thead>
<tbody>
<tr>
<td>Max. width m</td>
<td>7.28</td>
<td>9.0</td>
<td>9.0</td>
<td>6.0</td>
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<tr>
<td>Overall length m</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Max. cross section m²</td>
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<tr>
<td>Number seats and arrange- ment</td>
<td>1</td>
<td>2 tandem</td>
<td>2 tandem</td>
<td>1</td>
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<td>retractable wheel</td>
<td>fixed wheel</td>
<td>retractable wheel</td>
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<tr>
<td>Wheel diameter cm</td>
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<td>Special features</td>
<td>hydraulic wheel brake</td>
<td>hydraulic wheel brake</td>
<td>hydraulic wheel brake</td>
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<td>Breguet 901S</td>
<td>Breguet 902</td>
<td>Breguet 904</td>
<td>Breguet 905</td>
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<tr>
<td>-----------------------------</td>
<td>--------------</td>
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<td>-------------</td>
<td>-------------</td>
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<tr>
<td><strong>Lift increasing devices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>Fowler flaps</td>
<td>—</td>
<td>Fowler flaps</td>
<td>—</td>
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<tr>
<td>Max. deflection up deg.</td>
<td>— 6</td>
<td>—</td>
<td>— 6</td>
<td>—</td>
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<tr>
<td>Max. deflection down deg.</td>
<td>+25</td>
<td></td>
<td>+25</td>
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<td><strong>Drag producing devices</strong></td>
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<td></td>
</tr>
<tr>
<td>Type</td>
<td>wing air brakes</td>
<td>wing air brakes</td>
<td>wing air brakes</td>
<td>top: 1.80</td>
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<tr>
<td>Span m</td>
<td></td>
<td></td>
<td></td>
<td>bottom: 1.52</td>
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<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td><strong>Weights</strong></td>
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<tr>
<td>Empty weight kg</td>
<td></td>
<td></td>
<td>340</td>
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<tr>
<td>Instruments and equipment kg</td>
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<td></td>
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<tr>
<td>Equipped weight kg</td>
<td>265</td>
<td>330</td>
<td>405</td>
<td>148</td>
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<tr>
<td>Removable ballast kg</td>
<td>115</td>
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<td></td>
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<tr>
<td>Max. permissible flying weight kg</td>
<td>430</td>
<td>500</td>
<td>690</td>
<td>250</td>
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<tr>
<td>Wing loading kg/m²</td>
<td>28.0</td>
<td>23.0</td>
<td>34.5</td>
<td>22.2</td>
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<td><strong>Limiting flight conditions</strong></td>
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<td></td>
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<td></td>
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<tr>
<td>Placard airspeed smooth km/h</td>
<td>220</td>
<td>220</td>
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<td></td>
</tr>
<tr>
<td>Placard airspeed gusty km/h</td>
<td>180</td>
<td>180</td>
<td></td>
<td></td>
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<tr>
<td>Aero-towing speed km/h</td>
<td>150</td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td><strong>Straight flight performance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at flying weight of kg</td>
<td>315</td>
<td>520</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td><strong>No flap or brake</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V for min. sink</td>
<td>72</td>
<td>0.60</td>
<td>65</td>
<td>0.70</td>
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<tr>
<td>V for max. L/D</td>
<td>85</td>
<td>0.65</td>
<td>78</td>
<td>0.75</td>
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<tr>
<td></td>
<td>100</td>
<td>0.82</td>
<td>100</td>
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<td></td>
<td>120</td>
<td>1.25</td>
<td>120</td>
<td>1.75</td>
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<tr>
<td></td>
<td>150</td>
<td>2.3</td>
<td>150</td>
<td>3.60</td>
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<tr>
<td>With...° flap deg. V for min. sink</td>
<td>25°</td>
<td>60</td>
<td>0.65</td>
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<tr>
<td>Limiting speed</td>
<td>100</td>
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<tr>
<td>Stalling speed km/h</td>
<td>62</td>
<td>60</td>
<td></td>
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</tr>
<tr>
<td>Max. L/D</td>
<td>36</td>
<td>28</td>
<td>35</td>
<td>32</td>
</tr>
</tbody>
</table>
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 accommodation for two in tan-
dem in a nacelle beneath the center section.

Fauvel AV-22
Zweisitziges Schulungsflugzeug in Holz-
konstruktion, als schwanzloser fliegender
Flügel gebaut. Tandemsitzanordnung für
zwei Personen in einer Gondel unter dem
Flügelmittelstück.

Fauvel AV-22
Biplace d'école, construction en bois, pla-
neur sans queue type aile volante. Sièges en
tandem dans une nacelle sous la partie mé-
diane de la voilure.

Fauvel AV-36
The AV-36 is a single-seat medium perform-
ance sailplane of wooden construction. A
tail-less flying wing, it has accommodation
for the pilot in a nacelle beneath the cen-
ter section.

Fauvel AV-36
Einsitzer für mittlere Leistung in Holzkon-
struktion, als schwanzloser fliegender Flü-
gel gebaut. Pilotensitz in einer Gondel un-
ter 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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>AV-22</th>
<th>AV-36 Monobloc</th>
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<td>Designer ..........</td>
<td>Charles Fauvel</td>
<td></td>
</tr>
<tr>
<td>Date of 1st flight of prototype</td>
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<td>1951</td>
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<tr>
<td>Number produced</td>
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<td><strong>Wings</strong></td>
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</tr>
<tr>
<td>Span .......... m</td>
<td>15.04</td>
<td>11.95</td>
</tr>
<tr>
<td>Area .......... m²</td>
<td>21.75</td>
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<tr>
<td>Aspect ratio</td>
<td>10.4</td>
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<tr>
<td>Wing root chord .......... m</td>
<td>1.90</td>
<td>1.60</td>
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<tr>
<td>Wing tip chord .......... m</td>
<td>0.60</td>
<td>0.50</td>
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<tr>
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<td>F₂ 17%</td>
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<tr>
<td>Wing section, mid .......... F₂ 17%</td>
<td>F₂ 17%</td>
<td></td>
</tr>
<tr>
<td>Wing section, tip .......... F₂ 17%</td>
<td>F₂ 17%</td>
<td></td>
</tr>
<tr>
<td>Dihedral .......... deg.</td>
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</tr>
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<td>¼ chord sweep .......... deg.</td>
<td>-6</td>
<td>0</td>
</tr>
<tr>
<td>Aero. twist root/tip .......... deg.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Length of each section of wing .......... m</td>
<td>7.5</td>
<td>11.95</td>
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<td><strong>Ailerons</strong></td>
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<tr>
<td>Span .......... m</td>
<td>3.20</td>
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<tr>
<td>Area .......... m²</td>
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<tr>
<td>Mean chord .......... m</td>
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<td>0.213</td>
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<td>Max. deflection up .......... deg.</td>
<td>26</td>
<td>26</td>
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<tr>
<td>Max. deflection down .......... deg.</td>
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<td>13</td>
</tr>
<tr>
<td>Mass balance degree ..........</td>
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<td></td>
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<tr>
<td>Mass balance method ..........</td>
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<tr>
<td><strong>Horizontal tail</strong></td>
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</tr>
<tr>
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<td>No horizontal tail</td>
</tr>
<tr>
<td>Area of elevator and fixed tail .......... m²</td>
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<td>1.90</td>
<td>1.05</td>
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<tr>
<td>Max. deflection up .......... deg.</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>Max. deflection down .......... deg.</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>Aerofoil section .......... Extension of wing section</td>
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<tr>
<td>Mass balance method .......... weight</td>
<td>weight</td>
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</tr>
<tr>
<td>Elevator aerodynamic balance method ..........</td>
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<td>nil</td>
</tr>
<tr>
<td>Elevator trimming method .......... tab</td>
<td>tab</td>
<td></td>
</tr>
<tr>
<td>Special features .......... Tail-less aircraft</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type designation</td>
<td>AV-22</td>
<td>AV-36 Monobloc</td>
</tr>
<tr>
<td>------------------</td>
<td>-------</td>
<td>----------------</td>
</tr>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder ... m²</td>
<td>1.955</td>
<td>2 × 0.91</td>
</tr>
<tr>
<td>Area of rudder .......... m²</td>
<td>1.955</td>
<td>2 × 0.50</td>
</tr>
<tr>
<td>Max. deflection .......... deg.</td>
<td>20</td>
<td>38 — 15 (out) (in)</td>
</tr>
<tr>
<td>Aerofoil section ..........</td>
<td>sym. 12%</td>
<td>sym. 8%</td>
</tr>
<tr>
<td>Mass balance degree .....</td>
<td>nil</td>
<td>nil</td>
</tr>
<tr>
<td>Aerodynamic balance ......</td>
<td>0.13</td>
<td>nil</td>
</tr>
<tr>
<td>Special features ..........</td>
<td>Rudder on short fuselage</td>
<td>2 fins and rudders on wing</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. width ............. m</td>
<td>0.65</td>
<td>0.52</td>
</tr>
<tr>
<td>Overall length .......... m</td>
<td>5.10</td>
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</tr>
<tr>
<td>Max. cross section ...... m²</td>
<td>0.79</td>
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<td>Wetted surface area ...... m²</td>
<td>11.25</td>
<td>2.26</td>
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<td>Number seats and arrangement</td>
<td>2, tandem</td>
<td>1</td>
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<tr>
<td>Undercarriage type .......</td>
<td>Wheel and skid</td>
<td>Skid</td>
</tr>
<tr>
<td>Wheel diameter .......... cm</td>
<td>33.0</td>
<td>nil</td>
</tr>
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<td>Special features ..........</td>
<td>Semi-retractable wheel</td>
<td></td>
</tr>
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<td><strong>Lift increasing devices</strong></td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Type ...................</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drag producing devices</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ...................</td>
<td>AV-22-01: Lower surface spoilers</td>
<td>Lower surface spoilers</td>
</tr>
<tr>
<td>AV-22-02: Schemp-Hirth dive brakes</td>
<td>Bottom of wing</td>
<td>Bottom of wing</td>
</tr>
<tr>
<td><strong>General location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span ................. m</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area ................ m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of span (where applicable)</td>
<td>AV-22-02: 22%</td>
<td>22.5%</td>
</tr>
<tr>
<td>Location, % of chord (where applicable)</td>
<td>AV-22-01: 51%</td>
<td>51%</td>
</tr>
<tr>
<td>AV-22-02: 43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weights</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wings ................. kg</td>
<td>120</td>
<td>Monobloc</td>
</tr>
<tr>
<td>Fuselage ............. kg</td>
<td>110</td>
<td>Monobloc</td>
</tr>
<tr>
<td>Tailplane and elevator ... kg</td>
<td>—</td>
<td>Monobloc</td>
</tr>
<tr>
<td>Empty weight .......... kg</td>
<td>230</td>
<td>118</td>
</tr>
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<td>Instruments ........... kg</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Other equipment (e.g. oxygen, radio) .... kg</td>
<td>17</td>
<td></td>
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<tr>
<td>Equipped weight .......... kg</td>
<td>250</td>
<td>120</td>
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<tr>
<td>Type designation</td>
<td>AV-22</td>
<td>AV-36 Monobloc</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------</td>
<td>----------------</td>
</tr>
<tr>
<td>Max. load ............... kg</td>
<td>413</td>
<td>225</td>
</tr>
<tr>
<td>Max. permissible flying weight ........... kg</td>
<td>440</td>
<td>225</td>
</tr>
<tr>
<td>Wing loading ........... kg/m²</td>
<td>20.2</td>
<td>15.8</td>
</tr>
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</table>

**Design standards**

- Airworthiness requirements to which aircraft has been built:
  - French: Reglement air 2.104
  - Cat. III, nuages
- Date of issue of these requirements: 1.8.1954
- Certificate of Airworthiness: 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
- Permitted aerobatic manoeuvres: Loop, stall turn, side slip
- 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**

<table>
<thead>
<tr>
<th></th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>70</td>
<td>0.85</td>
<td>67</td>
<td>0.82</td>
</tr>
<tr>
<td>V for max. L/D</td>
<td>85</td>
<td>0.92</td>
<td>83</td>
<td>0.95</td>
</tr>
<tr>
<td>1.5 × V stall</td>
<td>73</td>
<td>0.85</td>
<td>75</td>
<td>0.90</td>
</tr>
<tr>
<td>1.75 × V stall</td>
<td>85</td>
<td>0.92</td>
<td>82.5</td>
<td>0.93</td>
</tr>
<tr>
<td>2.00 × V stall</td>
<td>97</td>
<td>1.15</td>
<td>100</td>
<td>1.35</td>
</tr>
</tbody>
</table>

- 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

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.
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 Kastenhohl 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 auftrieberhöhende 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 continue 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 épaissie 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 manoeuvre load factor of 12.

**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).

<table>
<thead>
<tr>
<th>Type designation</th>
<th>D-34</th>
<th>D-34B</th>
<th>Mü-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer ..........</td>
<td>Akademische Fliegergruppe Darmstadt e.V.</td>
<td>AKAFLIEG München Head: Frodo Hadwich</td>
<td></td>
</tr>
<tr>
<td>Date of 1st flight of prototype ..........</td>
<td>1955</td>
<td>1957</td>
<td>1954</td>
</tr>
<tr>
<td>Number produced .....</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Wings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span .............. m</td>
<td>12.65</td>
<td>12.65</td>
<td>16.60</td>
</tr>
<tr>
<td>Area .............. m²</td>
<td>8.0</td>
<td>8.0</td>
<td>13.54</td>
</tr>
<tr>
<td>Aspect ratio ..........</td>
<td>20.0</td>
<td>20.0</td>
<td>20.35</td>
</tr>
<tr>
<td>Wing root chord ...... m</td>
<td>0.915</td>
<td>0.915</td>
<td>1.07</td>
</tr>
<tr>
<td>Wing tip chord ........ m</td>
<td>0.360</td>
<td>0.360</td>
<td>0.362</td>
</tr>
<tr>
<td>Mean aerodynamic chord (m.a.c.) .......... m</td>
<td>0.683</td>
<td>0.683</td>
<td>0.816</td>
</tr>
<tr>
<td>Wing section, root ...... 64₄-₆₂₁</td>
<td>64₄-₆₂₁</td>
<td>6₃₅-₆₁₈</td>
<td></td>
</tr>
<tr>
<td>Wing section, mid ....... 64₄-₆₂₁</td>
<td>64₄-₆₂₁</td>
<td>6₃₅-₆₁₈</td>
<td></td>
</tr>
<tr>
<td>Wing section, tip ....... 64₄-₆₂₁</td>
<td>6₃₅-₆₂₁</td>
<td>6₃₅-₆₁₈</td>
<td></td>
</tr>
<tr>
<td>Dihedral ............ deg.</td>
<td>+0.8</td>
<td>+0.8</td>
<td>+3.0</td>
</tr>
<tr>
<td>¼ chord sweep .......... deg.</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-5.0</td>
</tr>
<tr>
<td>Aero. twist root/tip ...... deg.</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Length of each section of wing .......... m</td>
<td>1 × 12.65</td>
<td>1 × 12.65</td>
<td>2 × 8.4</td>
</tr>
<tr>
<td><strong>Ailerons</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ..........</td>
<td>plain</td>
<td>plain</td>
<td>normal ailerons fastened with piano hinge</td>
</tr>
<tr>
<td>Span .............. m</td>
<td>1.92</td>
<td>2.40</td>
<td>3.08</td>
</tr>
<tr>
<td>Area .............. m²</td>
<td>0.307</td>
<td>0.22</td>
<td>0.893</td>
</tr>
<tr>
<td>Type designation</td>
<td>D-34</td>
<td>D-34 B</td>
<td>Mu 22</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>Mean chord ........ %</td>
<td>37</td>
<td>20</td>
<td>24.4</td>
</tr>
<tr>
<td>Max. deflection up deg.</td>
<td>22.5</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td>Max. deflection down deg.</td>
<td>7.5</td>
<td>30</td>
<td>13</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>none</td>
<td>none</td>
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</tr>
<tr>
<td>Mass balance method</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Special features</td>
<td>ailerons are deflected down to 20° with trailing edge flaps</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Horizontal tail</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span .................. m</td>
<td>2.16</td>
<td>2.36</td>
<td>3.38</td>
</tr>
<tr>
<td>Area of elevator and fixed tail ........ m²</td>
<td>0.96</td>
<td>0.99</td>
<td>1.582</td>
</tr>
<tr>
<td>Area of elevator ........ m²</td>
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<td>0.495</td>
<td>0.721</td>
</tr>
<tr>
<td>Max. deflection up deg.</td>
<td>26</td>
<td>26</td>
<td>23 + 23 = 46</td>
</tr>
<tr>
<td>Max. deflection down deg.</td>
<td>26</td>
<td>26</td>
<td>23 + 23 = 46</td>
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<tr>
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<td>NACA 0012</td>
<td>NACA 0012</td>
<td>NACA 0012-0,825-35</td>
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</tr>
<tr>
<td>Mass balance method</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail) ........ m</td>
<td>3.60</td>
<td>3.80</td>
<td>4.44</td>
</tr>
<tr>
<td>Elevator aerodynamic balance method</td>
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<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Elevator trimming method</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Horizontal tail volume coefficient ..........</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special features ..........</td>
<td>T-tail</td>
<td>T-tail</td>
<td>0.451 (45°)</td>
</tr>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder ........ m²</td>
<td>1.04</td>
<td>0.92</td>
<td>—</td>
</tr>
<tr>
<td>Area of rudder ........ m²</td>
<td>0.59</td>
<td>0.575</td>
<td>—</td>
</tr>
<tr>
<td>Aspect ratio ........</td>
<td>1.75</td>
<td>1.44</td>
<td>—</td>
</tr>
<tr>
<td>Tail arm ........ m</td>
<td>3.55</td>
<td>3.80</td>
<td>—</td>
</tr>
<tr>
<td>Max. deflection ........ deg.</td>
<td>35</td>
<td>≈30</td>
<td>—</td>
</tr>
<tr>
<td>Aerofoil section ..........</td>
<td>NACA 63-015</td>
<td>NACA 65 A 010</td>
<td>—</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mass balance type</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Aerodynamic balance</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. width ........ m</td>
<td>0.62</td>
<td>0.60</td>
<td>0.61</td>
</tr>
<tr>
<td>Overall length ........ m</td>
<td>6.053</td>
<td>6.351</td>
<td>6.95</td>
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<tr>
<td>Max. cross section ........ m²</td>
<td>0.48</td>
<td>0.49</td>
<td>0.48</td>
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<tr>
<td>Wetted surface area ........ m²</td>
<td>≈7.5</td>
<td>≈7.5</td>
<td>—</td>
</tr>
<tr>
<td>Number seats and arrangement ..........</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Type designation</td>
<td>D-34</td>
<td>D-34B</td>
<td>Mu 22</td>
</tr>
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<td>------------------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Undercarriage type</td>
<td>skid</td>
<td>wheel</td>
<td>retractable wheel with brake and rubber-spring</td>
</tr>
<tr>
<td>Wheel diameter</td>
<td>cm</td>
<td></td>
<td>29</td>
</tr>
<tr>
<td>Special features</td>
<td></td>
<td>airbrakes</td>
<td>rubber-spring as compression member</td>
</tr>
<tr>
<td>Lift increasing devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>none</td>
<td>20° drooping ailerons and trailing edge flaps</td>
<td>split flap fastened with piano hinge</td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>3.36</td>
<td>3.30</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>0.655</td>
<td>1.15</td>
</tr>
<tr>
<td>Mean chord</td>
<td>%</td>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
<td>60</td>
<td>72</td>
</tr>
<tr>
<td>Drag producing devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>fuselage airbrakes</td>
<td>none</td>
<td>split flaps</td>
</tr>
<tr>
<td>General location</td>
<td></td>
<td>fuselage, below wing</td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>0.26</td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Weights</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Wings</td>
<td>kg</td>
<td>64.0</td>
<td>77.7</td>
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<td>Fuselage</td>
<td>kg</td>
<td>54.5</td>
<td>55.4</td>
</tr>
<tr>
<td>Tailplane and elevator</td>
<td>kg</td>
<td>4.2</td>
<td>3.6</td>
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<tr>
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<td>kg</td>
<td>122.7</td>
<td>136.7</td>
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<td>Instruments</td>
<td>kg</td>
<td>~3.0</td>
<td>~4.0</td>
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<tr>
<td>Equipped weight</td>
<td>kg</td>
<td>128</td>
<td>141</td>
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<tr>
<td>Max. load</td>
<td>kg</td>
<td>88</td>
<td>94</td>
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<tr>
<td>Max. permissible flying weight</td>
<td>kg</td>
<td>216</td>
<td>235</td>
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<tr>
<td>Wing loading</td>
<td>kg/m²</td>
<td>27.0</td>
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<td>Design standards</td>
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<td></td>
<td></td>
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<td>Airworthiness requirements to which aircraft has been built</td>
<td>Bauvorschriften für Segelflugzeuge</td>
<td>Bauvorschriften für Flugzeuge</td>
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</tr>
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<td>Date of issue of these requirements</td>
<td>1951</td>
<td>1952 (1936)</td>
<td></td>
</tr>
<tr>
<td>Type designation</td>
<td>D-34</td>
<td>D-34B</td>
<td>Mü 22</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Certificate of Airworthiness yes/no</td>
<td>yes</td>
<td>Category of certification: Beanspruchungsgruppe 2 (G= 400 kg) 3 (G= 340 kg)</td>
<td></td>
</tr>
<tr>
<td>Any other certification (e.g. experimental license, permit to fly)</td>
<td>permit to fly</td>
<td>experimental license</td>
<td></td>
</tr>
</tbody>
</table>

### Design flight envelope

#### Manoeuvre loads

<table>
<thead>
<tr>
<th>Point</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Ultimate load factor n</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>131</td>
<td>4</td>
<td>131</td>
<td>4</td>
<td>155</td>
<td>12</td>
</tr>
<tr>
<td>B</td>
<td>236.5</td>
<td>4</td>
<td>236.5</td>
<td>4</td>
<td>244</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>236.5</td>
<td>0</td>
<td>236.5</td>
<td>0</td>
<td>280</td>
<td>0</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>244</td>
<td>6</td>
</tr>
</tbody>
</table>

