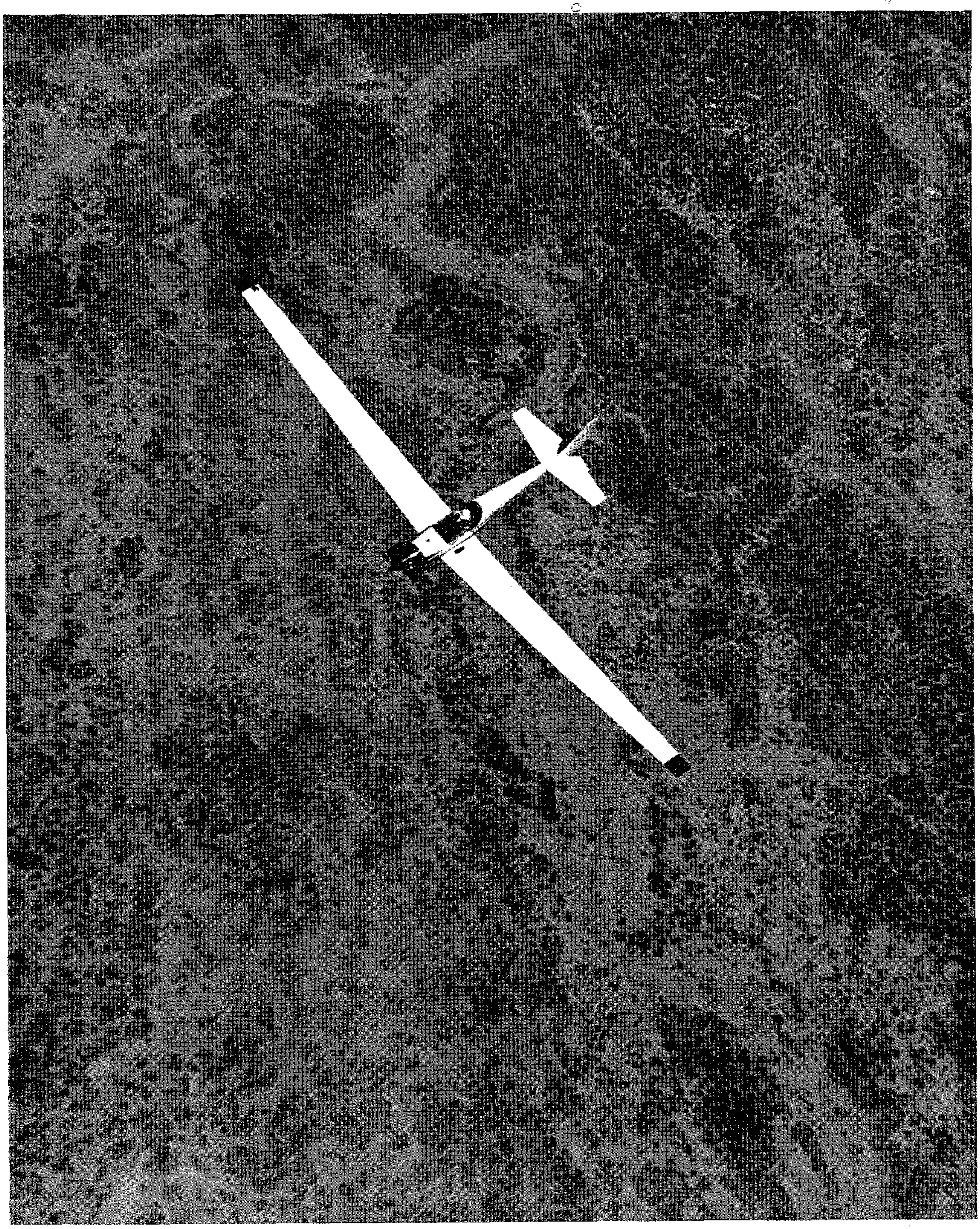
MOTORGLIDING

FEBRUARY 1974
50 CENTS



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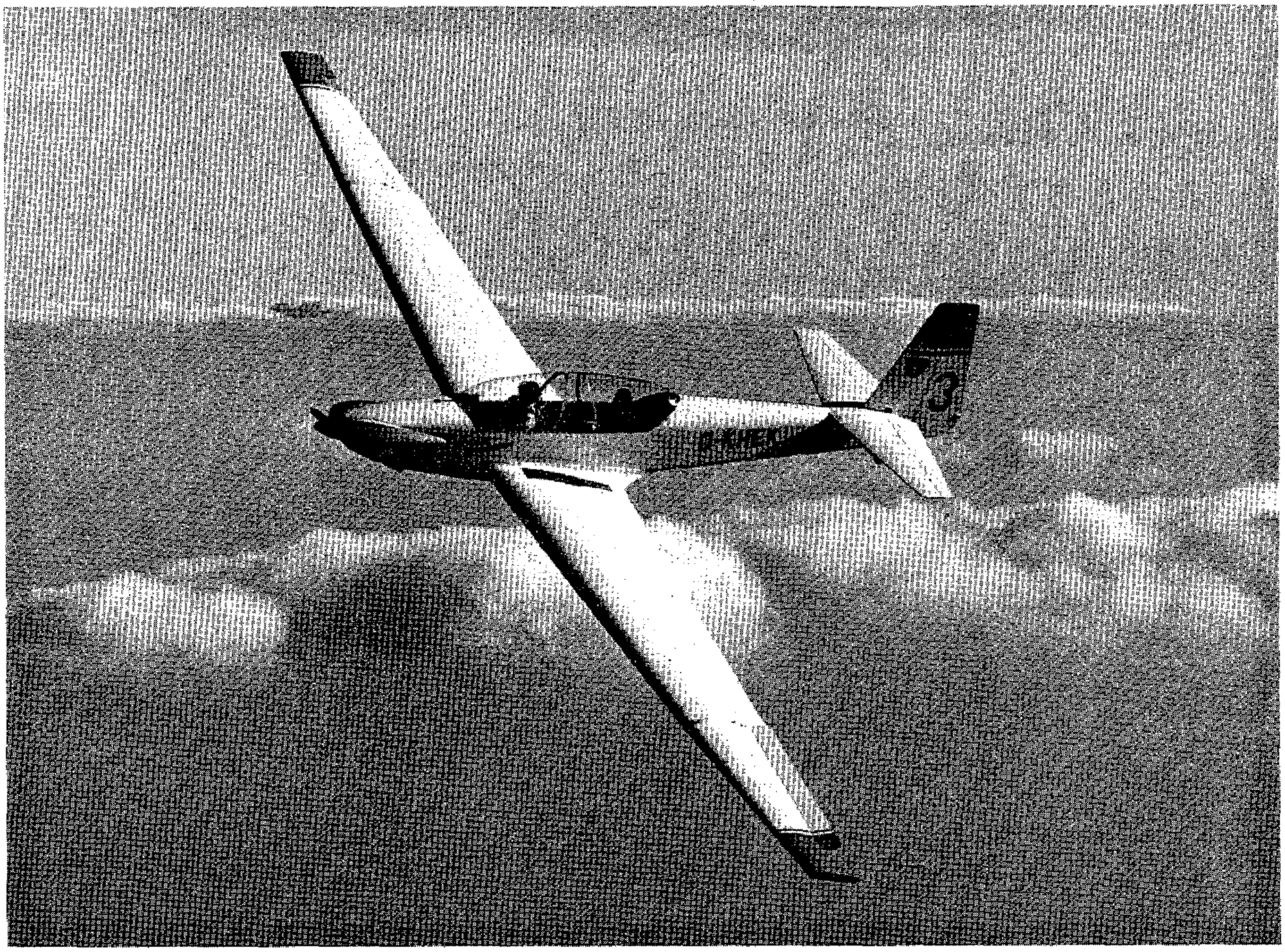

RF-5B SPERBER

TYPE	SPAN	L/D	DELIVERY	SEATS	HP	ENGINE	MIN R/S
RF-5B	57 ft	28	4 months	Dual	68	SL 1700E	2.7 ft/sec

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MOTORGLIDING

Donald P. Monroe, Editor

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Cover: SFS-31 *Milan*, by George Uveges

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SOME FLIGHT TESTS ON SELF-LAUNCHING SAILPLANES

by Hans Zacher
DFVLR, Munchen-Riem, Germany

Introduction

Self-launching sailplanes (SLS's) have proved themselves; there are 500 training and high performance machines flying in Germany. The increase is due mainly to the availability of usable powerplants, but also to the acknowledgement that SLS's are used abroad. The author has reported on the philosophy and purpose of SLS's at the OSTIV Congress in Junin, Argentina (1963) [2] as well as technical characteristics; this report was updated and published in Holland [3]. Table 5, taken from that publication, lists almost all the SLS's which have been developed and flown in Germany.

There has been a lengthy preoccupation in several places with the question of what a SLS is. Table 1 presents a selection of different requirements, (corresponding to "definitions") set by particular organizations, which have been brought to the attention of the FAI [4]. The official requirements, which are primarily concerned with flight safety, depart understandably from competition requirements in many ways. One can nevertheless be thankful that the Luftfahrt-Bundesamt (Federal Aviation Office) in Braunschweig left plenty of room in its "Guidelines" [1] for technical development, and so encouraged SLS's in this manner. Unfortunately the Sporting Commissions have all too often wished for a very strict definition of SLS's; if this definition were applied to gliders themselves, nearly all training machines would lose their licenses.