Factor of safety 2.5

### Gust loads

<table>
<thead>
<tr>
<th>Point</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>127.5</td>
<td>+10</td>
<td>127.5</td>
<td>+10</td>
<td>163.8</td>
<td>+10</td>
</tr>
<tr>
<td>B</td>
<td>127.5</td>
<td>—10</td>
<td>127.5</td>
<td>—10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>163.8</td>
<td>—10</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>No flap or brake</th>
<th>D-34</th>
<th>D-34 B</th>
<th>Mu 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>km/h</td>
<td>m/s</td>
<td>km/h</td>
</tr>
<tr>
<td>73° 0.56°</td>
<td></td>
<td></td>
<td>73°</td>
</tr>
<tr>
<td>V for max. L/D</td>
<td>km/h</td>
<td>m/s</td>
<td>km/h</td>
</tr>
<tr>
<td>76° 0.56°</td>
<td></td>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>With .....° flap deg</th>
<th>D-34</th>
<th>D-34 B</th>
<th>Mu 22</th>
</tr>
</thead>
<tbody>
<tr>
<td>V stall</td>
<td>km/h</td>
<td>m/s</td>
<td>km/h</td>
</tr>
<tr>
<td>72°</td>
<td></td>
<td></td>
<td>72°</td>
</tr>
<tr>
<td>Stallling speed</td>
<td>km/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;63</td>
<td></td>
<td></td>
<td>90°</td>
</tr>
<tr>
<td>Max. L/D</td>
<td>km/h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≈36</td>
<td></td>
<td></td>
<td>80°</td>
</tr>
</tbody>
</table>

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 Phônix*

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

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 qualities 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>FS 24 Phönix</th>
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</thead>
<tbody>
<tr>
<td>Designers</td>
<td>H. Nägele, R. Eppler</td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>27 November 1957</td>
</tr>
<tr>
<td>Number produced</td>
<td>1</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Wings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
</tr>
<tr>
<td>Area</td>
</tr>
<tr>
<td>Aspect ratio</td>
</tr>
<tr>
<td>Wing root chord</td>
</tr>
<tr>
<td>Wing tip chord</td>
</tr>
<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
</tr>
<tr>
<td>Wing section</td>
</tr>
<tr>
<td>Dihedral</td>
</tr>
<tr>
<td>½ chord sweep</td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ailerons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
</tr>
<tr>
<td>Area</td>
</tr>
<tr>
<td>Mean chord</td>
</tr>
</tbody>
</table>

<p>| | |</p>
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<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Date of first flight of prototype</td>
<td>27 November 1957</td>
</tr>
<tr>
<td>Number produced</td>
<td>1</td>
</tr>
<tr>
<td>Wings</td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
</tr>
<tr>
<td>Wing root chord</td>
<td>m</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>m</td>
</tr>
<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
<td>m</td>
</tr>
<tr>
<td>Wing section</td>
<td></td>
</tr>
<tr>
<td>Dihedral</td>
<td>deg.</td>
</tr>
<tr>
<td>½ chord sweep</td>
<td>deg.</td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
<td>deg.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ailerons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
</tr>
<tr>
<td>Area</td>
</tr>
<tr>
<td>Mean chord</td>
</tr>
<tr>
<td>Type designation</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Max. deflection up</td>
</tr>
<tr>
<td>Max deflection down</td>
</tr>
<tr>
<td>Mass balance degree</td>
</tr>
<tr>
<td>Mass balance method</td>
</tr>
</tbody>
</table>

**Horizontal tail**

<table>
<thead>
<tr>
<th>Span</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of elevator and fixed tail</td>
<td>m²</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>m²</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td>NACA 65-009</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>nil</td>
</tr>
<tr>
<td>Mass balance method</td>
<td>none</td>
</tr>
<tr>
<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)</td>
<td>m</td>
</tr>
<tr>
<td>Horizontal tail volume coefficient</td>
<td>0.531</td>
</tr>
</tbody>
</table>

**Vertical tail**

| Area of fin and rudder               | m²           |
| Area of rudder                       | m²           |
| Aspect ratio                         | deg.         |
| Tail arm                             | m            |
| Max. deflection                       | deg.         |
| Aerofoil section                     | NACA 651-012 |
| Mass balance degree                  | nil          |
| Mass balance type                    | none         |
| Aerodynamic balance                  | none         |

**Fuselage**

| Max. width                           | m            |
| Overall length                       | m            |
| Max. cross section                   | m²           |
| Wetted surface area                  | m²           |
| Number seats                         | 1            |
| Undercarriage type                   | skid         |

**Lift increasing devices**

| Type                                 | none         |

**Drag producing devices**

| Type                                  | airbrakes, bottom of wing |
| Span                                  | m                        |
| Area                                  | m²                       |
| % of chord                            | deg.                     |
| Location, % of span                   | m                        |
| Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. | yes |
### Weights

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Unit</th>
<th>FS 24 Phoenix</th>
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</thead>
<tbody>
<tr>
<td>Wings</td>
<td>kg</td>
<td>94.9</td>
</tr>
<tr>
<td>Fuselage</td>
<td>kg</td>
<td>58.8</td>
</tr>
<tr>
<td>Tailplane and elevator</td>
<td>kg</td>
<td>8.0</td>
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<tr>
<td>Empty weight</td>
<td>kg</td>
<td>161.7</td>
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<tr>
<td>Instruments</td>
<td>kg</td>
<td>2.5</td>
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<tr>
<td>Equipped weight</td>
<td>kg</td>
<td>164.2</td>
</tr>
<tr>
<td>Max. load</td>
<td>kg</td>
<td>100.8</td>
</tr>
<tr>
<td>Max. permissible flying weight</td>
<td>kg</td>
<td>265.0</td>
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<tr>
<td>Wing loading</td>
<td>kg/m²</td>
<td>18.5</td>
</tr>
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</table>

### Design standards

**Airworthiness requirements to which aircraft has been built**

- Date of issue of these requirements
- Certificate of Airworthiness

**Design flight envelope**

**Manoeuvre loads**

<table>
<thead>
<tr>
<th>Point A</th>
<th>km/h</th>
<th>Proof load factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>103</td>
<td>4</td>
</tr>
<tr>
<td>Point B</td>
<td>196</td>
<td>4</td>
</tr>
<tr>
<td>Point C</td>
<td>231</td>
<td>0</td>
</tr>
<tr>
<td>Point D</td>
<td>138</td>
<td>-2</td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>No flap or brake</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>km/h</td>
<td>69.2</td>
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<td>V for max. L/D</td>
<td>km/h</td>
<td>80.2</td>
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<tr>
<td></td>
<td>m/s</td>
<td>0.53</td>
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<td>0.68</td>
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<td>0.94</td>
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</table>

Stalling speed

<table>
<thead>
<tr>
<th>km/h</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>~37</td>
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</table>
The Kranich III has practically nothing in common with the earlier Kranich marks. 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


Flügel aus der Weihe entwickelt, aber mit Endkörperrn an den Flügelenden. Leichte aerodynamische Vorwärtspeilung, 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 entoillement.
**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 manoeuvrability 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**

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.


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

**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 Schemp­Hirth. 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 contreplaqués 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.
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**


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

**Olympia Meise 51**


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

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Kranich III</th>
<th>Weihe 50</th>
<th>Olympia Meise 51</th>
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<td>—</td>
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<tr>
<td>Max. width m</td>
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<td>0.58</td>
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<td>Weihe 50</td>
<td>Olympia-Meise 51</td>
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<td>Point B ..............</td>
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<td>Weihe 50</td>
<td>Olympia-Meise 51</td>
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<td>and</td>
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<td>290</td>
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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.


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'efforça de conserver l'écoulement laminaire sur la plus grande partie de l'aile. D'autre part il réduit 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 exécutement 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/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-

**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.
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.

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<tr>
<td>Area</td>
</tr>
<tr>
<td>Aspect ratio</td>
</tr>
<tr>
<td>Wing root chord</td>
</tr>
<tr>
<td>Wing tip chord</td>
</tr>
<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
</tr>
<tr>
<td>Wing section, root</td>
</tr>
<tr>
<td>Wing section, mid</td>
</tr>
<tr>
<td>Wing section, tip</td>
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<td>Dihedral</td>
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<table>
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<td>symm. 14%</td>
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<td>external bob weight</td>
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<td>Undercarriage type</td>
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<td>Tail skid Low pressure wheel with 2 shock struts ahead of c of g</td>
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<td>Weights</td>
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<td>Wings</td>
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<td>145 kg</td>
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<td>Fuselage¹</td>
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<td>112 kg</td>
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<td>Equipped weight</td>
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<td>257 kg</td>
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<td>Removable ballast</td>
<td>~ 30 (water) kg</td>
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<td>Max. load</td>
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<td>Max. permissible flying weight kg</td>
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<td>380 kg</td>
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<td>¹ Complete with rudders, elevators and fins; including instruments and equipment.</td>
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<td>Wing loading</td>
<td>solo 29, 2-seat 35 kg/m²</td>
<td>25.7 kg/m²</td>
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<td>Airworthiness requirements to which aircraft has been built</td>
<td>BVS</td>
<td>BVS</td>
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<td>Date of issue of these requirements</td>
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<td>Certificate of airworthiness yes/no</td>
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<td>V km/h Forward speed</td>
<td>Proof load factor (% ultimate)</td>
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<td>Maneuver loads</td>
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<tr>
<td>Point A</td>
<td>130 139</td>
<td>4.2 5.2</td>
</tr>
<tr>
<td>Point B</td>
<td>261 261</td>
<td>4.2 5.2</td>
</tr>
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<td>Point C</td>
<td>261 261</td>
<td>-2.2 -3.2</td>
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<td>Point D</td>
<td>185 215</td>
<td>-2.2</td>
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66
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<td>Solo</td>
<td>215</td>
<td>-10.4</td>
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| **Limiting flight conditions** |         |       |
| Placard airspeed smooth conditions | 230 | 200 |
| Placard airspeed gusty conditions | 150 | 140 |
| Aero-towing speed | 150 | 140 |
| Winch launching speed | 80 | 105 |
| Cloud flying permitted | 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) | 230 | 200 |

| **Straight flight performance** | 2-seat 600 kg | Solo 500 kg | 380 |
| at flying weight of | kg |       |
| No flap or brake | |       |
|                   | V km/h | v m/s | V km/h | v m/s |
| V for min. sink   | 77     | 0.61  | 66.5    | 0.53  |
| Solo             | 72     | 0.56  |         |       |
| 2-seat           | 89     | 0.66  |         |       |
| V for max. L/D   | 80     | 0.60  | 77      | 0.57  |
| Solo             | 80     | 0.60  |         |       |
| 2-seat           | 97.5   | 0.74  |         |       |
| 1.5 x V stall    | 114    | 0.98  |         |       |
| Solo             |         |       |         |       |
| 2-seat           | 130    | 1.37  |         |       |
| 1.75 x V stall   |         |       |         |       |
| 2-seat           |         |       |         |       |
| 2.00 x V stall   |         |       |         |       |
| 2-seat           |         |       |         |       |
| Stalling speed   | 65     |       |         |       |
| solo             |         |       |         |       |
| 2-seat           |         |       |         |       |
| Max. L/D         | 37.2   | 37.2  |         |       |
**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-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 of wooden construction.

---

**Manufacturer:**
Wolf Hirth GmbH, Nabern-Teck, Wurttemberg, Germany
Lo-150

Ahnlich 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Lo-100</th>
<th>Lo-150</th>
<th>Goevier</th>
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<tbody>
<tr>
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<td>Alfred Vogt</td>
<td>Alfred Vogt</td>
<td>Wolf Hirth Wolfgang Hütter</td>
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<td>Date of 1st flight</td>
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<td>55</td>
<td>55</td>
<td></td>
</tr>
</tbody>
</table>

**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**

| Wings¹ ............... kg | 76     | 121   | 120   |
| Fuselage² .......... kg | 67     | 67    | 112   |
| Tailplane and elevator .. kg | 7      | 7     | 10    |
| Empty weight³ .......... kg | 150    | 195   | 242   |
| Instruments .......... kg | 3      | 3     |       |
| Equipment .......... kg | 5      | 5     |       |
| Equipped weight ....... kg | 155    | 200   | 245   |
| Max. load .......... kg | 90⁴  110⁵ | 110  | 165   |
| Max. permissible flying weight .......... kg | 245⁴  265⁴ | 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 |         |
| Date of issue of these requirements |         |
| Category of certification |         |

<table>
<thead>
<tr>
<th>Bauvorschriften für Segelflugzeuge</th>
<th>October 1952</th>
</tr>
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<tbody>
<tr>
<td>full aerobatics and normal flight</td>
<td>normal</td>
</tr>
<tr>
<td>normal</td>
<td>normal</td>
</tr>
<tr>
<td>V km/h</td>
<td>V km/h</td>
</tr>
<tr>
<td>km/h</td>
<td>n</td>
</tr>
<tr>
<td>Point A ..................</td>
<td>(⁺)</td>
</tr>
<tr>
<td>Point B ..................</td>
<td></td>
</tr>
<tr>
<td>Point C ..................</td>
<td></td>
</tr>
<tr>
<td>Point D ..................</td>
<td></td>
</tr>
</tbody>
</table>

**Limiting flight conditions**

<p>| Placard airspeed smooth conditions ...... km/h | 290  190 | 200  | 175  |
| Placard airspeed | gusty conditions ...... km/h | 225  150 | 150  | 110  |</p>
<table>
<thead>
<tr>
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<th>Lo-100</th>
<th>Lo-150</th>
<th>Goevier</th>
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<tbody>
<tr>
<td>Aero-towing speed</td>
<td>225</td>
<td>150</td>
<td>110</td>
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<td>Winch launching speed</td>
<td>140</td>
<td>125</td>
<td>80</td>
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<td>Cloud flying permitted</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
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<tr>
<td>Permitted aerobatic manœuvres</td>
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<tr>
<td>Spinning permitted</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Foremost and aftmost c. g. positions for which compliance with regulations has been shown or is intended in % m. a. c.</td>
<td>23% and 34%</td>
<td>22% and 31.6%</td>
<td>38.2% and 43%</td>
</tr>
<tr>
<td>Straight flight performance at flying weight of ...... kg</td>
<td>265</td>
<td>310</td>
<td>410</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No flap or brake</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
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<tbody>
<tr>
<td>V for min. sink</td>
<td>72</td>
<td>0.80</td>
<td>86</td>
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<td>V for max. L/D</td>
<td>85</td>
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<td>0.97</td>
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<tr>
<td>Max. L/D</td>
<td>25</td>
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<td>34</td>
<td></td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

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

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
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.
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 caracasse en tubes d'acier, carénée avec des longe­rons de bois et entoilée. L'avant du fuselage est caréné avec une coque en contre-plaquée; 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 arétières et l'épaisseur des diagonales en contre-plaquée donnent une superficie lisse et irréprochable. Les ailerons sont revêtus de contre-plaquée et montés sur charnières. Les ailes sont rattachées au fuselage chacune par un œillet et des boulons fixés, 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 sailplane 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


**L-Spatz-55**


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**


**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-plaquée 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 sailplane 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


Bergfalke II/55


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


<table>
<thead>
<tr>
<th>Type designation</th>
<th>Zugvogel III</th>
<th>L-Spatz-55</th>
<th>Sperber</th>
<th>Bergfalke II/55</th>
<th>Specht</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of prototype construction</td>
<td>1954</td>
<td>1952</td>
<td>1956</td>
<td>1951</td>
<td>1953</td>
</tr>
<tr>
<td>Number produced</td>
<td>12</td>
<td>200</td>
<td>5</td>
<td>280</td>
<td>55</td>
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<td>L-Spatz-55</td>
<td>Sperber</td>
<td>Bergfjake 11/55</td>
<td>Specht</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>----------</td>
<td>------------</td>
<td>---------</td>
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</tr>
<tr>
<td>Wings</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Span</td>
<td>17.00</td>
<td>15.00</td>
<td>14.20</td>
<td>16.60</td>
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<tr>
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<td>11.70</td>
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<td>17.70</td>
<td>16.60</td>
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<td>19.0</td>
<td>11.6</td>
<td>15.6</td>
<td>11.0</td>
</tr>
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<td>0.99</td>
<td>1.35</td>
<td>1.51</td>
<td>1.35</td>
</tr>
<tr>
<td>Wing tip chord</td>
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<td>0.36</td>
<td>0.94</td>
<td>0.65</td>
<td>1.00</td>
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<td>1.5</td>
<td>2.3</td>
<td>1.35</td>
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<tr>
<td>Wing section, root</td>
<td>63.6 16</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
</tr>
<tr>
<td>Wing section, mid</td>
<td>63.6 15</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
</tr>
<tr>
<td>Wing section, tip</td>
<td>63.6 14</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
<td>Mii-Profil</td>
</tr>
<tr>
<td>Dihedral</td>
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<td>2.5</td>
<td>2.0</td>
<td>3.5</td>
<td>2.0</td>
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<tr>
<td>1/4 chord sweep</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>-4</td>
<td>0</td>
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<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<td>8.56</td>
<td>7.55</td>
<td>7.12</td>
<td>8.35</td>
<td>6.75</td>
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<td>Ailerons</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Type</td>
<td>Inset</td>
<td>Inset</td>
<td>Inset</td>
<td>Frise</td>
<td>Inset</td>
</tr>
<tr>
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<td>Mean chord ratio</td>
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</tr>
<tr>
<td>Max. deflection up</td>
<td>28</td>
<td>29</td>
<td>26</td>
<td>28</td>
<td>26</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>90° 30'</td>
<td>70° 45'</td>
<td>90° 15'</td>
<td>80° 40'</td>
<td>80° 20'</td>
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<tr>
<td>Horizontal tail</td>
<td></td>
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<td>Span</td>
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<td>1.00</td>
<td>0.96</td>
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<tr>
<td>Max. deflection up</td>
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<td>190° 30'</td>
<td>190° 15'</td>
<td>230°</td>
<td>210° 30'</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>20°</td>
<td>230° 30'</td>
<td>190° 15'</td>
<td>230°</td>
<td>210° 30'</td>
</tr>
<tr>
<td>Aerofoil section</td>
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<td>Symmetrical</td>
<td>Symmetrical</td>
<td>Symmetrical</td>
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<td>Tail arm (from 1/4 chord m.a.c. wing to 1/4 chord m.a.c. tail)</td>
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<td>3.36</td>
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<td>spring</td>
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<td>0.346</td>
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<td>Area of fin and rudder</td>
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<td>0.84</td>
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</tr>
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<td>L-Spatz-55</td>
<td>Sperber</td>
<td>Bergfalke II/55</td>
<td>Specht</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td>------------</td>
<td>---------</td>
<td>----------------</td>
<td>--------</td>
</tr>
<tr>
<td>Max. deflection</td>
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<td>39°</td>
<td>32°</td>
<td>29°</td>
<td>32°</td>
</tr>
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<td>Aerofoil section</td>
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<td>Symmetrical</td>
<td>Symmetrical</td>
<td>Symmetrical</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
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<tr>
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<td>2</td>
<td>2</td>
<td>2</td>
</tr>
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<td>arrangement</td>
<td>skid, droppable wheels</td>
<td>side-by-side skid and fixed wheel</td>
<td>tandem</td>
<td>tandem skid and fixed wheel</td>
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<tr>
<td>Undercarriage type</td>
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</tr>
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<td>26.</td>
<td>31.</td>
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<tr>
<td>Special features</td>
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<td></td>
<td></td>
<td>Rear seat accessible through door under wing</td>
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</tr>
<tr>
<td><strong>Lift increasing devices</strong></td>
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<td>none</td>
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<td>none</td>
<td>none</td>
</tr>
<tr>
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<td>Percentage of span</td>
<td>13</td>
<td>13</td>
<td>11</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Location, percentage of chord</td>
<td>50</td>
<td>50</td>
<td>11</td>
<td>50</td>
<td>11</td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>no</td>
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<tr>
<td><strong>Weights</strong></td>
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<td>Wings¹</td>
<td>154</td>
<td>94</td>
<td>128</td>
<td>148</td>
<td>123</td>
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<tr>
<td>Fuselage²</td>
<td>83</td>
<td>53</td>
<td>82</td>
<td>90</td>
<td>75</td>
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<tr>
<td>Tailplane and elevator</td>
<td>6</td>
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<td>8</td>
<td>8</td>
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<td>Empty weight³</td>
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<td>153</td>
<td>218</td>
<td>246</td>
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<td>–</td>
<td>–</td>
<td>–</td>
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<td>155</td>
<td>220</td>
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<td>210</td>
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<tr>
<td>Removable ballast</td>
<td>–</td>
<td>–</td>
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<td>–</td>
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<tr>
<td>Max. load</td>
<td>120</td>
<td>110</td>
<td>180</td>
<td>190</td>
<td>180</td>
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<tr>
<td>Max. permissible flying weight</td>
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<td>265</td>
<td>400</td>
<td>440</td>
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<td>Wing loading (max.)</td>
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<td>22.6</td>
<td>23.0</td>
<td>24.8</td>
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**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
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Zugvogel III</th>
<th>L-Spatz-55</th>
<th>Sperber</th>
<th>Bergfalke 11/55</th>
<th>Specht</th>
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<td>Point A</td>
<td>122</td>
<td>4</td>
<td>113</td>
<td>4</td>
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<td>-2</td>
<td>154</td>
<td>-2</td>
<td>157</td>
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<td><strong>Factor of safety (ultimate load/proof load)</strong></td>
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<td></td>
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<td><strong>Gust Loads</strong></td>
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<td>130</td>
<td>10.</td>
<td>144</td>
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<td>Point D</td>
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<td>-10.</td>
<td>130</td>
<td>-10.</td>
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<td>Placard airspeed smooth conditions</td>
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<td>110</td>
<td>130</td>
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<td>130</td>
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<td>110</td>
<td>130</td>
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<td>130</td>
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<td>Winch launching speed km/h</td>
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<td>90</td>
<td>90</td>
<td>85</td>
<td>90</td>
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<td>Cloud flying permitted...</td>
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<td>Permitted aerobatic manoeuvres...</td>
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<td>Spinning permitted...</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Foremost and aftmost e.g. positions for which compliance with regulations has been shown or is intended in percentage m.a.c.</td>
<td>22%</td>
<td>18%</td>
<td>18%</td>
<td>15%</td>
<td>18%</td>
</tr>
<tr>
<td></td>
<td>and</td>
<td>and</td>
<td>and</td>
<td>and</td>
<td></td>
</tr>
<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests km/h</td>
<td>210</td>
<td>200</td>
<td>--</td>
<td>205</td>
<td></td>
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<td><strong>Straight flight performance</strong></td>
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<tr>
<td>at flying weight of kg</td>
<td>320</td>
<td>250</td>
<td>400</td>
<td>410</td>
<td>390</td>
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<td><strong>No flap or brake</strong></td>
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<td>V for min. sink</td>
<td>67</td>
<td>0.58</td>
<td>62</td>
<td>0.64</td>
<td>68</td>
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<tr>
<td>V for max. L/D</td>
<td>80</td>
<td>0.65</td>
<td>73</td>
<td>0.70</td>
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<td>90</td>
<td>0.78</td>
<td>80</td>
<td>0.8</td>
<td>90</td>
<td>0.9</td>
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<tr>
<td>105</td>
<td>1.03</td>
<td>95</td>
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<td>105</td>
<td>1.2</td>
</tr>
<tr>
<td>120</td>
<td>1.42</td>
<td>110</td>
<td>1.6</td>
<td>120</td>
<td>1.6</td>
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<tr>
<td><strong>Stalling speed km/h</strong></td>
<td>58</td>
<td>50</td>
<td>54</td>
<td>60</td>
<td>55</td>
</tr>
<tr>
<td><strong>Max. L/D</strong></td>
<td>35</td>
<td>29</td>
<td>19</td>
<td>28</td>
<td>20</td>
</tr>
</tbody>
</table>

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

Le Ka 2 est le premier de toute une série de constructions biplaces calculées par Kaiser. Le Ka 2B Rhonschwalbe 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.

The Ka 2 is the first of a series of 2-seaters designed by Kaiser. The Ka 2B Rhonschwalbe 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.


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 Stahlrohrumpf, stoffbespannt.

**Rhönlerche II**

Petit biplace d’entraînement à ailes lambrées 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**


**Ka 7 Rhönadler**

Le Rhonadler 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.

### Aircraft Specifications

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Kaiser Ka3</th>
<th>Ka 6B Rhönsegler</th>
<th>Ka 2</th>
<th>Rhönlerche II</th>
<th>K 7 Rhönadler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer</td>
<td>Rudolf Kaiser</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Date of 1st flight of prototype</td>
<td>1954</td>
<td>1955</td>
<td>1953</td>
<td>1954</td>
<td></td>
</tr>
<tr>
<td>Number produced</td>
<td>15</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
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</table>

**Wings**

<p>| Span       | 10.0 | 15.0 | 15.0 | 13.0 | 16.0 |
| Area       | 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 | 1.0 | 1.2  | 1.5  | 1.38 | 1.5  |
| Wing tip chord | 1.0 | 0.38 | 0.68 | 0.88 | 0.6  |
| Mean aerodynamic chord | 1.0 | 0.83 | 1.12 | 1.26 | 1.09 |
| (m. a. c.) |      |      |      |      |      |</p>
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Kaiser Ka 3</th>
<th>Ka 6B Rhonsegler</th>
<th>Ka 2</th>
<th>Rhön-lerche II</th>
<th>K 7 Rhonader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wing section, root</td>
<td>Gő 549</td>
<td>63–618</td>
<td>Gő 533</td>
<td>Gő 533</td>
<td>Gő 533</td>
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<tr>
<td></td>
<td>16%</td>
<td>16%</td>
<td>15.7%</td>
<td>16%</td>
<td>16%</td>
</tr>
<tr>
<td>Wing section, mid</td>
<td>Gő 549</td>
<td>63–614</td>
<td>Gő 533</td>
<td>Gő 533</td>
<td>Gő 533</td>
</tr>
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<td>16%</td>
<td>14%</td>
<td>15.7%</td>
<td>14%</td>
<td>14%</td>
</tr>
<tr>
<td>Wing section, tip</td>
<td>Gő 549</td>
<td>Joukowsky 12%</td>
<td>Gő 533</td>
<td>Gő 533</td>
<td>Gő 533</td>
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<tr>
<td></td>
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<td>12.5%</td>
<td>14%</td>
<td>14%</td>
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<tr>
<td>Dihedral</td>
<td>2.5</td>
<td>3.0</td>
<td>2.5</td>
<td>2.5</td>
<td>4.0</td>
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<td>¼ chord sweep deg.</td>
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<td>6.0</td>
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<td>6</td>
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<td>Aero. twist root/tip deg.</td>
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<td>3.5</td>
<td>1.0</td>
<td>1.0</td>
<td>3.0</td>
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<tr>
<td>Length of each section of wing m</td>
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<td>7.5</td>
<td>7.53</td>
<td>6.2</td>
<td>8.03</td>
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**Ailerons**

<table>
<thead>
<tr>
<th>Type (e.g. slotted, frise, inset hinge, plain)</th>
<th>Kaiser Ka 3</th>
<th>Ka 6B Rhonsegler</th>
<th>Ka 2</th>
<th>Rhön-lerche II</th>
<th>K 7 Rhonader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span m</td>
<td>2.05</td>
<td>2.15</td>
<td>2.95</td>
<td>2.90</td>
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<td>0.43×2</td>
<td>0.8×2</td>
<td>0.95×2</td>
<td>0.8×2</td>
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<td>0.2</td>
<td>0.27</td>
<td>0.33</td>
<td>0.27</td>
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<tr>
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<td>30</td>
<td>30</td>
<td>30</td>
<td>25</td>
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<td>15</td>
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<tr>
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<td>nil</td>
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**Horizontal tail**

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<th>Ka 6B Rhonsegler</th>
<th>Ka 2</th>
<th>Rhön-lerche II</th>
<th>K 7 Rhonader</th>
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</thead>
<tbody>
<tr>
<td>Area of elevator and fixed tail m²</td>
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<td>1.61</td>
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<td>2.32</td>
<td>2.25</td>
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<td>Area of elevator m²</td>
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<td>0.64</td>
<td>1.04</td>
<td>1.06</td>
<td>1.04</td>
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<tr>
<td>Max. deflection up deg.</td>
<td>17.5</td>
<td>20</td>
<td>20</td>
<td>30</td>
<td>20</td>
</tr>
<tr>
<td>Max. deflection down deg.</td>
<td>17.5</td>
<td>20</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Aerofoil section sym. 12%</td>
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<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
</tr>
<tr>
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<td>sym. 12%</td>
<td>sym. 12%</td>
<td>sym. 12%</td>
<td>sym. 12%</td>
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<tr>
<td>Tail arm (from ¼ chord m. a. c. wing to ¼ chord m. a. c. tail) m</td>
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<td>3.67</td>
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<td>trim</td>
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<td>Horizontal tail volume coefficient</td>
<td>V-tail</td>
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<td>0.4</td>
<td>0.335</td>
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<td>1.15</td>
<td>1.13</td>
<td>1.21</td>
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<td>1.74</td>
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<td>Ka 6B Rhöneegler</td>
<td>Ka 2</td>
<td>Rhön-Jerche II</td>
<td>K 7 Rhonadler</td>
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<tr>
<td>------------------</td>
<td>------------</td>
<td>-----------------</td>
<td>-----</td>
<td>----------------</td>
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</tr>
<tr>
<td>Tail arm</td>
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<td>sym. 12% nil</td>
<td>sym. 12% nil</td>
<td>sym. 12% nil</td>
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<td>Mass balance type</td>
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<tr>
<td>Fuselage</td>
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<td>Max. width</td>
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<td>0.47</td>
<td>0.61</td>
<td>0.68</td>
</tr>
<tr>
<td>Wetted surface area</td>
<td>m²</td>
<td>8.5</td>
<td>10.15</td>
<td>13.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Number seats and arrangement</td>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Undercarriage type</td>
<td></td>
<td>skid wheel with brake</td>
<td>tandem fixed wheel and skid</td>
<td>tandem fixed wheel and skid</td>
<td>tandem fixed wheel and skid</td>
</tr>
<tr>
<td>Wheel diameter</td>
<td>cm</td>
<td>30</td>
<td>38</td>
<td>30</td>
<td>38</td>
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<tr>
<td>Special features</td>
<td></td>
<td>steel tube fuselage</td>
<td>none</td>
<td>steel tube fuselage</td>
<td>none</td>
</tr>
<tr>
<td>Lift increasing devices</td>
<td></td>
<td>wing spoilers</td>
<td>wing airbrakes</td>
<td>wing airbrakes</td>
<td>wing airbrakes</td>
</tr>
<tr>
<td>Drag producing devices</td>
<td></td>
<td>spoilers wing airbrakes</td>
<td>both</td>
<td>both sides</td>
<td>both</td>
</tr>
<tr>
<td>General location (e.g. top of wing, bottom of wing, fuselage)</td>
<td></td>
<td>top of wing</td>
<td>both sides</td>
<td>top of wing</td>
<td>both</td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>0.6</td>
<td>1.0</td>
<td>0.9</td>
<td>1.2</td>
</tr>
<tr>
<td>Area (total)</td>
<td>m²</td>
<td>0.12</td>
<td>0.35</td>
<td>0.45</td>
<td>0.25</td>
</tr>
<tr>
<td>% of span (where applicable)</td>
<td></td>
<td>12.0</td>
<td>13.3</td>
<td>16.0</td>
<td>13.8</td>
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<tr>
<td>Location, % of chord (where applicable)</td>
<td></td>
<td>40</td>
<td>44</td>
<td>38</td>
<td>36</td>
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<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no</td>
<td></td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Weights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wings (¹)</td>
<td>kg</td>
<td>43</td>
<td>110</td>
<td>100</td>
<td>160</td>
</tr>
<tr>
<td>Fuselage (¹)</td>
<td>kg</td>
<td>65.5</td>
<td>108.5</td>
<td>97.5</td>
<td>112</td>
</tr>
<tr>
<td>Tailplane and elevator</td>
<td>kg</td>
<td>6.5</td>
<td>9.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Empty weight (¹)</td>
<td>kg</td>
<td>98.5</td>
<td>182</td>
<td>251.5</td>
<td>107.5</td>
</tr>
<tr>
<td>Instruments</td>
<td>kg</td>
<td>1.5</td>
<td>3</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>Type designation</td>
<td>Kaiser Ka3</td>
<td>Ka 6B Rhönseglern</td>
<td>Ka 2</td>
<td>Rhön-lerche II</td>
<td>K 7 Rhönadler</td>
</tr>
<tr>
<td>------------------</td>
<td>------------</td>
<td>-------------------</td>
<td>-----</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Equipped weight</td>
<td>100</td>
<td>185</td>
<td>254</td>
<td>210</td>
<td>284.5</td>
</tr>
<tr>
<td>Max. load</td>
<td>95</td>
<td>115</td>
<td>200</td>
<td>190</td>
<td>200</td>
</tr>
<tr>
<td>Max. permissible flying weight</td>
<td>195</td>
<td>300</td>
<td>460</td>
<td>400</td>
<td>484.5</td>
</tr>
<tr>
<td>Wing loading max.</td>
<td>19.5</td>
<td>24.2</td>
<td>27.4</td>
<td>24.5</td>
<td>27.3</td>
</tr>
<tr>
<td>Design standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Airworthiness requirements to which aircraft has been built</td>
<td>German</td>
<td>German</td>
<td>German</td>
<td>German</td>
<td>German</td>
</tr>
<tr>
<td>Date of issue of these requirements</td>
<td>August 1939</td>
<td>August 1939</td>
<td>August 1939</td>
<td>August 1939</td>
<td>August 1939</td>
</tr>
<tr>
<td>Certificate of Airworthiness yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Design flight envelope</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Proof load factor n</th>
<th>V km/h</th>
<th>Proof load factor n</th>
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<tbody>
<tr>
<td>Point A</td>
<td>110</td>
<td>4</td>
<td>122</td>
<td>4</td>
<td>125</td>
<td>4</td>
<td>126</td>
<td>4.7</td>
<td>124</td>
<td>4</td>
</tr>
<tr>
<td>Point B</td>
<td>200</td>
<td>4</td>
<td>225</td>
<td>4</td>
<td>238</td>
<td>4</td>
<td>208</td>
<td>4.7</td>
<td>236</td>
<td>4</td>
</tr>
<tr>
<td>Point C</td>
<td>219</td>
<td>0</td>
<td>250</td>
<td>0</td>
<td>266</td>
<td>0</td>
<td>172</td>
<td>-2.3</td>
<td>264</td>
<td>0</td>
</tr>
<tr>
<td>Point D</td>
<td>143</td>
<td>-2</td>
<td>158</td>
<td>-2</td>
<td>168</td>
<td>-2</td>
<td>208</td>
<td>-2.3</td>
<td>167</td>
<td>-2</td>
</tr>
</tbody>
</table>

| Factor of safety      | 2      | 2                   | 1.5    | 2                   |        |                     |        |                     |

<table>
<thead>
<tr>
<th>Gust loads</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>±10</td>
<td>140</td>
<td>±10</td>
<td>130</td>
<td>±10</td>
<td>130</td>
<td>±10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limiting flight conditions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Placard airspeed</td>
<td></td>
</tr>
<tr>
<td>smooth conditions</td>
<td>km/h</td>
</tr>
<tr>
<td>160</td>
<td>200</td>
</tr>
<tr>
<td>Placard airspeed</td>
<td></td>
</tr>
<tr>
<td>gusty conditions</td>
<td>km/h</td>
</tr>
<tr>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>Aero-towing speed</td>
<td>km/h</td>
</tr>
<tr>
<td>100</td>
<td>140</td>
</tr>
<tr>
<td>Winch launching speed</td>
<td>km/h</td>
</tr>
<tr>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
</tr>
<tr>
<td>Spinning permitted</td>
<td>yes</td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended</td>
<td>31%</td>
</tr>
<tr>
<td>in % m.a.c.</td>
<td></td>
</tr>
<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting)</td>
<td>230</td>
</tr>
</tbody>
</table>
### Straight flight performance

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Kaiser Ka 3</th>
<th>Ka 6B Rhönsegler</th>
<th>Ka 2</th>
<th>Rhönsegler II</th>
<th>K 7 Rhönsegler</th>
</tr>
</thead>
<tbody>
<tr>
<td>at flying weight of ........ kg</td>
<td>180</td>
<td>276</td>
<td>415</td>
<td>360</td>
<td>445</td>
</tr>
<tr>
<td>V for max. L/D ...........</td>
<td>65</td>
<td>68</td>
<td>65</td>
<td>62</td>
<td>67</td>
</tr>
<tr>
<td>° flap ............... deg.</td>
<td>1.0</td>
<td>0.63</td>
<td>0.9</td>
<td>1.1</td>
<td>0.81</td>
</tr>
<tr>
<td>V for min. sink ..........</td>
<td>75</td>
<td>76</td>
<td>80</td>
<td>78</td>
<td>85</td>
</tr>
<tr>
<td>° flap ............... deg.</td>
<td>1.2</td>
<td>0.67</td>
<td>0.95</td>
<td>1.25</td>
<td>0.91</td>
</tr>
<tr>
<td>V for max. L/D ..........</td>
<td>90</td>
<td>104</td>
<td>119</td>
<td></td>
<td></td>
</tr>
<tr>
<td>° flap ............... deg.</td>
<td>0.34</td>
<td>1.10</td>
<td>1.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stalling speed .......... km/h</td>
<td>53</td>
<td>59.5</td>
<td>58.5</td>
<td>56</td>
<td>59.3</td>
</tr>
<tr>
<td>Max. L/D ..............</td>
<td>17.5</td>
<td>31.5</td>
<td>24</td>
<td>17.5</td>
<td>26</td>
</tr>
</tbody>
</table>

* 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Ly 542-K Stösser</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer</td>
<td>Ing. Paul Lüty</td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>11 August 1955</td>
</tr>
<tr>
<td>Number produced</td>
<td>1</td>
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</table>

**Wings**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>12.80</td>
</tr>
<tr>
<td>Area</td>
<td>14.0</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>11.7</td>
</tr>
<tr>
<td>Wing root chord</td>
<td>1.66</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>0.55</td>
</tr>
<tr>
<td>Mean aerodynamic chord</td>
<td>1.10</td>
</tr>
<tr>
<td>Wing section</td>
<td>Gö 549</td>
</tr>
<tr>
<td>Dihedral</td>
<td>1.5</td>
</tr>
<tr>
<td>1/4 chord sweep</td>
<td>-5</td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**Ailerons**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>plain</td>
</tr>
<tr>
<td>Span</td>
<td>2.90</td>
</tr>
<tr>
<td>Area</td>
<td>0.58</td>
</tr>
<tr>
<td>Mean chord</td>
<td>0.10</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>60</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>60</td>
</tr>
<tr>
<td>Mass balance method</td>
<td>external</td>
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</table>

**Horizontal tail**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Span</td>
<td>2.80</td>
</tr>
<tr>
<td>Area of elevator and fixed tail</td>
<td>2.11</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>0.91</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>25</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>22.5</td>
</tr>
<tr>
<td>Type designation</td>
<td>Ly 542-K Stösser</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder  ( m^2 )</td>
<td>1.157</td>
</tr>
<tr>
<td>Area of rudder  ( m^2 )</td>
<td>0.788</td>
</tr>
<tr>
<td>Max. deflection  ( \text{deg.} )</td>
<td>30</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
</tr>
<tr>
<td>Max. width  ( m )</td>
<td>0.68</td>
</tr>
<tr>
<td>Overall length  ( m )</td>
<td>7.8</td>
</tr>
<tr>
<td>Number seats and arrangement</td>
<td>2 tandem</td>
</tr>
<tr>
<td><strong>Lift increasing devices</strong></td>
<td>sucking-off of the turbulent boundary layer</td>
</tr>
<tr>
<td>Type</td>
<td>2.40</td>
</tr>
<tr>
<td>Span  ( m )</td>
<td></td>
</tr>
<tr>
<td><strong>Drag producing devices</strong></td>
<td>wing airbrakes</td>
</tr>
<tr>
<td>Type</td>
<td>1.10</td>
</tr>
<tr>
<td>Span  ( m )</td>
<td>40</td>
</tr>
<tr>
<td>Location, % of chord</td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity to max. permissible I.A.S.?</td>
<td>no</td>
</tr>
<tr>
<td><strong>Weights</strong></td>
<td></td>
</tr>
<tr>
<td>Wings  ( \text{kg} )</td>
<td>166</td>
</tr>
<tr>
<td>Fuselage  ( \text{kg} )</td>
<td>108</td>
</tr>
<tr>
<td>Tailplane and elevator  ( \text{kg} )</td>
<td>14</td>
</tr>
<tr>
<td>Empty weight  ( \text{kg} )</td>
<td>288</td>
</tr>
<tr>
<td>Instruments  ( \text{kg} )</td>
<td>7</td>
</tr>
<tr>
<td>Equipped weight  ( \text{kg} )</td>
<td>295</td>
</tr>
<tr>
<td>Max. load  ( \text{kg} )</td>
<td>180</td>
</tr>
<tr>
<td>Max. permissible flying weight  ( \text{kg} )</td>
<td>475</td>
</tr>
<tr>
<td>Wing loading  ( \text{kg}/m^2 )</td>
<td>33</td>
</tr>
<tr>
<td><strong>Design standards</strong></td>
<td>fully aerobatic</td>
</tr>
<tr>
<td>Airworthiness requirements to which aircraft has been built</td>
<td>(strength group 3, use group K)</td>
</tr>
<tr>
<td>Date of issue of these requirements</td>
<td>1955</td>
</tr>
<tr>
<td><strong>Limiting flight conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Placard airspeed, smooth conditions  ( \text{km/h} )</td>
<td>300</td>
</tr>
<tr>
<td>Placard airspeed, gusty conditions  ( \text{km/h} )</td>
<td>200</td>
</tr>
<tr>
<td>Aero-towing speed  ( \text{km/h} )</td>
<td>160</td>
</tr>
<tr>
<td>Winch launching speed  ( \text{km/h} )</td>
<td>110</td>
</tr>
<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
</tr>
<tr>
<td>Permitted aerobatic manoeuvres</td>
<td>fully aerobatic</td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.</td>
<td>26.6% and 41%</td>
</tr>
</tbody>
</table>
### 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

---

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Ly 542-K Stösser</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Straight flight performance</strong></td>
<td></td>
</tr>
<tr>
<td>at flying weight of</td>
<td>kg</td>
</tr>
<tr>
<td>V for min. sink</td>
<td></td>
</tr>
<tr>
<td>V for max. L/D</td>
<td></td>
</tr>
<tr>
<td>Stalling speed</td>
<td>km/h</td>
</tr>
<tr>
<td>Max. L/D</td>
<td></td>
</tr>
</tbody>
</table>

| V |  |
| km/h | m/s |
| 80 | 0.9 |
| 88 | |

| 60 | 26 |

---

**Condor 4**


**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.
Germany - Deutschland - Allemagne

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


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


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.
**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. Stahlrohrrippf 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.

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**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 aluminum.

**Greif I**


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**Greif V-DSG**

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

**Greif V-DSG**

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

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**Greif V-DSG**

Biplace d'école à cabine ouverte. Construction analogue à celle du Greif III.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Kranich II</th>
<th>Doppelauf V-5</th>
<th>Nipp Bremen-Lane</th>
<th>Greif I</th>
<th>Greif III</th>
<th>Greif V-DSG</th>
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<td>Manufacturer</td>
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<td>E. Nipp</td>
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<td>Address</td>
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<td>Bremen</td>
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<td>Designer(s)</td>
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<td>Fritz Raab</td>
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<td>Hans Hollfelder</td>
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<td>14.65</td>
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<th>Type designation</th>
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<th>Doppelraab V-5</th>
<th>Nipp Bremen-Lane</th>
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</table>
Germany - Deutschland - Allemagne

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 and III

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

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
**Grunau Baby V**


**Scheibe Spatz-B**

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

**Reinhard Cumulus**

The Cumulus is a single-seat trainer with wings similar to the Grunau Baby IIb. The fuselage is steel tube, 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**

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

**Reinhard Cumulus**

Monoplace d'éccole avec ailes pareilles à celles du Grunau Baby IIb. Fuselage en tubes d'acier avec entoilage.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Grunau Baby IIb</th>
<th>Grunau Baby III</th>
<th>ES 49 V-3</th>
<th>Grunau Baby V</th>
<th>Scheibe Spatz-B</th>
<th>Reinhard Cumulus</th>
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<tbody>
<tr>
<td>Manufacturer</td>
<td>diverse</td>
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<td>Alexander Schleicher</td>
<td>Gomolzig</td>
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<td>~10</td>
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</table>

**Wings**

| Span | 13.57 | 13.50 | 16.00 | 14.0 | 13.2 | 13.57 |
| Area | 14.20 | 14.40 | 21.30 | 15.0 | 10.9 | 14.2 |
| Aspect ratio | 13.00 | 12.80 | 11.74 | 13.0 | 16.0 | 13.0 |
| Wing root chord | 1.18 | 1.20 | 1.60 | 1.2 | 0.99 | 1.18 |
| Wing tip chord   | 0.50 | 0.50 | 0.90 | 0.50 | 0.50 | 0.50 |
| Mean aerodynamic chord (m.a.c.) | 1.05 | 1.06 | 1.25 | 1.06 | 0.83 | 1.05 |
| Dihedral | 1.5 | 1.0 | 0 | 1.0 | 2.5 | 1.5 |
| Sweep | 0 | 0 | 0 | 0 | 0 | 0 |
| Aero. twist root/tip | 1.7 | 3.0 | 3.0 | 3.0 | 3.5 | 3.5 |
| Wing section (root) | G6 535 | G6 535 | G6 549 | G6 535 | Mü-Profil | G6 535 |

**Ailerons**

| Type | plain | plain | plain | plain | plain |
| Area | 2.14 | 2.06 | 3.54 | 2.06 | 1.8 | 2.14 |

**Horizontal tail**

| Area of elevator and fixed tail | 2.32 | 2.16 | 3.03 | 2.16 | 1.18 | 2.32 |
| Area of elevator | 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 | 0.84 | 1.10 | 1.37 | 1.10 | 0.80 | 1.06 |
| Area of rudder | 0.76 | 0.89 | 1.05 | 0.89 | 0.50 | 0.86 |
| Aerofoil section | symmetrical | symmetrical | symmetrical | symmetrical | symmetrical | symmetrical |

**Fuselage**

<p>| Max. width | 0.55 | 0.65 | 0.60 | 0.58 | 0.52 |
| Overall length | 6.09 | 6.35 | 8.61 | 6.4 | 6.00 | 6.09 |
| Max. cross section | 0.47 | 0.69 | 0.68 | 0.52 | 0.45 |
| Number seats and arrangement | 1 | 1 | 2 | 2 | 1 | 1 |
| Undercarriage type | skid | fixed wheel | fixed wheel | fixed wheel | skid | fixed wheel |</p>
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Grunau Baby IIb</th>
<th>Grunau Baby III</th>
<th>ES 49 V.3</th>
<th>Grunau Baby V</th>
<th>Scheibe Spats-B</th>
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<td><strong>Lift increasing devices</strong></td>
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<td>260</td>
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<td>55</td>
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East Germany - Deutsche Demokratische Republik -
Allemagne de l’Est

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

Lom 55/1 Libelle

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

Lom 55/1 Libelle

Einsitziges Hochleistungsflugzeug in Holzkonstruktion.

Lom 55/1 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


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 contre-plaqué.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Lom 55/1 Libelle</th>
<th>FES 530 Lehrmeister</th>
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<tbody>
<tr>
<td>Designers</td>
<td>Heinz Roessing</td>
<td>Wilhelm Zimmermann</td>
</tr>
<tr>
<td></td>
<td>Prof. Landmann</td>
<td>Hans Wegerich</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hans Hartung</td>
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<td>Date of first flight of prototype</td>
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**Wings**

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<td>Gö 549</td>
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<td>Wing section, tip</td>
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**Ailerons**

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<tr>
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<tr>
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<td>Max. deflection up</td>
<td>25</td>
<td>30</td>
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<tr>
<td>Max. deflection down</td>
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**Horizontal tail**

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<td>Area of elevator</td>
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<td>19.5</td>
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<td>3.89</td>
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**Vertical tail**

<table>
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<td>Mass balance degree</td>
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<td>Aerodynamic balance</td>
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<td>none</td>
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<td>Type designation</td>
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<td>FES 530 Lehrmeister</td>
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<td>------------------</td>
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<tr>
<td><strong>Fuselage</strong></td>
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<td>Max. width</td>
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<td>0.82 m</td>
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<td>Max. load</td>
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<td>Max. permissible flying weight</td>
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<td><strong>Limiting flight conditions</strong></td>
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Great Britain — Großbritannien — Grande-Bretagne

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

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 Flügeltritts- 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 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. À 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'aile 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.

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<th>Olympia Eon Mark 2</th>
<th>Olympia Eon Mark 4/15</th>
<th>Olympia Eon Mark 4/19</th>
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<td></td>
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<td>April 1958</td>
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<table>
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<th>Type designation</th>
<th>Olympia Eon Mark 2</th>
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<th>Olympia Eon Mark 4/19</th>
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<td>64₄ 618</td>
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<td><strong>Fuselage</strong></td>
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<td>Max. width ............ m</td>
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<td>0.61</td>
<td>0.61</td>
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<td>skid, droppable wheels</td>
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<td><strong>Lift increasing devices</strong></td>
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<td>Location, % of chord ...</td>
<td>37</td>
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<td>yes</td>
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<tr>
<td><strong>Weights</strong></td>
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<td>226</td>
<td>272</td>
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<td>Max. load ............. kg</td>
<td>109</td>
<td>114</td>
<td>113</td>
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<tr>
<td>Max. permissible flying weight .......... kg</td>
<td>304</td>
<td>340</td>
<td>385</td>
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<tr>
<td>Wing loading .......... kg/m²</td>
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<td>22.6</td>
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<td><strong>Design standards</strong></td>
<td></td>
<td></td>
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<tr>
<td>Airworthiness require- ments to which aircraft has been built ..........</td>
<td>BCAR</td>
<td>BCAR</td>
<td>BCAR</td>
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<tr>
<td>Date of issue of these requirements ...........</td>
<td>1948</td>
<td>1958</td>
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<td>Manoeuvre loads</td>
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<td>Point C ................</td>
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<td>Point D ................</td>
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<td>-2.5</td>
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### Limiting flight conditions

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<th>Winch launching speed</th>
<th>Cloud flying permitted</th>
<th>Permitted aerobatic manoeuvres</th>
<th>Spinning permitted</th>
<th>Foremost and aftmost e.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.</th>
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<tbody>
<tr>
<td>smooth conditions km/h</td>
<td>conditions km/h</td>
<td>km/h</td>
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<td>loop, stall turns</td>
<td>yes</td>
<td>30% and 40%</td>
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<tr>
<td>208</td>
<td>128</td>
<td>100</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>224</td>
<td>137</td>
<td>120</td>
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<td>yes</td>
<td>yes</td>
<td>30% and 40%</td>
</tr>
<tr>
<td>224</td>
<td>127</td>
<td>120</td>
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<td>yes</td>
<td>30% and 40%</td>
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### Straight flight performance

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<th>at flying weight of kg</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
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<td>304</td>
<td>63</td>
<td>0.67</td>
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<td>0.56</td>
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<td>340</td>
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<td>0.73</td>
<td>86.0</td>
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<td>83.5</td>
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<tr>
<td>385</td>
<td>100</td>
<td>1.00</td>
<td>100</td>
<td>0.93</td>
<td>100</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>1.63</td>
<td>120</td>
<td>1.57</td>
<td>120</td>
<td>1.57</td>
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<tr>
<td></td>
<td>140</td>
<td>2.35</td>
<td>140</td>
<td>2.25</td>
<td>140</td>
<td>2.25</td>
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### No flap or brake

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<tr>
<th>V for min. sink km/h</th>
<th>V for max. L/D km/h</th>
<th>Stalling speed km/h</th>
<th>Max. L/D</th>
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<tr>
<td>63</td>
<td>72.5</td>
<td>50</td>
<td>56</td>
</tr>
<tr>
<td>0.67</td>
<td>0.73</td>
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<td>~33</td>
</tr>
<tr>
<td>81.5</td>
<td>1.00</td>
<td>60</td>
<td>56</td>
</tr>
<tr>
<td>0.70</td>
<td>1.63</td>
<td>~33</td>
<td>~38</td>
</tr>
<tr>
<td>86</td>
<td>2.35</td>
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<tr>
<td>0.73</td>
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<tr>
<td>100</td>
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<td>120</td>
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<td>1.63</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>140</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.35</td>
<td></td>
<td></td>
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</tbody>
</table>
Skylark 2

The Skylark 2 is a medium high performance single seat sailplane intended for private owner or club use. It is highly manœuvreable 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 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**


**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.

**Skylark 3B**


**Slingsby 21B**

**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**


**Tandem Tutor**

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

**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**


**Eagle 3**

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Skylark 2</th>
<th>Skylark 3B</th>
<th>Slingsby T-21B</th>
<th>Tandem Tutor T-31</th>
<th>Eagle 3 T-42</th>
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<td>Slingsby Sailplanes Ltd.</td>
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<td></td>
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<td>Number produced ..</td>
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<td>157</td>
<td>139</td>
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<td>m</td>
<td>m</td>
<td>m</td>
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<tr>
<td>Area .............</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
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</tr>
<tr>
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<td></td>
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</tr>
<tr>
<td>Wing root chord</td>
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<td>m</td>
<td>m</td>
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<tr>
<td>Wing tip chord</td>
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<td>m</td>
<td>m</td>
<td>m</td>
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<tr>
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<td>m</td>
<td>m</td>
<td>m</td>
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<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
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<tr>
<td>Wing section, tip</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
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<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
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<td>1/4 chord sweep</td>
<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
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<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
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<tr>
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<td>Plain</td>
<td>Plain</td>
<td>Plain</td>
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<td>Span (total)</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
</tr>
<tr>
<td>Area (total)</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
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<tr>
<td>Mean chord</td>
<td>m</td>
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<td>m</td>
<td>m</td>
<td>m</td>
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<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
<td>deg.</td>
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</tr>
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<td>none</td>
<td>internal weight</td>
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<tr>
<td>Horizontal tail</td>
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<td></td>
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<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
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<tr>
<td>Area of elevator and fixed tail</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
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</tr>
<tr>
<td>Mass balance method</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Tail arm (from 1/4 chord m.a.c. wing to 1/4 chord m.a.c. tail)</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>m</td>
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111
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<th>Type designation</th>
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<th>Skylark 3B</th>
<th>Slingsby T-21B</th>
<th>Tandem Tutor T-31</th>
<th>Eagle 3 T-42</th>
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<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
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<td>none</td>
<td>control-</td>
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<td>0.362</td>
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<td>1.55</td>
<td>0.89</td>
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<td>0.89</td>
<td>1.20</td>
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<td>1.32</td>
<td>1.58</td>
<td>1.27</td>
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<td>4.40</td>
<td>5.55</td>
<td>3.96</td>
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<td>25</td>
<td>24.5</td>
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<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
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<td>NIL</td>
<td>Horn</td>
<td>Horn</td>
<td>NIL</td>
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<td>Special features</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

**Vertical tail**

| Area of fin and rudder         | m²        | 1.38       | 1.87           | 1.55              | 0.89         |
| Area of rudder                 | m²        | 0.70       | 0.89           | 1.20              | 0.70         |
| Aspect ratio                   |           | 1.34       | 1.32           | 1.58              | 1.27         |
| Tail arm                       | m         | 4.45       | 4.40           | 5.55              | 3.96         |
| Max. deflection                | deg.      | 25         | 25             | 24.5              | 21.8         |
| Mass balance degree            |           | NIL        | NIL            | NIL               | NIL          |
| Mass balance type              |           | —          | —              | —                 | —            |
| Aerodynamic balance            | NIL       | NIL        | Horn           | Horn              | NIL          |
| Special features               |           |            |                |                   |              |

**Fuselage**

| Max. width                     | m         | 0.62       | 0.62           | 1.12              | 0.65         |
| Overall length                 | m         | 7.31       | 7.62           | 8.16              | 7.1          |
| Max. cross section             | m²        | 0.44       | 0.44           | not               | not          |
| Wetted surface area            | m²        | not        | 11.4           | 12.3              | available    |
| Number seats and arrange-     |           | 1          | 1              | 2                 | 2           |
| ment                          |           |            | 2              | tandem            | 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           |
| Special features               |           |            |                |                   |              |

**Lift increasing devices**

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<tr>
<th>Type</th>
<th>DFS type airbrakes</th>
<th>DFS type airbrakes</th>
<th>spoilers</th>
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<th>DFS type airbrakes</th>
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</thead>
<tbody>
<tr>
<td>Span (one surface)</td>
<td>m</td>
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<td>1.16</td>
<td>0.90</td>
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</tr>
<tr>
<td>Area (total)</td>
<td>m²</td>
<td>0.387</td>
<td>0.437</td>
<td>0.247</td>
<td>—</td>
</tr>
<tr>
<td>% of span</td>
<td></td>
<td>13.8</td>
<td>12.8</td>
<td>10.9</td>
<td>—</td>
</tr>
<tr>
<td>Location, % of chord</td>
<td></td>
<td>44</td>
<td>50</td>
<td>38.6</td>
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**Drag producing devices**

<table>
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<tr>
<th>Type</th>
<th>DFS type airbrakes</th>
<th>DFS type airbrakes</th>
<th>spoilers</th>
<th>none</th>
<th>DFS type airbrakes</th>
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<tbody>
<tr>
<td>Span (one surface)</td>
<td>m</td>
<td>1.01</td>
<td>1.16</td>
<td>0.90</td>
<td>—</td>
</tr>
<tr>
<td>Area (total)</td>
<td>m²</td>
<td>0.387</td>
<td>0.437</td>
<td>0.247</td>
<td>—</td>
</tr>
<tr>
<td>% of span</td>
<td></td>
<td>13.8</td>
<td>12.8</td>
<td>10.9</td>
<td>—</td>
</tr>
<tr>
<td>Location, % of chord</td>
<td></td>
<td>44</td>
<td>50</td>
<td>38.6</td>
<td>—</td>
</tr>
<tr>
<td>Type designation</td>
<td>Skylark 2</td>
<td>Skylark 3B</td>
<td>Slingsby T-21B</td>
<td>Tandem Tutor T-31</td>
<td>Eagle 3 T-42</td>
</tr>
<tr>
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<td>----------</td>
<td>-----------</td>
<td>----------------</td>
<td>------------------</td>
<td>-------------</td>
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<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. yes/no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>—</td>
<td>yes</td>
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<td><strong>Weights</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Wings$^1$ kg</td>
<td>123</td>
<td>160</td>
<td>142</td>
<td>89</td>
<td>216</td>
</tr>
<tr>
<td>Fuselage$^2$ kg</td>
<td>76</td>
<td>82</td>
<td>113</td>
<td>79</td>
<td>138</td>
</tr>
<tr>
<td>Tailplane and elevator kg</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>8</td>
<td>18</td>
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<tr>
<td>Empty weight$^3$ kg</td>
<td>209</td>
<td>253</td>
<td>267</td>
<td>176</td>
<td>372</td>
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<tr>
<td>Instruments kg</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Other equipment (e.g. oxygen, radio) kg</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Equipped weight kg</td>
<td>212</td>
<td>256</td>
<td>270</td>
<td>179</td>
<td>378</td>
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<tr>
<td>Max. load kg</td>
<td>96</td>
<td>102</td>
<td>205</td>
<td>197</td>
<td>184</td>
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<tr>
<td>Max. permissible flying weight kg</td>
<td>308</td>
<td>358</td>
<td>475</td>
<td>376</td>
<td>562</td>
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<tr>
<td>Wing loading kg/m²</td>
<td>23.0</td>
<td>22.2</td>
<td>19.6</td>
<td>23.8</td>
<td>26.4</td>
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<td><strong>Design standards</strong></td>
<td></td>
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<td>B.C.A.R. semi aerobatic category</td>
<td>B.C.A.R. semi aerobatic category</td>
<td>B.C.A.R. semi aerobatic category</td>
<td>B.C.A.R. semi aerobatic category</td>
<td>B.C.A.R. semi aerobatic category</td>
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<td>Date of issue of these requirements</td>
<td>1948</td>
<td>1957</td>
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<td>1948</td>
<td>1957</td>
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<td>Certificate of Airworthiness yes/no</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
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<td><strong>Design flight envelope</strong></td>
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<tr>
<td><strong>Manoeuvre loads</strong></td>
<td>V km/h</td>
<td>ULF</td>
<td>V km/h</td>
<td>ULF</td>
<td>V km/h</td>
</tr>
<tr>
<td>Point A</td>
<td>132</td>
<td>7.5</td>
<td>131</td>
<td>7.5</td>
<td>116</td>
</tr>
<tr>
<td>Point B</td>
<td>242</td>
<td>6.0</td>
<td>222</td>
<td>6.0</td>
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<td>Point C</td>
<td>242</td>
<td>0</td>
<td>222</td>
<td>0</td>
<td>233</td>
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<td>Point D</td>
<td>122</td>
<td>-3.8</td>
<td>120</td>
<td>-3.8</td>
<td>114</td>
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<tr>
<td><strong>Gust conditions (gradual gust)</strong></td>
<td>V km/h</td>
<td>v m/s</td>
<td>V km/h</td>
<td>v m/s</td>
<td>V km/h</td>
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<tr>
<td>Upgust</td>
<td>148</td>
<td>20</td>
<td>131</td>
<td>20</td>
<td>130</td>
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<tr>
<td>Downgust</td>
<td>148</td>
<td>20</td>
<td>131</td>
<td>20</td>
<td>130</td>
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<td><strong>Limiting flight conditions</strong></td>
<td>EAS</td>
<td>EAS</td>
<td>IAS</td>
<td>IAS</td>
<td>EAS</td>
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<tr>
<td>Placard airspeed smooth conditions km/h</td>
<td>215</td>
<td>216</td>
<td>170</td>
<td>130</td>
<td>237</td>
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<tr>
<td>Placard airspeed gusty conditions km/h</td>
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<td>131</td>
<td>not applicable</td>
<td>not applicable</td>
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<td>Type designation</td>
<td>Skylark 2</td>
<td>Skylark 3B</td>
<td>Slingsby T-21B</td>
<td>Tandem Tutor T-31</td>
<td>Eagle 3 T-42</td>
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<td>-----------</td>
<td>------------</td>
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<td>-------------------</td>
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<tr>
<td>Aero-towing speed .................... km/h</td>
<td>132</td>
<td>131</td>
<td>120</td>
<td>96</td>
<td>134</td>
</tr>
<tr>
<td>Winch launching speed ................ km/h</td>
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<td>131</td>
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<td>134</td>
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<td>Cloud flying permitted</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
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<tr>
<td>Permitted aerobatic manoeuvres .......</td>
<td>loop</td>
<td>loop</td>
<td>loop</td>
<td>none</td>
<td>loop</td>
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<td>Spinning permitted yes/no</td>
<td>yes</td>
<td>yes</td>
<td>stall turn</td>
<td>no</td>
<td>stall turn</td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c. ...............</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
<td>not available</td>
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<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting) . . km/h</td>
<td>215</td>
<td>216</td>
<td>—</td>
<td>—</td>
<td>237</td>
</tr>
<tr>
<td>Straight flight performance</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>at flying weight of ............ kg</td>
<td>308</td>
<td>359</td>
<td>475</td>
<td>376</td>
<td>544</td>
</tr>
<tr>
<td>No flap or brake</td>
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</table>

<table>
<thead>
<tr>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
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<tbody>
<tr>
<td>V for min. sink ....................</td>
<td>71</td>
<td>0.67</td>
<td>70</td>
<td>0.55</td>
<td>62</td>
<td>0.85</td>
<td>67</td>
<td>1.05</td>
<td>71</td>
</tr>
<tr>
<td>V for max. L/D .....................</td>
<td>78</td>
<td>0.72</td>
<td>76</td>
<td>0.59</td>
<td>69</td>
<td>0.91</td>
<td>73</td>
<td>1.10</td>
<td>83</td>
</tr>
<tr>
<td>V stall turn</td>
<td>133</td>
<td>2.0</td>
<td>141</td>
<td>2.0</td>
<td>102</td>
<td>2.0</td>
<td>102</td>
<td>2.0</td>
<td>140</td>
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<tr>
<td>Stalling speed ..................... km/h</td>
<td>59</td>
<td>58</td>
<td>52</td>
<td>61</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. L/D ...........................</td>
<td>30</td>
<td>36</td>
<td>21</td>
<td>18.5</td>
<td>31.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 with struts, controls, flaps and brakes
2 complete with rudder and fin, less instruments and equipment
3 to include any fixed ballast
**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 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**

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-plaqués 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 cleanliness 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


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 lesconcours 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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Slingsby Prefect</th>
<th>Slingsby Sky</th>
<th>Slingsby Swallow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer(s)</td>
<td>Slingsby Sailplanes Ltd.</td>
<td></td>
<td></td>
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<tr>
<td>Date of first flight of prototype</td>
<td>June 1948</td>
<td>September 1950</td>
<td>October 1957</td>
</tr>
<tr>
<td>Number produced</td>
<td>43</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td><strong>Wings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span ............ m</td>
<td>13.72</td>
<td>18.0</td>
<td>11.83</td>
</tr>
<tr>
<td>Area ............ m²</td>
<td>14.25</td>
<td>17.37</td>
<td>12.88</td>
</tr>
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<td>Aspect ratio ......</td>
<td>13.2</td>
<td>18.7</td>
<td>10.9</td>
</tr>
<tr>
<td>Wing root chord ... m</td>
<td>1.18</td>
<td>1.20</td>
<td>1.52</td>
</tr>
<tr>
<td>Wing tip chord ..... m</td>
<td>.62</td>
<td>.61</td>
<td>.61</td>
</tr>
<tr>
<td>Standard mean chord ... m</td>
<td>1.04</td>
<td>.96</td>
<td>1.09</td>
</tr>
<tr>
<td>Wing section, root ...</td>
<td>Gö 535</td>
<td>Gö 547</td>
<td>NACA 633618</td>
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<td>Wing section, tip ...</td>
<td>symmetrical</td>
<td>NACA 2R, 12</td>
<td>NACA 4412</td>
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<td>Dihedral ........... deg.</td>
<td>2.0</td>
<td>2.0</td>
<td>3.3</td>
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<tr>
<td>¼ chord sweepback .... deg.</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
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<td>Aero. twist root/tip .... deg.</td>
<td>7.0</td>
<td>5.0</td>
<td>3.04</td>
</tr>
<tr>
<td>Length of each section of wing ........ m</td>
<td>6.70</td>
<td>9.02</td>
<td>5.94</td>
</tr>
<tr>
<td><strong>Ailerons</strong></td>
<td></td>
<td></td>
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<tr>
<td>Type ............</td>
<td>plain</td>
<td>plain</td>
<td>plain</td>
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<tr>
<td>Span (total) .... m</td>
<td>7.01</td>
<td>5.87</td>
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<tr>
<td>Area (total) .... m²</td>
<td>2.04</td>
<td>2.90</td>
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<tr>
<td>Mean chord .... m</td>
<td>.291</td>
<td>.250</td>
<td>.250</td>
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<tr>
<td>Max. deflection up .... deg.</td>
<td>22.9</td>
<td>27.8</td>
<td>24.4</td>
</tr>
<tr>
<td>Max. deflection down .... deg.</td>
<td>11.7</td>
<td>13.9</td>
<td>12.0</td>
</tr>
<tr>
<td>Mass balance degree ...... nil</td>
<td>nil</td>
<td>nil</td>
<td></td>
</tr>
<tr>
<td>Mass balance method ...... none</td>
<td>none</td>
<td>none</td>
<td></td>
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<tr>
<td>Special features ......</td>
<td>2 ailerons p. wing</td>
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<tr>
<td><strong>Horizontal tail</strong></td>
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<td></td>
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<td>Span ............ m</td>
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<td>Area of elevator and fixed tail ........ m²</td>
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<td>2.01</td>
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<td>.86</td>
<td>1.00</td>
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<td>26.8</td>
<td>23.9</td>
<td>22.2</td>
</tr>
<tr>
<td>Max. deflection down .... deg.</td>
<td>22.0</td>
<td>23.9</td>
<td>22.2</td>
</tr>
<tr>
<td>Aerofoil section .... symmetrical</td>
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<td></td>
</tr>
<tr>
<td>Mass balance degree ...... nil</td>
<td>nil</td>
<td>nil</td>
<td></td>
</tr>
<tr>
<td>Mass balance method ...... none</td>
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<td>none</td>
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<tr>
<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail) ........ m</td>
<td>3.51</td>
<td>4.27</td>
<td>3.69</td>
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<tr>
<td>Elevator aerodynamic balance method ...... nil</td>
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<td></td>
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<tr>
<td>Type designation</td>
<td>Slingsby Prefect</td>
<td>Slingsby Sky</td>
<td>Slingsby Swallow</td>
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<tr>
<td>-------------------------------------------------------</td>
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<td>--------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Elevator trimming method</td>
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<td>controllable tab</td>
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<tr>
<td>Horizontal tail volume</td>
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<td>.567</td>
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<td><strong>Vertical tail</strong></td>
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<td>Area of fin and rudder ... m²</td>
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<tr>
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<td>.70</td>
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<td>Tail arm ................................................. m</td>
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<td>4.01</td>
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<tr>
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<td><strong>Fuselage</strong></td>
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<td>Max. width .............................................. m</td>
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<tr>
<td>Overall length ........................................ m</td>
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<td>7.65</td>
<td>7.04</td>
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**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**


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-plaquée. Bien que le poste de pilotage soit ouvert, il est recouvert partiellement, de sorte que la résistance est minime.
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.

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.
**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.

---

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<thead>
<tr>
<th>Type designation</th>
<th>Kite 1</th>
<th>Tutor</th>
<th>Gull 1</th>
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**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-mono-coque type of structure.

**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-plaque de sapin rouge et de bouleau. Le contre-plaque de la face supérieure de l'aile devant le longeron a sa veineur 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

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.

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 height" 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.
turbée, on a employé du contre-plaqués 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Gull 2</th>
<th>Kite 2</th>
<th>Gull 4</th>
<th>Skylark 1</th>
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<tbody>
<tr>
<td>Date of first flight of prototype</td>
<td>1939</td>
<td>June 1956</td>
<td>Feb. 1948</td>
<td>March 1953</td>
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**Wings**

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**Ailerons**

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<td>Area (total)</td>
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**Horizontal tail**

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<td>Area of elevator and fixed tail</td>
<td>2.52</td>
<td>2.19</td>
<td>1.94</td>
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<td>Area of elevator</td>
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<td>Aerofoil section</td>
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**Vertical tail**

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<td>Area of fin and rudder</td>
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<td>Area of rudder</td>
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**Fuselage**

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<td>Undercarriage type</td>
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<th>Kite 2</th>
<th>Gull 4</th>
<th>Skylark 1</th>
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</tbody>
</table>
Hungary – Ungarn – Hongrie

Manufacturer:
Alagú Központi Kisérleti Üzem
Dunakeszi, Hungary

A-08 Sírály

The A-08 Sírály 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.

Győr 2

The Győr 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.
**Gyor 2**


**Gyor 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:**  
Sportárutermelő 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**


**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 Gebics

Monoplace d'école tout métal de construction très moderne. Fabricué 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 ascancements. 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 Gebics, having the same fuselage but a greater span laminar-flow wing with high aspect ratio. It is highly manoeuvrable yet retains good inherent stability. It meets the requirements of the Standard Class sailplane. Both have V-tails, fuselage airbrakes and retractable wheels.

R-23 Gebics


R-24 Bibic

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

**R-24 Bibic**


**Manufacturer:**

OMRE Központi Javító Műhely
Mátyásfold, 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**

<table>
<thead>
<tr>
<th>Type designation</th>
<th>A-08 Sirly</th>
<th>Győr 2</th>
<th>R-22 Super</th>
<th>R-23 Gebies</th>
<th>R-24 Bibic</th>
<th>M-30 Fergeteg</th>
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</thead>
<tbody>
<tr>
<td>Designer (s) ...........</td>
<td>F. Zsebő</td>
<td>A. Lam-pich</td>
<td>E. Rubik</td>
<td>E. Rubik</td>
<td>E. Rubik</td>
<td>L. Benícky</td>
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<tr>
<td>Date of first flight of prototype</td>
<td>1956</td>
<td>1951</td>
<td>1957</td>
<td>1957</td>
<td>1958</td>
<td>1950 (designed 1942-44)</td>
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**Wings**

<table>
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<tr>
<th></th>
<th>Span</th>
<th>Area</th>
<th>Aspect ratio</th>
<th>Wing root chord</th>
<th>Wing tip chord</th>
<th>Mean aerodynamic chord (m.a.c.)</th>
<th>Wing section, root</th>
<th>Wing section, mid</th>
<th>Wing section, tip</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>m</td>
<td>m²</td>
<td></td>
<td>m</td>
<td>m</td>
<td>m</td>
<td>NACA 64(3)-618 mod</td>
<td>NACA 64(3)-618 mod</td>
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<tr>
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<td>17.6</td>
<td>17.00</td>
<td>15.70</td>
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<td>NACA 23012</td>
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<td>Győr 2</td>
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<td>1.00</td>
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<td>NACA 23012</td>
<td>NACA 23012</td>
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<tr>
<td>R-22</td>
<td>19.6</td>
<td>22.3</td>
<td>18.55</td>
<td>13.00</td>
<td>18.00</td>
<td>17.1</td>
<td>NACA 549 mod</td>
<td>NACA 549 mod</td>
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<td>R-23</td>
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<td>1.05</td>
<td>1.138</td>
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<td>0.82</td>
<td>1.4</td>
<td>NACA 64(3)-618 mod</td>
<td>NACA 64(3)-618 mod</td>
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<td>R-24</td>
<td>0.48</td>
<td>0.45</td>
<td>0.3</td>
<td>1.00</td>
<td>0.72</td>
<td>0.5</td>
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<td>NACA 23012</td>
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<td>M-30</td>
<td>0.92</td>
<td>0.76</td>
<td>0.93</td>
<td>1.00</td>
<td>0.82</td>
<td>1.05</td>
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**Ailerons**

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<th>Type</th>
<th>Frise</th>
<th>Junkers</th>
<th>Frise</th>
<th>special slotted Frise</th>
<th>special slotted Frise</th>
<th>plain</th>
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<td>Span</td>
<td>4.0</td>
<td>3.9</td>
<td>3.45</td>
<td>3.20</td>
<td>1.82</td>
<td>6.1</td>
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<tr>
<td>Area</td>
<td>0.72</td>
<td>0.78</td>
<td>0.725</td>
<td>1.02</td>
<td>0.58</td>
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<td>Mean chord</td>
<td>0.18</td>
<td>0.2</td>
<td>0.21</td>
<td>0.32</td>
<td>0.32</td>
<td>0.35</td>
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<tr>
<td>Max deflection up</td>
<td>30</td>
<td>—</td>
<td>18</td>
<td>28</td>
<td>33</td>
<td>35</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>20</td>
<td>—</td>
<td>12</td>
<td>14</td>
<td>22</td>
<td>15</td>
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<tr>
<td>Mass balance degree</td>
<td>100%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>NIL</td>
<td>NIL</td>
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<tr>
<td>Mass balance method</td>
<td>along nose</td>
<td>along nose</td>
<td>along nose</td>
<td>along nose</td>
<td>NIL</td>
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**Horizontal tail**

<table>
<thead>
<tr>
<th>Span</th>
<th>2.9</th>
<th>2.8</th>
<th>2.7</th>
<th>2.5 (projected)</th>
<th>2.5 (projected)</th>
<th>2.45</th>
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<tbody>
<tr>
<td>Area of elevator and fixed tail</td>
<td>1.75</td>
<td>1.31</td>
<td>1.81</td>
<td>2.6</td>
<td>2.6</td>
<td>1.47</td>
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<tr>
<td>Area of elevator</td>
<td>0.80</td>
<td>0.75</td>
<td>0.74</td>
<td>1.15</td>
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<td>0.82</td>
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<td>Max. deflection up</td>
<td>30</td>
<td>—</td>
<td>20</td>
<td>35</td>
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<td>Type designation</td>
<td>A-08 Sirfly</td>
<td>Györ 2</td>
<td>R-22 S Super Futár</td>
<td>R-23 Gébic</td>
<td>R-24 Bibic</td>
<td>M-30 Fergeteg</td>
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<tr>
<td>Max. deflection down ... deg.</td>
<td>25</td>
<td>—</td>
<td>22</td>
<td>35</td>
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<td>30</td>
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<tr>
<td>Aerofoil section ........</td>
<td>NACA</td>
<td>symm.</td>
<td>NACA</td>
<td>9%</td>
<td>9%</td>
<td>NACA</td>
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<tr>
<td>Mass balance degree ....</td>
<td>100%</td>
<td>NIL</td>
<td>NIL</td>
<td>75%</td>
<td>75%</td>
<td>NIL</td>
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<tr>
<td>Tail arm (from 1/4 chord m.a.c. wing to 1/4 chord m.a.c. tail) ........ m</td>
<td>4.00</td>
<td>4.35</td>
<td>3.64</td>
<td>4.80</td>
<td>4.80</td>
<td>3.95</td>
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<td>Elevator aerodynamic balance method ........</td>
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<td>NIL</td>
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<td>Elevator trimming method ..........</td>
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<td>tab</td>
<td>tab</td>
<td>spring-trim</td>
<td>spring-trim</td>
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<td>Horizontal tail volume coefficient ........</td>
<td>0.47</td>
<td>1.12</td>
<td>0.52</td>
<td>90º</td>
<td>90º</td>
<td>0.48</td>
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<tr>
<td>Special features ........</td>
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<tr>
<td><strong>Vertical tail</strong></td>
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<tr>
<td>Area of fin and rudder . m²</td>
<td>1.73</td>
<td>0.81</td>
<td>1.52</td>
<td>V-tail</td>
<td>V-tail</td>
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<tr>
<td>Area of rudder .......... m²</td>
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<td>0.35</td>
<td>0.77</td>
<td>V-tail</td>
<td>V-tail</td>
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<td>2.48</td>
<td>1.42</td>
<td>V-tail</td>
<td>V-tail</td>
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<td>Tail arm ............. m</td>
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<td>4</td>
<td>3.92</td>
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<td>—</td>
<td>25</td>
<td>V-tail</td>
<td>V-tail</td>
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<td>symm.</td>
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<td>0009</td>
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<td>NIL</td>
<td>NIL</td>
<td>V-tail</td>
<td>V-tail</td>
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<td>Aerodynamic balance ..........</td>
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<td>0.64</td>
<td>0.65</td>
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<td>Overall length .......... m</td>
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<td>6.81</td>
<td>6.48</td>
<td>7.50</td>
<td>7.50</td>
<td>7.95</td>
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<td>0.61</td>
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<td>1 retr. skid and wheel</td>
<td>1 skid and retract. or fixed wheel</td>
<td>1 retractable wheel</td>
<td>1 retractable wheel</td>
<td>2 skid and retractable wheel</td>
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<td>26</td>
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<td>Airworthiness requirements to which aircraft has been built ..........</td>
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<td>BVS</td>
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<td>R-23 Gébies</td>
<td>R-24 Bibic</td>
<td>M-30 Fergeteg</td>
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<td>138 -2.25</td>
<td>131</td>
<td>-2</td>
<td>115 -2</td>
<td>117 -2</td>
<td>156 -2</td>
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<td>V km/h</td>
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<td>140 ±10</td>
<td>120 ±10</td>
<td>130 ±10</td>
<td>147 ±10</td>
<td>151 ±10</td>
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<td>m/s</td>
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<td>260</td>
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<td>Placard airspeed gusty conditions km/h</td>
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<td>140</td>
<td>120</td>
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<td>150</td>
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<tr>
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<td>140</td>
<td>120</td>
<td>130</td>
<td>147</td>
<td>150</td>
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<tr>
<td>Winch launching speed km/h</td>
<td></td>
<td>120</td>
<td>110</td>
<td>110</td>
<td>100</td>
<td>100</td>
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<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Permitted aerobatic manouevres</td>
<td>loops, spins, stall turns</td>
<td>none</td>
<td>loops, spins, stall turns</td>
<td>all</td>
<td>none</td>
<td></td>
</tr>
<tr>
<td>Spinning permitted yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.</td>
<td>28-36</td>
<td>32.5-39</td>
<td>29-35</td>
<td>29-35</td>
<td>31-36</td>
<td>2x2.5</td>
</tr>
<tr>
<td>Lift increasing devices</td>
<td>NIL</td>
<td>Junkers flap</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>2x0.875</td>
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<tr>
<td>Type</td>
<td>DFS</td>
<td>DFS</td>
<td>DFS</td>
<td>Fuselage airbrakes</td>
<td>Fuselage airbrakes</td>
<td>DFS</td>
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<tr>
<td>Span m</td>
<td>2x1.37</td>
<td>2x1.0</td>
<td>2x0.87</td>
<td>—</td>
<td>—</td>
<td>2x1.2</td>
</tr>
<tr>
<td>Area m²</td>
<td>4x0.18</td>
<td>4x0.11</td>
<td>4x0.122</td>
<td>0.6</td>
<td>0.6</td>
<td>4x0.11</td>
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<td>Győr 2</td>
<td>R-22 S</td>
<td>R-23</td>
<td>R-24</td>
<td>M-30</td>
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<tr>
<td></td>
<td>Sirdy</td>
<td>Super</td>
<td>Futár</td>
<td>Géhcs</td>
<td>Bibic</td>
<td>Fergeteg</td>
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<tr>
<td>% of span</td>
<td>15.5</td>
<td>11.8</td>
<td>11.3</td>
<td>—</td>
<td>—</td>
<td>13.3</td>
</tr>
<tr>
<td>Location, % of chord</td>
<td>47</td>
<td>35</td>
<td>42</td>
<td>—</td>
<td>—</td>
<td>50</td>
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<tr>
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<td>—</td>
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*Weights*

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<tr>
<th>Wings kg</th>
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<th>140</th>
<th>120</th>
<th>84</th>
<th>90</th>
<th>186</th>
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<tr>
<td>Fuselage kg</td>
<td>105</td>
<td>67</td>
<td>74</td>
<td>65</td>
<td>65</td>
<td>134</td>
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<td>Tailplane and elevator kg</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>10</td>
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<tr>
<td>Empty weight kg</td>
<td>295</td>
<td>215</td>
<td>230</td>
<td>158</td>
<td>164</td>
<td>330</td>
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<tr>
<td>Instruments kg</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>—</td>
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<tr>
<td>Other equipment(e.g. oxygen, radio) kg</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Equipped weight kg</td>
<td>310</td>
<td>228</td>
<td>240</td>
<td>169</td>
<td>174</td>
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<tr>
<td>Removable ballast kg</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>Max. load kg</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>95</td>
<td>95</td>
<td>170</td>
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<tr>
<td>Max. permissible flying weight kg</td>
<td>410</td>
<td>328</td>
<td>340</td>
<td>264</td>
<td>270</td>
<td>500</td>
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<td>Wing loading kg/m²</td>
<td>25.3</td>
<td>25.2</td>
<td>25.2</td>
<td>20</td>
<td>22</td>
<td>21.9/26.4</td>
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Terminal velocity with brakes opened at max. all up weight from flight tests km/h

<table>
<thead>
<tr>
<th></th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of span</td>
<td>15.5</td>
<td>11.8</td>
<td>11.3</td>
<td>—</td>
<td>—</td>
<td>13.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location, % of chord</td>
<td>47</td>
<td>35</td>
<td>42</td>
<td>—</td>
<td>—</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity to max. permissible I.A.S.</td>
<td>yes</td>
<td>—</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Straight flight performance*

at flying weight of kg

|                | 410   | 328   | 312   | 264   | 270   | 500   |

*No flap or brake*

<table>
<thead>
<tr>
<th></th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>70</td>
<td>0.60</td>
<td>0.58</td>
<td>65</td>
<td>0.62</td>
<td>0.68</td>
<td>0.85</td>
<td>0.85</td>
<td>0.65</td>
<td>0.65</td>
<td>0.79</td>
<td>0.79</td>
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<tr>
<td>V for max. L/D</td>
<td>80</td>
<td>0.65</td>
<td>0.7</td>
<td>69</td>
<td>0.63</td>
<td>0.73</td>
<td>0.9</td>
<td>0.75</td>
<td>0.75</td>
<td>0.94</td>
<td>0.83</td>
<td>0.83</td>
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<tr>
<td>1.5×V stall</td>
<td>93</td>
<td>0.95</td>
<td>105</td>
<td>0.91</td>
<td>92</td>
<td>1.0</td>
<td>0.78</td>
<td>0.84</td>
<td>0.98</td>
<td>0.84</td>
<td>0.98</td>
<td>0.86</td>
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<tr>
<td>1.75×V stall</td>
<td>105</td>
<td>1.05</td>
<td>120</td>
<td>1.31</td>
<td>102</td>
<td>1.40</td>
<td>0.88</td>
<td>1.50</td>
<td>0.98</td>
<td>1.10</td>
<td>1.14</td>
<td>1.12</td>
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<tr>
<td>2.00×V stall</td>
<td>124</td>
<td>1.50</td>
<td>138</td>
<td>1.93</td>
<td>122</td>
<td>2.0</td>
<td>1.14</td>
<td>1.40</td>
<td>1.30</td>
<td>1.30</td>
<td>1.50</td>
<td>1.50</td>
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*With -3° flap*

<table>
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<tr>
<th></th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stalling speed with 20° flap km/h</td>
<td>62</td>
<td>69</td>
<td>61</td>
<td>52</td>
<td>56</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. L/D</td>
<td>34.2</td>
<td>36.2</td>
<td>30.2</td>
<td>22.5</td>
<td>27.8</td>
<td>31.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

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Hungary - Ungarn - Hongrie

Manufacturer:
Sportáutermelő 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


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


Monoplace d'acrobatie. Solide construction en bois.

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.

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.

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


<table>
<thead>
<tr>
<th>Type designation</th>
<th>R-08 Filis</th>
<th>R-16 Lepke</th>
<th>R-17 Môka</th>
<th>R-22 Futár</th>
<th>R-22S Junius 18</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of first flight of prototype</td>
<td>1938</td>
<td>1949</td>
<td>1944</td>
<td>1944</td>
<td>1950</td>
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<tr>
<td>Number produced</td>
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<td>65</td>
<td>3</td>
<td>8</td>
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<tr>
<td>Wings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>13.6</td>
<td>10.1</td>
<td>13.0</td>
<td>15.8</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>15.5</td>
<td>12.8</td>
<td>16.0</td>
<td>13.5</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
<td>11.9</td>
<td>7.8</td>
<td>10.56</td>
<td>18.5</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
<td>1.20</td>
<td>1.30</td>
<td>1.7</td>
<td>1.15</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>m</td>
<td>0.75</td>
<td>1.30</td>
<td>0.8</td>
<td>0.30</td>
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<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
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<td>1.14</td>
<td>1.30</td>
<td>1.20</td>
<td>0.85</td>
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<td>Dihedral</td>
<td>deg.</td>
<td>1.5</td>
<td>4</td>
<td>outer 0</td>
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<tr>
<td>Chord sweep</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>outer 1.5</td>
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<td>Aero. twist root/tip</td>
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<td>—1.5</td>
<td>—3</td>
<td>NACA</td>
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<td>Wing section (root)</td>
<td></td>
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<td>Gö 549</td>
<td>23012</td>
<td>Gö 549</td>
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<td>Type</td>
<td></td>
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<td>special slotted-Frise</td>
<td>plain</td>
<td>plain</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Area of elevator and fixed tail</td>
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<td>2.0</td>
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<td>1.76</td>
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<td>Area of elevator</td>
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<td>0.9</td>
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<td>sym.</td>
<td>sym.</td>
<td>sym.</td>
<td>0009</td>
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<table>
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<tr>
<th>Type designation</th>
<th>R-08 Pilis</th>
<th>R-16 Lepke</th>
<th>R-17 Mőka</th>
<th>R-22 Futár</th>
<th>R-22 S Junius 18</th>
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<tbody>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
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<td></td>
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<td>Area of fin and rudder ... m²</td>
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<td>1.25</td>
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<td>1.62</td>
<td>1.62</td>
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<td>sym.</td>
<td>sym.</td>
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<td><strong>Fuselage</strong></td>
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<td></td>
<td></td>
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<td></td>
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<td>0.58</td>
<td>0.62</td>
<td>0.62</td>
<td>0.62</td>
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<td>6.5</td>
<td>6.5</td>
<td>6.5</td>
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<td>1</td>
<td>1</td>
<td>1</td>
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<td>skid and fixed wheel</td>
<td>skid and fixed wheel</td>
<td>skid and wheel</td>
<td>skid and wheel</td>
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<tr>
<td><strong>Lift increasing devices</strong></td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>none</td>
<td>flap</td>
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<td>Type ....................</td>
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<td>none</td>
<td>none</td>
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<tr>
<td>Span ....................</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>1.65</td>
</tr>
<tr>
<td>Area .................... m²</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>10</td>
</tr>
<tr>
<td>Max. deflection up ...... deg.</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>60</td>
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<tr>
<td>Max. deflection down .... deg.</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td><strong>Drag producing devices</strong></td>
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<td>none</td>
<td>DFS type airbrakes top and bottom of wing</td>
<td>DFS airbrakes top and bottom of wing</td>
<td>DFS airbrakes top and bottom of wing</td>
</tr>
<tr>
<td>Type ....................</td>
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<td>none</td>
<td>DFS type airbrakes top and bottom of wing</td>
<td>DFS airbrakes top and bottom of wing</td>
<td>DFS airbrakes top and bottom of wing</td>
</tr>
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<td>General location ..........</td>
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</tr>
<tr>
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<td>2×1.24</td>
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<td>2×1.0</td>
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<td>4×0.145</td>
<td>4×0.115</td>
<td>4×0.115</td>
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<td>90</td>
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<td>173</td>
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<td>90</td>
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<td>370</td>
<td>273</td>
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<td>4</td>
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<td>R-16 Lepke</td>
<td>R-17 Méka</td>
<td>R-22 Futár</td>
<td>R-22S Junius 18</td>
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<td><strong>Limiting flight conditions</strong></td>
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<td>80</td>
<td>110</td>
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<td>100</td>
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<td>all</td>
<td>loops, stall turns</td>
<td>loops, stall turns</td>
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<td>yes</td>
<td>yes</td>
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<td><strong>Straight flight performance</strong></td>
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<tr>
<td>at flying weight of  kg</td>
<td>253</td>
<td>160</td>
<td>370</td>
<td>273</td>
<td>280</td>
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<td><strong>V for min. sink</strong></td>
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<td>52</td>
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<td>65</td>
<td>63</td>
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**Manufacturer:**
Sportárutermelő Vállalat
Esztergom, Hungary

*K-02b Szellő*

The K-02b Szellő is a single-seat high-wing training sailplane of wooden construction. The wing is strut braced.
**Manufacturer:**
Sportáru termelő 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**

**R-15F Koma**

**Manufacturer:**
Alagi Központi Kisérleti Üzem Dunakeszi

**Z-03B Ifjuság**
The Z-03B Ifjúság 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**

**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**


**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 Műhely Mátýásföld**

**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**


**OE-01**

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

<table>
<thead>
<tr>
<th>Type designation</th>
<th>K-02b Szellő</th>
<th>R-15 F Koma</th>
<th>Z-03B Ifjúság</th>
<th>Z-04 Béke</th>
<th>OE-01</th>
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<tbody>
<tr>
<td>Designers</td>
<td>A. Kemény</td>
<td>E. Rubik</td>
<td>F. Zsebő</td>
<td>F. Zsebő</td>
<td>M. Papp E. Rubik</td>
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<tr>
<td>Date of first flight of prototype</td>
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<td>1948</td>
<td>1953</td>
<td>1955</td>
<td>1951</td>
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<td>13.35</td>
<td>15.0</td>
<td>14.0</td>
<td>18.0</td>
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<td>K-06 b</td>
<td>R-15 F</td>
<td>Z-03 B</td>
<td>Z-04 B</td>
<td>OE-01</td>
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<tr>
<td>--------------------------</td>
<td>--------</td>
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<tr>
<td></td>
<td>Seclis</td>
<td>Koma</td>
<td>Itusag</td>
<td>Beke</td>
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<tr>
<td>Area ................... m²</td>
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<td>17.12</td>
<td>18.4</td>
<td>13.7</td>
<td>13.95</td>
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<td>10.7</td>
<td>10.4</td>
<td>12.2</td>
<td>14.3</td>
<td>23.3</td>
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<tr>
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<td>1.29</td>
<td>1.6</td>
<td>1.4</td>
<td>0.9</td>
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<tr>
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<td>1.29</td>
<td>0.75</td>
<td>0.52</td>
<td>0.40</td>
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<td>1.17</td>
<td>1.29</td>
<td>1.23</td>
<td>0.98</td>
<td>0.775</td>
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<td>2</td>
<td>4</td>
<td>3</td>
<td>inner 3</td>
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<tr>
<td>Chord sweep ............. deg.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>outer 0</td>
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<tr>
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<td>—2</td>
<td>0</td>
<td>—3</td>
<td>—2</td>
<td>outer 3</td>
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<td>Gö 549</td>
<td>mod.</td>
<td>Gö 549</td>
<td>23015</td>
<td>laminar</td>
</tr>
</tbody>
</table>

**Ailerons**

Type .................. Frise  slotted-Frise  Frise  Frise  plain
Span .................. m | 3.8    | 3.45   | 4.0    | inner 2.0 |
| Area .................. m² | 1.15   | 0.725  | 1.33   | inner 0.45 |

**Horizontal tail**

Area of elevator and fixed tail  m² | 1.5    | 2.32   | 2.56   | 1.87   | 2.08  |
| Area of elevator  m² | 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  m² | 1.2    | 1.85   | 1.40   | 1.25   | V-tail |
| Area of rudder  m² | 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 m² | 0.65   | 0.84   | 0.68   | 0.55   | 0.51  |
| Number seats and arrangement ... | side-by-side | tandem | 1  | 1 | 1 |
| Undercarriage type  | skid and wheel  | skid and wheel  | fixed wheel and nose wheel |

**Lift increasing devices**

Type .................. none  slotted  none  none  plain
Span .................. m | —  | 5.99  | —  | —  | 9.0  |
<p>| Area .................. m² | —  | 2.39  | —  | —  | 1.94 |
| Max. deflection up deg. | —  | 0     | —  | —  | 0    |
| Max. deflection down deg. | —  | 45    | —  | —  | 60   |</p>
<table>
<thead>
<tr>
<th>Type designation</th>
<th>K-06 b Stelló</th>
<th>R-15 F Koma</th>
<th>Z-03 B Íjuság</th>
<th>Z-04 Béke</th>
<th>OE-01</th>
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<td>Type .........................</td>
<td>Rubik type top and bottom</td>
<td>DFS type airbrakes top and bottom</td>
<td>DFS type airbrakes top and bottom</td>
<td>tail parachute 1.1 m diam.</td>
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<tr>
<td>Span ......................... m</td>
<td>2 × 0.9</td>
<td>2 × 1.35</td>
<td>2 × 1.0</td>
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<td></td>
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<tr>
<td>Area ......................... m²</td>
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<td>4 × 0.155</td>
<td>4 × 0.09</td>
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<td></td>
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<td>350</td>
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<td>170</td>
<td>170</td>
<td>90</td>
<td>100</td>
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<tr>
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<td>360</td>
<td>520</td>
<td>370</td>
<td>315</td>
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<tr>
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<td>Limiting flight conditions</td>
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<tr>
<td>Placard airspeed .......... km/h</td>
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<td>150</td>
<td>220</td>
<td>400</td>
<td>220</td>
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<td>120</td>
<td>130</td>
<td>150</td>
<td>125</td>
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<td>150</td>
<td>100</td>
<td>100</td>
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<td>loops, stall turns none</td>
<td>loops, stall turns all</td>
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<td></td>
<td></td>
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<tr>
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<td>unspinnable</td>
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<td>yes</td>
<td>yes</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>at flying weight of .......... kg</td>
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<td>360</td>
<td>520</td>
<td>370</td>
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<table>
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<tr>
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<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
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<td>62</td>
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<td>71.5</td>
<td>1.09</td>
<td>83</td>
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<td>0.93</td>
<td>68</td>
<td>1.12</td>
<td>84</td>
<td>1.13</td>
<td>90</td>
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<td>66.6</td>
<td>70</td>
<td>4</td>
<td>62</td>
<td>24</td>
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</table>
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.

### Specifications

<table>
<thead>
<tr>
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<th>3 V-1 Eolo</th>
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<td>Designer ..........</td>
<td>Ing. Giovanni Bruni</td>
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<tr>
<td>Date of first flight of prototype ..........</td>
<td>Aug. 1955</td>
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<td>Area ..............</td>
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<td>3 V-1 Eolo</td>
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<tr>
<td>Wing root chord ........ m</td>
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<td>Wing tip chord ........ m</td>
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<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
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<td>Aero. twist root/tip ........</td>
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<td>Special features ........</td>
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<td></td>
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<tr>
<td><strong>Ailerons</strong></td>
<td></td>
</tr>
<tr>
<td>Type (e.g. slotted, frise, inset, hinge, plain)</td>
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</tr>
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<td>29</td>
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<td>Max. deflection down .... deg.</td>
<td>17° 30'</td>
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<td>Mass balance degree ...</td>
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<td>Mass balance method ...</td>
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<td>Special features ........</td>
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<tr>
<td><strong>Horizontal tail</strong></td>
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<td>Area of elevator ........ m²</td>
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<td>Tail arm (from ¼ chord m.a.c. wing to ¼ chord m.a.c. tail)........... m</td>
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<td>controllable tab</td>
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<tr>
<td>Horizontal tail volume coefficient ..........</td>
<td>0.572</td>
</tr>
<tr>
<td>Type designation</td>
<td>3 V-1 Eolo</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td></td>
<td>V-tail</td>
</tr>
<tr>
<td>Vertical tail</td>
<td>2 × 0.635</td>
</tr>
<tr>
<td>Area of rudder m²</td>
<td>2 × 0.635</td>
</tr>
<tr>
<td>Max. deflection deg.</td>
<td>20</td>
</tr>
<tr>
<td>Fuselage</td>
<td>0.716</td>
</tr>
<tr>
<td>Max. width m</td>
<td>0.716</td>
</tr>
<tr>
<td>Overall length m</td>
<td>8.55</td>
</tr>
<tr>
<td>Max. cross section m²</td>
<td>0.985</td>
</tr>
<tr>
<td>Number seats and arrangement</td>
<td>1</td>
</tr>
<tr>
<td>Undercarriage type</td>
<td>retractable wheel with brake</td>
</tr>
<tr>
<td>Wheel diameter cm</td>
<td>33</td>
</tr>
<tr>
<td>Lift increasing devices</td>
<td></td>
</tr>
<tr>
<td>Type (e.g. trailing edge flaps, fowler flaps, droopable ailerons, slotted flaps, split flaps)</td>
<td>slotted</td>
</tr>
<tr>
<td>Span m</td>
<td>2 × 3.34</td>
</tr>
<tr>
<td>Area m²</td>
<td>2 × 1.075</td>
</tr>
<tr>
<td>Max. deflection up deg.</td>
<td>2</td>
</tr>
<tr>
<td>Max. deflection down deg.</td>
<td>50</td>
</tr>
<tr>
<td>Drag producing devices</td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>segmented surface brakes</td>
</tr>
<tr>
<td>General location</td>
<td>top and bottom of wing</td>
</tr>
<tr>
<td>Area m²</td>
<td>2 × 0.60</td>
</tr>
<tr>
<td>% of span (where applicable)</td>
<td>14</td>
</tr>
<tr>
<td>Location, % of chord</td>
<td>65</td>
</tr>
<tr>
<td>(where applicable)</td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit</td>
<td>yes</td>
</tr>
<tr>
<td>terminal velocity (vertical dive) to max. permissible I.A.S.</td>
<td>no</td>
</tr>
<tr>
<td>Weights</td>
<td></td>
</tr>
<tr>
<td>Wings kg</td>
<td>220</td>
</tr>
<tr>
<td>Fuselage kg</td>
<td>95</td>
</tr>
<tr>
<td>Tailplane and elevator kg</td>
<td>16.5</td>
</tr>
<tr>
<td>Empty weight kg</td>
<td>329.5</td>
</tr>
<tr>
<td>Instruments kg</td>
<td>15.5</td>
</tr>
<tr>
<td>Other equipment (e.g. oxygen, radio) kg</td>
<td>20</td>
</tr>
<tr>
<td>Type designation</td>
<td>3 V-1 Eolo</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Equipped weight ... kg</td>
<td>365</td>
</tr>
<tr>
<td>Max. load ... kg</td>
<td>85</td>
</tr>
<tr>
<td>Max. permissible flying weight ... kg</td>
<td>450</td>
</tr>
<tr>
<td>Wing loading ... kg/m²</td>
<td>28.1</td>
</tr>
</tbody>
</table>

**Design standards**

Airworthiness requirements to which aircraft has been built: 
Certificate of airworthiness: Italian Civil Board yes

**Limiting flight conditions**

Placard airspeed ... km/h: 230
Aero-towing speed ... km/h: 100-130
Cloud flying permitted: yes/no yes
Permitted aerobatic manoeuvres: yes
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 limiting): ... km/h

**Straight flight performance**

at flying weight of ... kg 450

<table>
<thead>
<tr>
<th>No flap or brake</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>92</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td>96.5</td>
<td>0.82</td>
</tr>
<tr>
<td>1.5×V stall</td>
<td>120</td>
<td>1.3</td>
</tr>
<tr>
<td>Stalling speed</td>
<td>60 no flap</td>
<td></td>
</tr>
<tr>
<td>Max. L/D</td>
<td>40 full flaps</td>
<td>32.8</td>
</tr>
</tbody>
</table>

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-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-1 Zigolo
Planeur monoplace d'entraînement de structure conventionnelle. Construction cantilever normale en bois. Ailes à un seul longeron, recouvertes de contreplaque et de toile.

CVT-2 Veltro
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


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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>CVT-1 Zigolo</th>
<th>CVT-2 Veltro</th>
<th>CVT-4 Strale</th>
<th>M-100</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Centro di volo a vela del Politecnico di Torino (CVT)</td>
<td>Ditta Nico</td>
<td>lotti &amp; Figli</td>
<td></td>
</tr>
<tr>
<td><strong>Designers</strong></td>
<td>Dott. Ing. Alberto and Piero Morelli</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Date of first flight of prototype</strong></td>
<td>1954</td>
<td>1954</td>
<td>1957</td>
<td></td>
</tr>
<tr>
<td><strong>Number produced</strong></td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Wings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span .................. m</td>
<td>12.0</td>
<td>15.0</td>
<td>16.1</td>
<td>14.0</td>
</tr>
<tr>
<td>Area .................. m²</td>
<td>14.0</td>
<td>12.5</td>
<td>13.3</td>
<td>12.25</td>
</tr>
<tr>
<td>Aspect ratio ...........</td>
<td>10.0</td>
<td>18.0</td>
<td>19.4</td>
<td>16.0</td>
</tr>
<tr>
<td>Wing root chord ....... m</td>
<td>1.34</td>
<td>1.17</td>
<td>1.17</td>
<td>1.30</td>
</tr>
<tr>
<td>Wing tip chord ....... m</td>
<td>0.80</td>
<td>0.50</td>
<td>0.50</td>
<td>0.45</td>
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<tr>
<td>Mean aerodynamic chord (m.a.c.) ....... m</td>
<td>1.19</td>
<td>0.88</td>
<td>0.88</td>
<td>0.95</td>
</tr>
<tr>
<td>Wing section, root ......</td>
<td>NACA 4415</td>
<td>64°515</td>
<td>64°515</td>
<td>63-613</td>
</tr>
<tr>
<td>Wing section, mid ......</td>
<td>NACA 4415</td>
<td></td>
<td></td>
<td>63-612.3</td>
</tr>
<tr>
<td>Wing section, tip ......</td>
<td>NACA 4415</td>
<td>64°512</td>
<td>64°512</td>
<td>NACA 4412</td>
</tr>
<tr>
<td>Dihedral ............... deg.</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>¼ chord sweep ......... deg.</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Aero. twist root/tip ... deg.</td>
<td>—4</td>
<td>—4</td>
<td>0</td>
<td>—4</td>
</tr>
<tr>
<td>Length of each section of wing ....... m</td>
<td>one section</td>
<td></td>
<td>two sections</td>
<td></td>
</tr>
<tr>
<td>Special features ......</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ailerons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ..................</td>
<td>Frise</td>
<td>Slotted</td>
<td>Slotted</td>
<td>Frise</td>
</tr>
<tr>
<td>Span .................. m</td>
<td>3.6</td>
<td>4.0</td>
<td>3.1</td>
<td>2.5</td>
</tr>
<tr>
<td>Area .................. m²</td>
<td>1.78</td>
<td>1.34</td>
<td>1.06</td>
<td>0.84</td>
</tr>
<tr>
<td>Mean chord ............ m</td>
<td>0.3</td>
<td>0.25</td>
<td>0.22</td>
<td>0.20</td>
</tr>
<tr>
<td>Max. deflection up .... deg.</td>
<td>30</td>
<td>30</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Max. deflection down .. deg.</td>
<td>30</td>
<td>15</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Mass balance method ..</td>
<td>—</td>
<td>concentrated mass on tip</td>
<td></td>
<td>—</td>
</tr>
<tr>
<td>Type designation</td>
<td>CVT-1 Zigolo</td>
<td>CVT-2 Veltro</td>
<td>CVT-4 Strale</td>
<td>M-100</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------</td>
<td>--------------</td>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Horizontal tail</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>3.0</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
</tr>
<tr>
<td>Area of elevator and fixed tail</td>
<td>2.3</td>
<td>1.4</td>
<td>1.4</td>
<td>1.56</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>0.93</td>
<td>0.57</td>
<td>0.57</td>
<td>0.75</td>
</tr>
<tr>
<td>Max. deflection up deg.</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Max. deflection down deg.</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td>NACA 0009</td>
<td>NACA 64009</td>
<td>NACA 64009</td>
<td>NACA 64009</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mass balance method</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Tail arm (from 1/4 chord m.a.c. wing to 1/4 chord m.a.c. tail)</td>
<td>3.56</td>
<td>3.98</td>
<td>3.98</td>
<td>3.80</td>
</tr>
<tr>
<td>Elevator aerodynamic balance method</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Elevator trimming method</td>
<td>—</td>
<td>—</td>
<td>trim tab</td>
<td>adjustable spring on control stick</td>
</tr>
<tr>
<td>Horizontal tail volume coefficient</td>
<td>0.5</td>
<td>0.51</td>
<td>0.48</td>
<td>0.52</td>
</tr>
<tr>
<td><strong>Vertical tail</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder</td>
<td>0.98</td>
<td>0.67</td>
<td>0.70</td>
<td>1.20</td>
</tr>
<tr>
<td>Area of rudder</td>
<td>0.73</td>
<td>0.45</td>
<td>0.50</td>
<td>0.80</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>1.7</td>
<td>0.85</td>
<td>0.75</td>
<td>~ 1</td>
</tr>
<tr>
<td>Tail arm</td>
<td>4.0</td>
<td>3.96</td>
<td>4.02</td>
<td>4.05</td>
</tr>
<tr>
<td>Max. deflection deg.</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
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<tr>
<td>Aerofoil section</td>
<td>NACA 0009</td>
<td>NACA 64009</td>
<td>NACA 64009</td>
<td>NACA 64009 mod.</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Mass balance type</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Aerodynamic balance</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>horn balance</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. width</td>
<td>0.64</td>
<td>0.62</td>
<td>0.62</td>
<td>0.60</td>
</tr>
<tr>
<td>Overall length</td>
<td>6.55</td>
<td>6.9</td>
<td>7.03</td>
<td>6.70</td>
</tr>
<tr>
<td>Max. cross section m²</td>
<td>0.47</td>
<td>0.39</td>
<td>0.41</td>
<td>0.45</td>
</tr>
<tr>
<td>Wetted surface area m²</td>
<td>~ 13</td>
<td>~ 6</td>
<td>~ 8</td>
<td>~ 12</td>
</tr>
<tr>
<td>Number seats</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Undercarriage type</td>
<td>fixed wheel + shock-absorbing skid + 2 aux. wheels</td>
<td>retractable skid + 1 aux. wheel</td>
<td>shock absorbing skid, wheel fixed to skid</td>
<td></td>
</tr>
<tr>
<td>Wheel diameter</td>
<td>26</td>
<td>14</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td><strong>Lift increasing devices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>none</td>
<td>slotted flap</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Span</td>
<td>3.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>1.5</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean chord</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type designation</td>
<td>CVT-1 Zigolo</td>
<td>CVT-2 Veltro</td>
<td>CVT-4 Strale</td>
<td>M-100</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------</td>
<td>-------------</td>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>....</td>
<td>deg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>....</td>
<td>deg.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drag producing devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>fuselage airbrakes</td>
<td>flap (at high deflection angles)</td>
<td>wing airbrakes top and bottom of wings</td>
<td>wing airbrakes (perforated rectangular plates) top and bottom of wings</td>
</tr>
<tr>
<td>General location</td>
<td>fuselage sides (under wing)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location, per cent of chord</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S.</td>
<td>yes/no</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Weights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wings¹</td>
<td>kg</td>
<td>82</td>
<td>111</td>
<td>119</td>
</tr>
<tr>
<td>Fuselage²</td>
<td>kg</td>
<td>60</td>
<td>59</td>
<td>60</td>
</tr>
<tr>
<td>Tailplane and elevator</td>
<td>kg</td>
<td>9</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Empty weight³</td>
<td>kg</td>
<td>151</td>
<td>176</td>
<td>185</td>
</tr>
<tr>
<td>Instruments</td>
<td>kg</td>
<td>4</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Equipped weight</td>
<td>kg</td>
<td>155</td>
<td>181</td>
<td>190</td>
</tr>
<tr>
<td>Removable ballast</td>
<td>kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>kg</td>
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<td>Point C</td>
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Registro Aeronautico Italiano

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154
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<th>CVT-2 Veltro</th>
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<td>200</td>
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<td>Aero-towing speed ▲ km/h</td>
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<td>25% and 35%</td>
<td>24% and 33%</td>
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<td>130</td>
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<td><strong>Straight flight performance</strong></td>
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<td><strong>With ▲ ^\circ flap</strong> ▲ deg.</td>
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<td>Max. L/D ▲</td>
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<td>35</td>
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</tr>
</tbody>
</table>

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 Maine 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**

**CVV 6 Canguro**
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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>CVV 6 Canguro</th>
<th>CVV 7 Pinocchio</th>
<th>CVV 8 Bonaventura</th>
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<td>Designer(s)</td>
<td>Prof. ing. E. Preti</td>
<td>Prof. ing. E. Preti</td>
<td>Prof. ing. E. Preti</td>
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</tr>
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<td>18</td>
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<td>19</td>
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<td>—6°8'</td>
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<td>plain and frise</td>
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<td>---------------</td>
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<td>spoilers</td>
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<td>top and bottom of wing</td>
<td>top and bottom of wing</td>
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The V-20 is a medium performance single-seater of wooden construction with strut braced wing. Handling qualities are similar to the Olympia.

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.
Manufacturer:
J. K. Høekstra
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

<table>
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<th>V-20</th>
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</tr>
<tr>
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<td>m</td>
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<td>Area</td>
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<td>Aspect ratio</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
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<tr>
<td>Wing tip chord</td>
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</tr>
<tr>
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<tr>
<td>Area of elevator</td>
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</table>

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.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>V-20</th>
<th>T-10</th>
<th>T-20</th>
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<tbody>
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<td>0.75</td>
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<td>fixed wheel and skid</td>
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<td>none</td>
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<td><strong>Drag producing devices</strong></td>
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<td>DFS airbrakes</td>
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<td>200</td>
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<td>V for max. L/D</td>
<td>72</td>
<td>65</td>
<td>70</td>
</tr>
<tr>
<td>Stalling speed</td>
<td>45–50</td>
<td>50</td>
<td>60</td>
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<td>Max. L/D</td>
<td>23</td>
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<table>
<thead>
<tr>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
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<td>56</td>
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<td>65</td>
<td>70</td>
<td>0.90</td>
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</table>
**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-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:** Monoplane moyen de performance pour joutes et concours, construction de bois, aile cantilever. Roue demi-éclipseable. 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:** 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.

**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.

**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'entrainement en bois; fuselage plat latéralement et aile haubanée. Propre à l'entraînement à l'acrobatie.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Jaskolka-L SZD-17X</th>
<th>Jaskolka-Z SZD-8bis</th>
<th>Mucha 100 SZD-12</th>
<th>Boecian SZD-9bis</th>
<th>Czapla SZD-10bis</th>
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<tbody>
<tr>
<td>Designers</td>
<td>T. Kostia J.Dyrek</td>
<td>T. Kostia Sandauer S.Wielgus Skarbinski</td>
<td>Okarmus Dyrek Badura</td>
<td>Wasilewski Zatwarnicki Sandauer</td>
<td>Zatwarnicki J. Kaniewska M.Gracz</td>
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<td>Date of first flight of prototype</td>
<td>1956</td>
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<td>1953</td>
<td>1952</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
<td>1.43</td>
<td>1.55</td>
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<td>Wing tip chord</td>
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<td>Wing section, root</td>
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<td>43 012A</td>
<td>Gö-549</td>
<td>43 018A</td>
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<tr>
<td>Wing section, mid</td>
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<td>Gö-549</td>
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<td>Gö-549</td>
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<td>M-12</td>
<td>43 012A</td>
<td>Gö-549</td>
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<td>4</td>
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<td>3</td>
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<td>Jaskolka-Z SZD-8bis</td>
<td>Mucha 100 SZD-12</td>
<td>Bocian SZD-9bis</td>
<td>Czapla SZD-10bis</td>
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<td>------------------</td>
<td>---------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>------------------</td>
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<td><strong>Ailerons</strong></td>
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<td>1.83</td>
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<td>30</td>
<td>35</td>
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<td>15</td>
<td>17</td>
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<td>Mass balance</td>
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<td>external weight</td>
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<td>nil</td>
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<tr>
<td><strong>Horizontal tail</strong></td>
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<td>30</td>
<td>25</td>
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<td>23</td>
<td>17</td>
<td>22</td>
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<td><strong>Vertical tail</strong></td>
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<td>V tail</td>
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<td>SZD-17X</td>
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<td>SZD-12</td>
<td>SZD-9bis</td>
<td>SZD-10bis</td>
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<td>Removable ballast</td>
<td>120 (water)</td>
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<td>Max. permissible flying weight</td>
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<td>455</td>
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<td><strong>Gust loads</strong></td>
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<td>Point A</td>
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<td>138 10.5</td>
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<td>Point B</td>
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<td>250 5.25</td>
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<td>250 0</td>
<td>250 0</td>
<td>160 0</td>
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<td>200 (flaps)</td>
<td>180 (airbrakes)</td>
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<td>Winch launching speed</td>
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<td>290</td>
<td>506</td>
<td>435</td>
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<td><strong>No flap or brake</strong></td>
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<td>V for min. sink</td>
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<td>0.75</td>
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<td>82</td>
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<td>31.2</td>
<td>28.5</td>
<td>47</td>
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<td>40</td>
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<tr>
<td>Max. L/D</td>
<td>31.2</td>
<td>28.5</td>
<td>47</td>
<td>52</td>
<td>40</td>
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</tbody>
</table>
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

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

Moswey III


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

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. Ságesser, 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.

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 normaler 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Moswey III</th>
<th>WLM 1</th>
<th>WLM 2</th>
<th>Elfe M</th>
</tr>
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<tbody>
<tr>
<td>Manufacturer</td>
<td>W. Hegetschweiler Moswey-Segel-flugzeug-Werke</td>
<td>Isler &amp; Co.</td>
<td>R. Sigesser, Flugzeugbau</td>
<td>A. Neukom</td>
</tr>
<tr>
<td>Address</td>
<td>Horgen</td>
<td>Wildegg</td>
<td>Herzogenbuchsee</td>
<td>Neuhausen</td>
</tr>
<tr>
<td>Designer(s)</td>
<td>Georg Müller</td>
<td>WLM-Flugingenieure</td>
<td>WLM-Flugingenieure</td>
<td>W. Pfenninger A. Markwalder</td>
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<tr>
<td>Date of first flight of prototype</td>
<td>October 1943</td>
<td>July 1947</td>
<td>May 1954</td>
<td>June 1956</td>
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<td>Number produced</td>
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<td>Wings</td>
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<td></td>
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<tr>
<td>Span</td>
<td>m</td>
<td>14.0</td>
<td>14.0</td>
<td>18.2</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>13.1</td>
<td>14.0</td>
<td>17.2</td>
</tr>
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<td>Aspect ratio</td>
<td></td>
<td>15.0</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
<td>1.375</td>
<td>1.40</td>
<td>1.37</td>
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<tr>
<td>Wing tip chord</td>
<td>m</td>
<td>0.485</td>
<td>0.60</td>
<td>0.50</td>
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<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
<td>m</td>
<td>0.995</td>
<td>1.064</td>
<td>0.975</td>
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<tr>
<td>Wing section, root</td>
<td></td>
<td>Gö 535</td>
<td>NACA 23013</td>
<td>64A013mod.</td>
</tr>
<tr>
<td>Wing section, mid</td>
<td></td>
<td>Gö 535</td>
<td>NACA 23013</td>
<td>64A013mod.</td>
</tr>
<tr>
<td>Wing section, tip</td>
<td></td>
<td>Gö 535</td>
<td>NACA 23007</td>
<td>64A018mod.</td>
</tr>
<tr>
<td>Dihedral</td>
<td>deg.</td>
<td>gull wing</td>
<td>1.5</td>
<td>2</td>
</tr>
<tr>
<td>Type designation</td>
<td>Moswey III</td>
<td>WLM 1</td>
<td>WLM 2</td>
<td>Eife M</td>
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<tr>
<td>----------------------------------------</td>
<td>------------</td>
<td>-------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>(\frac{1}{4}) chord sweep</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Aero. twist root/tip</td>
<td>0</td>
<td>-1</td>
<td>-1</td>
<td></td>
</tr>
<tr>
<td>Length of each section of wing</td>
<td>7.0</td>
<td>7.0</td>
<td>9.0</td>
<td>8.4 + 2 \times 4.55</td>
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**Ailerons**

<table>
<thead>
<tr>
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<th>Eife M</th>
</tr>
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<tbody>
<tr>
<td>Type</td>
<td>frise</td>
<td>slotted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>3.17</td>
<td>3.25</td>
<td>6.25</td>
<td>17.5</td>
</tr>
<tr>
<td>Area</td>
<td>0.80</td>
<td>0.77</td>
<td>1.335</td>
<td>2.0</td>
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<tr>
<td>Mean chord</td>
<td>0.255</td>
<td>0.24</td>
<td>0.21</td>
<td>0.115</td>
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<tr>
<td>Max. deflection up</td>
<td>25</td>
<td>26</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>10</td>
<td>12</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td>laminar 9%</td>
</tr>
<tr>
<td>Mass balance method</td>
<td>balance</td>
<td>weight</td>
<td></td>
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**Horizontal tail**

<table>
<thead>
<tr>
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<th>WLM 1</th>
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<th>Eife M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>2.78</td>
<td>2.80</td>
<td>3.0</td>
<td>2.54</td>
</tr>
<tr>
<td>Area of elevator and fixed tail</td>
<td>1.70</td>
<td>1.60</td>
<td>1.90</td>
<td>1.31</td>
</tr>
<tr>
<td>Area of elevator</td>
<td>0.81</td>
<td>0.69</td>
<td>0.95</td>
<td>0.47</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>25</td>
<td>26</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>25</td>
<td>18</td>
<td>20</td>
<td>40</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass balance degree</td>
<td>100%</td>
<td>100%</td>
<td></td>
<td>laminar 9%</td>
</tr>
<tr>
<td>Mass balance method</td>
<td>single weight</td>
<td>single weight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tail arm (from (\frac{1}{4}) chord m.a.c. wing to (\frac{1}{4}) chord m.a.c. tail)</td>
<td>3.05</td>
<td>4.05</td>
<td>4.25</td>
<td>5.2</td>
</tr>
<tr>
<td>Elevator aerodynamic balance method</td>
<td>horn</td>
<td>none</td>
<td>none</td>
<td></td>
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<tr>
<td>Elevator trimming method</td>
<td>tab</td>
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<td>none</td>
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**Vertical tail**

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<tr>
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<th>WLM 1</th>
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<th>Eife M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area of fin and rudder</td>
<td>0.78</td>
<td>0.95</td>
<td>1.20</td>
<td>0.905</td>
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<td>Area of rudder</td>
<td>0.66</td>
<td>0.74</td>
<td>0.76</td>
<td>0.35</td>
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<tr>
<td>Tail arm</td>
<td>3.50</td>
<td>4.15</td>
<td>4.35</td>
<td></td>
</tr>
<tr>
<td>Max. deflection</td>
<td>25</td>
<td>30</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td></td>
<td></td>
<td></td>
<td>laminar 9%</td>
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<tr>
<td>Mass balance degree</td>
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<td></td>
<td></td>
<td>laminar 9%</td>
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<tr>
<td>Mass balance type</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aerodynamic balance</td>
<td>horn</td>
<td></td>
<td></td>
<td>horn</td>
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**Fuselage**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Max. width</td>
<td>0.52</td>
<td>0.65</td>
<td>0.65</td>
<td>0.62</td>
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<tr>
<td>Overall length</td>
<td>6.0</td>
<td>7.0</td>
<td>7.7</td>
<td>7.8</td>
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<tr>
<td>Max. cross section</td>
<td>0.34</td>
<td>0.54</td>
<td>0.51</td>
<td>0.46</td>
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<td>Number seats</td>
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<td>1</td>
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<td>1</td>
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<td>Undercarriage type</td>
<td>skid,</td>
<td>skid,</td>
<td>skid,</td>
<td>skid,</td>
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<td></td>
<td>droppable wheels</td>
<td>droppable wheels</td>
<td>droppable wheels</td>
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<td>WLM 1</td>
<td>WLM 2</td>
<td>Elze M</td>
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<td>----------------------------------------</td>
<td>------------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
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<tr>
<td><strong>Lift increasing devices</strong></td>
<td>none</td>
<td>slotted camber flaps</td>
<td>slotted camber flaps</td>
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</tr>
<tr>
<td>Type ..................................</td>
<td></td>
<td>Ailerons also deflect to 1/2 flap travel</td>
<td>Ailerons deflect with flaps</td>
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</tr>
<tr>
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<td>m</td>
<td>2 x 3.20</td>
<td>2 x 2.40</td>
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<td>m²</td>
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<td>deg.</td>
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<td>Max. deflection down ....................</td>
<td>deg.</td>
<td>40</td>
<td>27</td>
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<td><strong>Drag producing devices</strong></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Type ..................................</td>
<td></td>
<td>airbrakes top and bottom of wing</td>
<td>airbrakes top and bottom of wing</td>
<td>airbrakes top and bottom of wing</td>
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<tr>
<td>Span ..................................</td>
<td>m</td>
<td>1.05</td>
<td>1.35</td>
<td>1.8</td>
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<td>Area (total) ................................</td>
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<td>0.69</td>
<td>0.8</td>
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<tr>
<td>% of span ................................</td>
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<td>10.2</td>
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<td>68</td>
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<tr>
<td>Wings ..................................</td>
<td>kg</td>
<td>86</td>
<td>218</td>
<td>171</td>
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<td>Fuselage ................................</td>
<td>kg</td>
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<td>76</td>
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<td>kg</td>
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<td>kg</td>
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<td>260</td>
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<td>Sept. 1944</td>
<td>1948</td>
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<td><strong>Manoeuvre loads</strong></td>
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<td>4</td>
<td>5</td>
<td>130</td>
</tr>
<tr>
<td>Point B ..................................</td>
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<td>210</td>
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</tr>
<tr>
<td>300</td>
<td>5</td>
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<td>5</td>
</tr>
<tr>
<td>5</td>
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<td>260</td>
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<td>Type designation</td>
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<td>------------------</td>
<td>-----------</td>
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<tr>
<td>Point C</td>
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<tr>
<td>Point D</td>
<td>190 -2</td>
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<tr>
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</tr>
<tr>
<td>Point D</td>
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<td>Factor of safety</td>
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### Gust loads

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<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
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<th>v m/s</th>
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<tr>
<td>Point A</td>
<td>150/125</td>
<td>+20</td>
<td>270/160</td>
<td>+20</td>
<td>200/140</td>
<td>+20</td>
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<tr>
<td>Point D</td>
<td>125</td>
<td>160</td>
<td>160</td>
<td>100</td>
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<td></td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
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</tbody>
</table>

### Limiting flight conditions

**Placard airspeed**
- Smooth conditions km/h: 210
- Gusty conditions km/h: 125

**Aero-towing speed**
- Smooth/gusty km/h: 150/125

**Winch launching speed** km/h: 125

**Cloud flying permitted**
- Yes

**Spinning permitted**
- Yes

**Foremost and aftmost e.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.**
- 30%
- 23.5%
- 32%
- 39%
- 42%
- 42%

### Straight flight performance

**at flying weight of** kg:
- 250
- 280
- 430
- 350

#### No flap or brake

<table>
<thead>
<tr>
<th></th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>V for min. sink</td>
<td>60 0.65</td>
<td>67 0.85</td>
<td>73 0.56</td>
<td>74 0.54</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V for max. L/D</td>
<td>70 0.70</td>
<td>85 0.97</td>
<td>80 0.60</td>
<td>98 0.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With flap</td>
<td>100 1.40</td>
<td>120 1.80</td>
<td>144 2.20</td>
<td>130 1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30°:80</td>
<td>0.90</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>V stall min.</td>
<td>27.5</td>
<td>40°:46</td>
<td>20°:60</td>
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</tr>
<tr>
<td>Stalling speed (no flap) km/h</td>
<td>~50</td>
<td>~60</td>
<td>~72</td>
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<td></td>
</tr>
<tr>
<td>Max. L/D</td>
<td>27.5</td>
<td>25</td>
<td>37</td>
<td>44</td>
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</tbody>
</table>
Manufacturer: 
Briegleb Aircraft Company 
El Mirage Field, Adelanto, California

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


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-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-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

Biplance 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
The wing and fuselage are covered with $\frac{1}{8}$" Douglas Fir plywood and the control surfaces are covered with $\frac{1}{16}$" 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 Spanen 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.

<table>
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³ piece tips 5.16 each center section 4.88
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<td>rolls, loops, etc., inverted flight</td>
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<td>yes</td>
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<td>32.5%</td>
<td>37.6%</td>
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<tr>
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<td><strong>Straight flight performance</strong></td>
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<td>m/s</td>
<td>V km/h</td>
<td>m/s</td>
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<td>54</td>
<td>61</td>
<td>64 (no flap)</td>
</tr>
<tr>
<td>Stalling speed</td>
<td>17</td>
<td>20</td>
<td>24</td>
<td>56 (with 70° flap)</td>
</tr>
<tr>
<td>Max L/D</td>
<td>17</td>
<td>20</td>
<td>24</td>
<td>33</td>
</tr>
</tbody>
</table>

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.
Manufacturer:
Schweizer Aircraft Corporation
Elmira, New York

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 1-21
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

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 1-23D
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 1-23E
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 Flügel spitzen, 17,3 m Spannweite, schwererer Beplankung und Ausrüstung mit Sturzflugbremsen.

Schweizer 1-23C
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 1-23C
**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**


**Schweizer 1-23F**

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**


**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**


**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

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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>1-21</th>
<th>1-23</th>
<th>1-23D</th>
<th>1-24</th>
<th>1-26</th>
<th>2-25</th>
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<tbody>
<tr>
<td>Designer(s) ......</td>
<td>Schweizer Aircraft Corporation</td>
<td>E. Schweizer H. Burr</td>
<td>Schweizer Aircraft Corporation</td>
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<td>Date of first flight of prototype</td>
<td>1947</td>
<td>1948</td>
<td>1952</td>
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<td>Wings</td>
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<tr>
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<td>15.3</td>
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<td>Wing root chord ...... m</td>
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<td>Wing tip chord ...... m</td>
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<tr>
<td>Mean aerodynamic chord (m.a.c.) ...... m</td>
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<td>1.07</td>
<td>1.0</td>
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<td>Dihedral</td>
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<td><strong>Area</strong></td>
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<td>1.55</td>
<td>1.68</td>
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<td><strong>Mean chord</strong></td>
<td>0.238</td>
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<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
<td>36</td>
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<tr>
<td><strong>Max. deflection down</strong></td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
<td>18</td>
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<td>100%</td>
<td>100%</td>
<td>none</td>
<td>none</td>
<td>100%</td>
</tr>
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<td><strong>Mass balance method</strong></td>
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<td></td>
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<td><strong>Horizontal tail</strong></td>
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<tr>
<td><strong>Span</strong></td>
<td>2.60</td>
<td>2.14</td>
<td>2.14</td>
<td>2.60</td>
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<tr>
<td><strong>Area of elevator and fixed tail</strong></td>
<td>1.62</td>
<td>1.41</td>
<td>1.41</td>
<td>1.62</td>
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<td><strong>Area of elevator</strong></td>
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<td>0.62</td>
<td>0.73</td>
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<td>0.84</td>
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<td><strong>Max. deflection up</strong></td>
<td>23</td>
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<td>25</td>
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<td>30</td>
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<td><strong>Max. deflection down</strong></td>
<td>23</td>
<td>23</td>
<td>25</td>
<td>25</td>
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<tr>
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<td>symmetrical</td>
<td>symmetrical</td>
<td>symmetrical</td>
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<tr>
<td><strong>Mass balance degree</strong></td>
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<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
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<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
<td>NIL</td>
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<tr>
<td><strong>Tail arm (from ¾ chord m.a.c. wing to ¼ chord m.a.c. tail)</strong></td>
<td>3.7</td>
<td>3.97</td>
<td>3.97</td>
<td>3.97</td>
<td>3.97</td>
<td>5.01</td>
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<td>adj. static balance</td>
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<td><strong>Elevator trimming method</strong></td>
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<td><strong>Vertical tail</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td><strong>Area of fin and rudder</strong></td>
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<td>0.85</td>
<td>0.99</td>
<td>1.14</td>
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<tr>
<td><strong>Area of rudder</strong></td>
<td>0.67</td>
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<td>0.7</td>
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<td><strong>Tail arm</strong></td>
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<td><strong>Max. deflection</strong></td>
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<td>30</td>
<td>30</td>
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<td>symmetrical</td>
<td>symmetrical</td>
<td>symmetrical</td>
<td>symmetrical</td>
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<td><strong>Fuselage</strong></td>
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<td><strong>Max. width</strong></td>
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<td>0.58</td>
<td>0.58</td>
<td>0.58</td>
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<td><strong>Overall length</strong></td>
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<td>6.25</td>
<td>6.25</td>
<td>6.49</td>
<td>6.45</td>
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<td>0.536</td>
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<td>1</td>
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<td>2</td>
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<td>fixed wheel with brake</td>
<td>fixed wheel with brake</td>
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<td><strong>Lift increasing devices</strong></td>
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<td><strong>Drag producing devices</strong></td>
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<td>Type..................................</td>
<td>Double spoiler-brake (top and bottom of wing) additional single spoiler (top of wing)</td>
<td>Single spoiler</td>
<td>Double spoiler</td>
<td>Double spoiler</td>
<td>Single spoiler</td>
<td>DFS airbrakes; single spoiler</td>
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<td>Area ................. m²</td>
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<td>0.95</td>
<td>1.06</td>
<td>0.52</td>
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<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible I.A.S. ...........</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<td>Wings ........................... kg</td>
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<td>112</td>
<td>134</td>
<td>152</td>
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<td>246</td>
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<td>Fuselage ...................... kg</td>
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<td>46</td>
<td>52</td>
<td>74</td>
<td>54</td>
<td>98</td>
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<tr>
<td>Tailplane and elevator .. kg</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Equipped weight ........... kg</td>
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<td>190</td>
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<td>Removable ballast....... kg (water)</td>
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<td>Max. load ........................ kg</td>
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<td>125</td>
<td>150</td>
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<td>100</td>
<td>175</td>
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<td>Max. permissible flying weight .... kg</td>
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<td>340</td>
<td>365</td>
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<td>507</td>
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<td>Wing loading max. ..... kg/m²</td>
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<td>17.5</td>
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<td>CAR 05</td>
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<tr>
<td>Any other certification (e.g. experimental licence, permit to fly) ......</td>
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<td></td>
</tr>
<tr>
<td>Placard airspeed ........ km/h</td>
<td>240</td>
<td>208</td>
<td>212</td>
<td>206</td>
<td>185</td>
<td>215</td>
</tr>
<tr>
<td>Aero-towing speed ...... km/h</td>
<td>215</td>
<td>186</td>
<td>176</td>
<td>185</td>
<td>153</td>
<td>195</td>
</tr>
<tr>
<td>Winch launching speed .. km/h</td>
<td>138</td>
<td>112</td>
<td>109</td>
<td>119</td>
<td>96</td>
<td>124</td>
</tr>
<tr>
<td>Type designation</td>
<td>1-21</td>
<td>1-23</td>
<td>1-23D</td>
<td>1-24</td>
<td>1-26</td>
<td>2-25</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Cloud flying permitted yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Permitted aerobatic manoeuvres</td>
<td>no restrictions</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Spinning permitted yes/no</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Foremost and aftmost c.g. positions for which compliance with regulations has been shown or is intended in % m.a.c.</td>
<td>26% and 36%</td>
<td>26% and 36%</td>
<td>25% and 34.5%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Straight flight performance at flying weight of ...... kg</td>
<td>300</td>
<td>268</td>
<td>290</td>
<td>365</td>
<td>260</td>
<td>509</td>
</tr>
<tr>
<td>No flap or brake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V for min. sink</td>
<td>V km/h</td>
<td>V m/s</td>
<td>V km/h</td>
<td>V m/s</td>
<td>V km/h</td>
<td>V m/s</td>
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<tr>
<td></td>
<td>61</td>
<td>0.66</td>
<td>58</td>
<td>0.70</td>
<td>55</td>
<td>0.61</td>
</tr>
<tr>
<td>V for max. L/D</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>72</td>
<td>0.69</td>
<td>77</td>
<td>0.79</td>
<td>77</td>
<td>0.73</td>
</tr>
<tr>
<td>Stalling speed</td>
<td>km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>58</td>
<td>53</td>
<td>53</td>
<td>58</td>
<td>45</td>
<td>58</td>
</tr>
<tr>
<td>Max L/D</td>
<td>km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>29</td>
<td>27</td>
<td>30</td>
<td>30</td>
<td>23</td>
<td>30</td>
</tr>
</tbody>
</table>

**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)


SGS 2-8 (TG-2)

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)


SGU 1-19


SGU 1-20

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

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

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


<table>
<thead>
<tr>
<th>Type designation</th>
<th>TG-2</th>
<th>TG-3A</th>
<th>1-19</th>
<th>1-20</th>
<th>2-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designers</td>
<td></td>
<td></td>
<td>Schweizer Aircraft Corporation</td>
<td></td>
<td></td>
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<tr>
<td>Date of 1st flight of prototype</td>
<td>1938</td>
<td>1942</td>
<td>1944</td>
<td>1946</td>
<td>1945</td>
</tr>
<tr>
<td>Number produced</td>
<td>57</td>
<td>114</td>
<td>57</td>
<td>2</td>
<td>55</td>
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<tr>
<td>Wings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>15.9</td>
<td>16.5</td>
<td>11.2</td>
<td>13.1</td>
<td>13.1</td>
</tr>
<tr>
<td>Area</td>
<td>19.9</td>
<td>22.0</td>
<td>15.8</td>
<td>16.9</td>
<td>19.5</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>12.6</td>
<td>12.3</td>
<td>7.9</td>
<td>10.15</td>
<td>8.8</td>
</tr>
<tr>
<td>Wing root chord</td>
<td>1.53</td>
<td>1.53</td>
<td>1.45</td>
<td>1.45</td>
<td>1.53</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>0.61</td>
<td>0.92</td>
<td>1.45</td>
<td>0.92</td>
<td>1.53</td>
</tr>
<tr>
<td>Wing section, root</td>
<td>NACA 4412</td>
<td>NACA 4416</td>
<td>NACA</td>
<td>NACA</td>
<td>NACA</td>
</tr>
<tr>
<td>Wing section, tip</td>
<td>NACA 4412</td>
<td>NACA 4412</td>
<td>NACA</td>
<td>NACA</td>
<td>NACA</td>
</tr>
<tr>
<td>Type designation</td>
<td>TG-2</td>
<td>TG-3A</td>
<td>1-19</td>
<td>1-20</td>
<td>2-22</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Dihedral .......... deg.</td>
<td>3.0</td>
<td>4.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Aero. twist root/tip deg.</td>
<td>6.0</td>
<td>3.0</td>
<td>3.0</td>
<td>4.0</td>
<td>3.0</td>
</tr>
<tr>
<td>Taper ratio ...........</td>
<td>2.5</td>
<td>1.7</td>
<td>1.0</td>
<td>1.6</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Ailerons**

| Type ..................... | 4.64 | 4.68 | 2.70 | 3.40 | 3.11 |
| Area ..................... m² | 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 ............. m² | 2.22 | 2.76 | 1.91 | 1.91 | 1.91 |
| Area of elevator ............. m² | 0.96 | 1.22 | 0.86 | 0.86 | 0.86 |

**Vertical tail**

| Area of fin and rudder ........... m² | 1.45 | 1.56 | 1.21 | 1.21 | 1.21 |
| Area of rudder ............. m² | 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 ............. | tandem | tandem | fixed wheel | fixed wheel | tandem |
| Undercarriage type ...... | fixed wheel with brake | fixed wheel with brake | fixed wheel | fixed wheel with brake |

**Lift increasing devices....**

| Type ..................... | spoilers | spoilers | none | none | spoilers |
| General location ............. | top of wing | top and bottom of wing | none | none | 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/m² | 19.6 | 25.2 | 15.8 | 16.9 | 19.5 |

**Design standards**

| Airworthiness require- ments to which aircraft has been built ............. | CAR 05 | CAR 05 | CAR 05 | CAR 05 | CAR 05 |
| Certificate of airworthiness ............. | ATC No. 5 | Military | ATC G 17 | Experimental | ATC G 18 |
### Limiting flight conditions

<table>
<thead>
<tr>
<th>Type designation</th>
<th>TG-2</th>
<th>TG-3A</th>
<th>1-19</th>
<th>1-20</th>
<th>2-22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placard airspeed</td>
<td>km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winch launching speed</td>
<td>km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prize-towing speed</td>
<td>km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cloud flying permitted</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinning permitted</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Straight flight performance

<table>
<thead>
<tr>
<th>at flying weight of</th>
<th>kg</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
<th>V km/h</th>
<th>v m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>for min. sink</td>
<td></td>
<td>63</td>
<td>0.78</td>
<td>53</td>
<td>1.10</td>
<td>56</td>
<td>0.94</td>
<td>60</td>
<td>1.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for max. L/D</td>
<td></td>
<td>74</td>
<td>0.88</td>
<td>68</td>
<td>1.19</td>
<td>69</td>
<td>1.19</td>
<td>76</td>
<td>1.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. L/D</td>
<td></td>
<td>23</td>
<td></td>
<td>16</td>
<td></td>
<td>16</td>
<td></td>
<td>17</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## United States - Vereinigte Staaten - Etats-Unis

**Manufacturer:**

Nelson Speciality Corp.
San Leandro, California

*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


**Nelson PG-185B Hummingbird**

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.

RJ-5

The RJ-5 is one of the first high performance sailplanes featuring a laminar aerofoil. The fuselage is of plywood semi-monocoque 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


RJ-5

L’un des premiers planeurs de haute per-
performance 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.

<table>
<thead>
<tr>
<th>Type designation</th>
<th>Nelson PG-185B Hummingbird</th>
<th>Perl PG-130 Penetrator</th>
<th>RJ-5</th>
<th>Cherokee II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Designer(s)</td>
<td>Harry Perl-aircraft</td>
<td>Harry N. Perl</td>
<td>Ross-Johnson</td>
<td>Stanley A. Hall</td>
</tr>
<tr>
<td>Date of first flight of prototype</td>
<td>May 1949</td>
<td>April 1953</td>
<td>July 1950</td>
<td>1956</td>
</tr>
<tr>
<td>Number produced</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>~ 80 under construction</td>
</tr>
<tr>
<td>Wings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>16.46</td>
<td>14.63</td>
<td>16.75</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>17.25</td>
<td>12.08</td>
<td>11.6</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td></td>
<td>15.73</td>
<td>17.75</td>
<td>24.0</td>
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<tr>
<td>Wing root chord</td>
<td>m</td>
<td>1.52</td>
<td>1.27</td>
<td>1.07</td>
</tr>
<tr>
<td>Wing tip chord</td>
<td>m</td>
<td>0.57</td>
<td>0.51</td>
<td>0.305</td>
</tr>
<tr>
<td>Mean aerodynamic chord (m.a.c.)</td>
<td>m</td>
<td>1.15</td>
<td>0.92</td>
<td>0.746</td>
</tr>
<tr>
<td>Wing section, root</td>
<td></td>
<td>Gö 549</td>
<td>Gö 549</td>
<td>63₉-615</td>
</tr>
<tr>
<td>Wing section, mid</td>
<td></td>
<td>Gö 549</td>
<td>Gö 549</td>
<td>63₉-615</td>
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<tr>
<td>Wing section, tip</td>
<td></td>
<td>Gö 676</td>
<td>Gö 676</td>
<td>63₉-615</td>
</tr>
</tbody>
</table>

Cherokee II


Cherokee II

Monoplace de performance moyenne, prévu pour la fabrication individuelle à bas prix. Construction de bois, de montage très simple, entoilée.
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Nelson PG-185B Hummingbird</th>
<th>Perl PG-130 Penetrator</th>
<th>RJ-5</th>
<th>Cherokee II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dihedral</td>
<td>3.</td>
<td>2.</td>
<td>2.5</td>
<td>2.</td>
</tr>
<tr>
<td>¼ chord sweep</td>
<td>0.5</td>
<td>0.5</td>
<td>0</td>
<td>-0.5</td>
</tr>
<tr>
<td>Aero twist root/tip</td>
<td>2.</td>
<td>0</td>
<td>-3.0</td>
<td>0.</td>
</tr>
<tr>
<td>Length of each section of wing</td>
<td>m</td>
<td>7.62</td>
<td>7.315</td>
<td>8.375</td>
</tr>
<tr>
<td>Special features</td>
<td></td>
<td>filled leading edge</td>
<td>filled leading edge “D” section</td>
<td>waviness ≤±.004 inches in 2.0 inches on leading edge</td>
</tr>
<tr>
<td>Ailerons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>plain</td>
<td>inset hinge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>4.26</td>
<td>2.37</td>
<td>2.13</td>
</tr>
<tr>
<td>Area</td>
<td>m²</td>
<td>2.50</td>
<td>1.17</td>
<td>2.09</td>
</tr>
<tr>
<td>Mean chord</td>
<td>m</td>
<td>0.29</td>
<td>0.24</td>
<td>0.14</td>
</tr>
<tr>
<td>Max deflection up</td>
<td>deg.</td>
<td>28</td>
<td>30</td>
<td>22</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
<td>14</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td></td>
<td>full</td>
<td>full</td>
<td>nil</td>
</tr>
<tr>
<td>Mass balance method</td>
<td></td>
<td>nose</td>
<td>nose</td>
<td>—</td>
</tr>
<tr>
<td>Horizontal tail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span</td>
<td>m</td>
<td>2.64</td>
<td>1.85</td>
<td>2.44</td>
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<td>Area of elevator and fixed tail</td>
<td>m²</td>
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<td>0.93</td>
<td>1.17</td>
</tr>
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<td>Area of elevator</td>
<td>m²</td>
<td>—</td>
<td>—</td>
<td>0.56</td>
</tr>
<tr>
<td>Max. deflection up</td>
<td>deg.</td>
<td>25</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Max. deflection down</td>
<td>deg.</td>
<td>25</td>
<td>23</td>
<td>15</td>
</tr>
<tr>
<td>Aerofoil section</td>
<td></td>
<td>NACA 0009</td>
<td>NACA 0009</td>
<td>(non-descript)</td>
</tr>
<tr>
<td>Mass balance degree</td>
<td></td>
<td>full</td>
<td>full</td>
<td>nil</td>
</tr>
<tr>
<td>Mass balance method</td>
<td></td>
<td>counterweight</td>
<td>counterweight</td>
<td>—</td>
</tr>
<tr>
<td>Tail arm (from 1/4 chord m.a.c. wing to 1/4 chord m.a.c. tail)</td>
<td>m</td>
<td>4.4</td>
<td>4.1</td>
<td>3.38</td>
</tr>
<tr>
<td>Elevator aerodynamic balance method</td>
<td>all-movable tail tab</td>
<td>all-movable tail tab</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Elevator trimming method</td>
<td></td>
<td>NACA tab</td>
<td>NACA tab</td>
<td>none</td>
</tr>
<tr>
<td>Special features</td>
<td></td>
<td>all-movable tail</td>
<td>all-movable tail</td>
<td>nil</td>
</tr>
<tr>
<td>Vertical tail</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area of fin and rudder</td>
<td>m²</td>
<td>1.3</td>
<td>1.04</td>
<td>0.92</td>
</tr>
<tr>
<td>Ares of rudder</td>
<td>m²</td>
<td>0.5</td>
<td>0.4</td>
<td>0.58</td>
</tr>
<tr>
<td>Aspect ratio</td>
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<td>CAAM 05</td>
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### Design flight envelope

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<th>V km/h</th>
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<td>133</td>
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<td>124</td>
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<td>225</td>
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<td>225</td>
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<td>140</td>
<td>—3.6</td>
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</table>

| Safety factor | 1.5 | 1.5 | 1.5 |

### Limiting flight conditions

- Placard airspeed smooth conditions km/h: 225
- Placard airspeed gusty conditions km/h: 225
- Aero-towing speed km/h: —
- Winch launching speed km/h: —
- Cloud flying permitted: yes
- Permitted aerobatic manoeuvres: loops
- Spinning permitted: 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
- Cloud flying permitted: yes
- Cloud flying conditions km/h: 20.0 and 31.5
- Cloud flying permitted: yes
- Cloud flying conditions km/h: 30.0 M.G.C. normal

### Straight flight performance

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<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
<th>V km/h</th>
<th>V m/s</th>
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<td>V for max. L/D</td>
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<table>
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<th>V km/h</th>
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**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.

**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.
Košava


Orao II c


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.

Manufacturer:
Savezni Vazduhoplovni Centar
Vršac

Mačka

The Mačka is a single-seat aerobatic sailplane.
Mоčka

Einsitziges Flugzeug für Kunstflug.

Mоčka

Monoplace d’acrobatie.

Ilindenka-1

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

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<th>Meteor</th>
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<th>Košava</th>
<th>Močka</th>
<th>Ilindenka-1</th>
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<td>Designer</td>
<td>Obad, Cijan and Mazovec</td>
<td>B. Cijan S. Obad</td>
<td>Ilie, Kisovec and Karapandzic</td>
<td>M. Ilie</td>
<td>M. Ilie</td>
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<td>1954</td>
<td>1952</td>
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<tr>
<td>Special features</td>
<td>dorsal fin</td>
<td></td>
<td></td>
<td>dorsal fin</td>
<td></td>
</tr>
<tr>
<td>Type designation</td>
<td>Meteor</td>
<td>Orao He</td>
<td>Košava</td>
<td>Mačka</td>
<td>Ilindenka-1</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>---------</td>
<td>--------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Fuselage</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. width ............ m</td>
<td>0.58</td>
<td>0.60</td>
<td>0.62</td>
<td>0.612</td>
<td>0.61</td>
</tr>
<tr>
<td>Overall length ....... m</td>
<td>8.05</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. cross section ..... m²</td>
<td>0.46</td>
<td></td>
<td>0.568</td>
<td>0.53</td>
<td></td>
</tr>
<tr>
<td>Wetted surface area ... m²</td>
<td>9.29</td>
<td>9.90</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number seats and</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>arrangement ..........</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undercarriage type ......</td>
<td>retractable front skid and retractable wheel</td>
<td>tandem</td>
<td>skid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheel diameter ....... cm</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special features ......</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Lift increasing devices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ..................</td>
<td>trailing edge flaps and droopable inner ailerons (sealed)</td>
<td>trailing edge flaps</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Span ................. m</td>
<td>2 × 3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area ................. m²</td>
<td>0.486</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. deflection up ... deg.</td>
<td>11</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. deflection down ... deg.</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Drag producing devices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type ..................</td>
<td>modified DFS airbrakes</td>
<td>modified DFS airbrakes</td>
<td>Schemp-Hirth airbrakes</td>
<td>Schemp-Hirth airbrakes</td>
<td></td>
</tr>
<tr>
<td>Span ................. m</td>
<td>1.06</td>
<td>1.170</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Area ................. m²</td>
<td>1.32</td>
<td>0.842</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of span ............</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Location, % of chord ...</td>
<td>55</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is device intended to limit terminal velocity (vertical dive) to max. permissible IAS, yes/no ..........</td>
<td>yes</td>
<td>yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weights</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wings¹ ................ kg</td>
<td>221</td>
<td>226</td>
<td>216</td>
<td>83</td>
<td>115</td>
</tr>
<tr>
<td>Fuselage² ............ kg</td>
<td>144</td>
<td>121</td>
<td>108</td>
<td>54</td>
<td>65</td>
</tr>
<tr>
<td>Tailplane and elevator ... kg</td>
<td>11</td>
<td>9</td>
<td>12</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Empty weight³ .......... kg</td>
<td>376</td>
<td>356</td>
<td>336</td>
<td></td>
<td>187</td>
</tr>
<tr>
<td>Instruments .......... kg</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Other equipment (e.g. oxygen, radio) .... kg</td>
<td>19</td>
<td>9</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipped weight ...... kg</td>
<td>405</td>
<td>365</td>
<td>372</td>
<td>157</td>
<td>197</td>
</tr>
<tr>
<td><strong>Type designation</strong></td>
<td><strong>Meteor</strong></td>
<td><strong>Orao IIc</strong></td>
<td><strong>Košava</strong></td>
<td><strong>Mačka</strong></td>
<td><strong>Ilindenka-1</strong></td>
</tr>
<tr>
<td>----------------------</td>
<td>-----------</td>
<td>------------</td>
<td>------------</td>
<td>-----------</td>
<td>---------------</td>
</tr>
<tr>
<td>Max. load .............. kg</td>
<td>100</td>
<td>90</td>
<td>203</td>
<td>100</td>
<td>113</td>
</tr>
<tr>
<td>Max. permissible flying weight .............. kg</td>
<td>505</td>
<td>455</td>
<td>575</td>
<td>260</td>
<td>310</td>
</tr>
<tr>
<td>Wing loading (max.) ...... kg/m²</td>
<td>31.5</td>
<td>25.5</td>
<td>27.2</td>
<td>26.0</td>
<td>21.8</td>
</tr>
</tbody>
</table>

**Design standards**

Airworthiness requirements to which aircraft has been built................. BCAR Section E Bauvor- schriften für Segelflug- zeuge BVS

Date of issue of these requirements .................. 1 March 1948 1939 1939

Certificate of airworthiness ................................................................. yes yes

**Design flight envelope**

**Manoeuvre loads**

<table>
<thead>
<tr>
<th>V km/h</th>
<th>proof load factor</th>
<th>V km/h</th>
<th>proof load factor</th>
<th>V km/h</th>
<th>proof load factor</th>
<th>V km/h</th>
<th>proof load factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point A</td>
<td>153</td>
<td>5.0</td>
<td>128</td>
<td>5.0</td>
<td>65</td>
<td>4.3</td>
<td>6.5</td>
</tr>
<tr>
<td>Point B</td>
<td>252</td>
<td>4.0</td>
<td>220</td>
<td>5.0</td>
<td>88</td>
<td>4.5</td>
<td>6.5</td>
</tr>
<tr>
<td>Point C</td>
<td>252</td>
<td>1.0</td>
<td>220</td>
<td>1.0</td>
<td>230</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>Point D</td>
<td>144</td>
<td>-2.5</td>
<td>184</td>
<td>-2.75</td>
<td>118</td>
<td>-2.5</td>
<td>-3.25</td>
</tr>
<tr>
<td>Gust loads</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V km/h</td>
<td>v m/s</td>
<td>V km/h</td>
<td>v m/s</td>
<td>V km/h</td>
<td>v m/s</td>
<td>V km/h</td>
<td>v m/s</td>
</tr>
<tr>
<td>Point A</td>
<td>171</td>
<td>20.0</td>
<td>252</td>
<td>7.4</td>
<td>252</td>
<td>-2.48</td>
<td>171</td>
</tr>
</tbody>
</table>

**Limiting flight conditions**

Placard airspeed smooth conditions .......... km/h | 250 | 220 | 450 |
Placard airspeed gusty conditions ................ km/h | 125 | 150 | 150 | 150 | 200 |
Aero-towing speed .......... km/h | | | |
Winch launching speed .......... km/h | 100 | |
Cloud flying permitted .......... yes | yes | yes |
Permitted aerobatic manoeuvres .......... semi aerobatic | none | aerobatic loops 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. .......... 25.8% | 38.0% |
<table>
<thead>
<tr>
<th>Type designation</th>
<th>Meteor</th>
<th>Orao IIe</th>
<th>Košava</th>
<th>Mačka</th>
<th>Ilindenka-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal velocity with brakes opened at max. all up weight from flight tests (if brakes are speed limiting)</td>
<td>230</td>
<td>220</td>
<td>230</td>
<td>250</td>
<td>230</td>
</tr>
<tr>
<td>Straight flight performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>at flying weight of</td>
<td>555</td>
<td>240</td>
<td>237</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No flap or brake</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V for min. sink</td>
<td>~90</td>
<td>75</td>
<td>0.60</td>
<td>75</td>
<td>0.66</td>
</tr>
<tr>
<td>V for max. L/D</td>
<td>85</td>
<td>0.65</td>
<td>87</td>
<td>0.72</td>
<td>83.0</td>
</tr>
<tr>
<td>1.5 × V stall</td>
<td>110</td>
<td>1.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.75 × V stall</td>
<td>140</td>
<td>2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With ....° flap</td>
<td>5°</td>
<td>120</td>
<td>1.2</td>
<td>150</td>
<td>1.95</td>
</tr>
<tr>
<td>Stalling speed</td>
<td>67</td>
<td>36</td>
<td>33.5</td>
<td>21.5</td>
<td>27.5</td>
</tr>
<tr>
<td>Max. L/D</td>
<td>~42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**

Einsitziges Amphibien-Segelflugzeug.

**Jadran**

Planeur amphibie monoplace.

Wings: span 15.0 m; area 13.25 m²; aspect ratio 17; root wing section Gō 549.
Weights: empty 195 kg; max. permissible flying weight 280 kg.
Limiting Flight Conditions: placard air-speed 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.)

\[ \text{Aspect Ratio} = \frac{\text{span}^2}{\text{wing area}} = \frac{b^2}{S} \]

Mean Aerodynamic Chord (m. a. c.)

\[ \frac{\text{wing area}}{\text{span}} = \frac{S}{b} = \bar{C} \]

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

\[ = \frac{2 \int_0^{b/2} cydx}{S} \]
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 (lightening 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.

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

**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:

- Plain
- Split
- Stopped
- Fowler

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

- Plain upper (or lower) surface spoilers
- Vented upper (or lower) surface spoilers
- Perforated upper (or lower) surface spoilers
- DPS type airbrakes (i.e. vented upper and lower surface spoilers)
- Segmented upper (or lower) surface brakes

Design Flight Envelope

This is specified in terms of two sets of design loads

a) applied by the pilot during manoeuvres 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 manoeuvre accelerations or gust velocities have to be considered. Typical "envelopes" resulting from these cases are as follows:

a) Manoeuvre cases
Note: $V_A =$ flight speed at which an upward 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 manoeuvre 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 develops 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:

\[ \text{Diagram showing gust cases and associated flight speeds.} \]

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 Flügel spitze / Profondeur de l’aile à l’extrémité

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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
\( \frac{1}{4} \) chord sweep / Pfeilung bei \( \frac{1}{4} \) Flügeltiefe / Flèche à \( \frac{1}{4} \) 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, Einsatzzscharniere, 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
Tail arm (from \( \frac{1}{4} \) chord m.a.c. wing to \( \frac{1}{4} \) chord m.a.c. tail) / Maß von \( \frac{1}{4} \) mittlerer aerodynamischer Tiefe des Flügels bis \( \frac{1}{4} \) 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
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 / Größer Querschnitt / Section maximum
Wetted surface area / Oberflacheninhalt / 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

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, Rumpfabszugsklappen) / Type (volets de freinage, parachute de poupe, etc.)
General location (e.g. top of wing, bottom of wing, fuselage) / Anordnung (z.B. Flügel spitze, 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 Eigen geschwindigkeit verwendet werden? / Le dispositif est-il destiné à limiter la vitesse de piqué au maximum admissible?

Weights / Gewichte / Poids
Wings¹ / Flügel¹ / Ailes¹
Fuselage² / Rumpf² / Fuselage²
Tailplane and elevator / Höhenflosse und Höhenruder / Gouvernails de profondeur et de direction

206
Empty weight / Leergewicht / Poids à vide
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, Flug-erlaubnis) / Autres certifications (admis pour expérience, admis à voler, etc.)

Design flight envelope / Begrenzung der Leistungen im Flug / Etendue des possibilités de vol
Manoeuvre 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 extremes 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 eroben (falls Bremsen geschwindigkeitsbeschrankend 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

Conversion of Units

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To convert

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<td>100's ft/min</td>
<td>knots</td>
<td>0.987</td>
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<table>
<thead>
<tr>
<th>Carrier telephony</th>
<th>Industry</th>
<th>Counters and Computers</th>
<th>Radio communication</th>
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<td>Measuring</td>
<td>Measuring, Radio communication</td>
<td>Measuring</td>
<td>fixed and mobile Navigation ARINC</td>
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<td>E 180 F</td>
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<td>E 180 F</td>
<td>E 88 CC</td>
<td>E 180 CC</td>
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