The technical development of SLS's has been accomplished without government support, and even working against the resistance of aero clubs and/or soaring associations. The industry, some groups, and certain individuals have succeeded, nonetheless, in creating a new aircraft at a time when a reduction in airspace is desired, even though not strictly necessary.

Work is still in progress on specifications and requirements. The requirements should be based on the "Guidelines". Since it is important that the performance and characteristics of SLS's be measured and verified, the DFVLR section for sailplanes and light aircraft has assumed responsibility for SLS's (since 1962). Measurements have been made of performance, flight characteristics, propeller thrust, fuel consumption, noise, and so on at SLS meets and trials; evaluation formulas have been investigated. Over and above this, precise flight tests have been carried out on individual aircraft. Fortunately other establishments have concerned themselves with similar investigations, (see, for example, Whitfield at Reading University (England) [5]).

Flight tests

In connection with the flight tests of the D-36 glider and other aircraft [6] (further bibliography in the cited reference) it should be mentioned that partial glide sinking speed as well as climbing speed tests were made for SLS's. The climbing speed curves are limited to full throttle or maximum permissible engine speed limits, the sinking speed curves to locked propeller or covered propeller operation. Performance with idling propellers was only determined in certain cases because the results show more scatter than usual (possibly because of the idling rotation speed change with cooling down of the engine). Comprehensive tests and calculations, such as those carried out by Whitfield [5] on one machine in a praiseworthy manner, were rejected by us in favor of tests on many machines. All climbing speed polars are presented with altitude as a parameter. The measured points are corrected to a payload of 90 kg (or 180 kg for two seaters). The sinking speed polars are also corrected for 90 kg (or 180 kg, correspondingly), but only for sea level air density.

Description and data

The aircraft selected for test purposes were not specially chosen; the examples which were tested were those which were available. In this way SLS's were proven in the fullest sense of the word. Concerning these aircraft, the following points should be noted:

RF-3. Built in 1964, with more than 1200 hours, not especially good condition.

Wood construction - measured ceiling - 4900 m, measured cruising speed - 175 km/h.

RF-5. Built in 1970. Two examples existed, both in good condition. Measured ceiling over 5000 m, measured cruising speed - 185 km/h.

SF-25B *Falke (Falcon)*. Built in 1969. Apparently well repaired after an accident. Wooden wing, steel-tube fuselage. Measured ceiling - 4900 m, measured cruising speed - 145 km/h.

SF-27M. Built in 1969. Good condition. Wooden wing, steel tube fuselage. The minimum climbing flight conditions were not available. The sinking speed polar was evaluated by correcting tests on the SF-27A for the new wing loading.

Kraehe (Crow). For data see Table 5, and the pictures in refs. [2], [3].

Motorspatz (Motorsparrow). For data see Table 5, and the pictures in ref. [2].

AS-K 14. For data see Table 5.

SF-25A. *Motorfalke (Motorfalcon)*. Predecessor of SF-25B. Data in Table 5. Shoulderwing, different powerplant than the B model.

Results

Figs. 5-8 and Table 2 present the essential results from the performance tests. Fig. 5 gives the climbing speed as a function of flight speed with altitude as a parameter. The figure serves as an example of the scatter of the data points. Figs. 6 and 7 contain the sinking speed and climbing speed for the four aircraft. In Fig. 3 the sinking speed polars of the four SLS's are compared with those of two sailplanes, the SF-27A and the well-known Ka-6CR (all machines at 90 kg, or correspondingly, 180 kg loading and at sea-level air density). Air brakes are indicated by BK (Bremsklappen).

Table 3 presents a collation of the important flying qualities. Table 4 shows take-off and performance measurements which were obtained from SLS tests held at Leutkirch and Feuerstein from 1962 through 1970. Average and extreme values are included; these show that the current guidelines may be met, at contests, either with high weight or without special skill (the practical case). The stated climb and sinking speeds correspond roughly to those which were measured in precise altitude step interval flights; they correspond to the average values for different examples of one type at altitudes between 500 and 1500 m.

Conclusions

From a great number of measurements at contests, comparative flight trials, and altitude step test flights the most important results have been extracted. They present a picture of a broad region between high performance sailplanes (SF-27M) on down to training and school aircraft (RF-5). The "Guidelines" laid down by the Luftfahrt-Bundesamt and also by the sport organizations as minimum performance definitions may be regarded as fulfilled.

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(From *Proceedings of the First International Symposium on the Technology and Science of Motorless Flight*, Massachusetts Institute of Technology, October 18-21, 1972.)

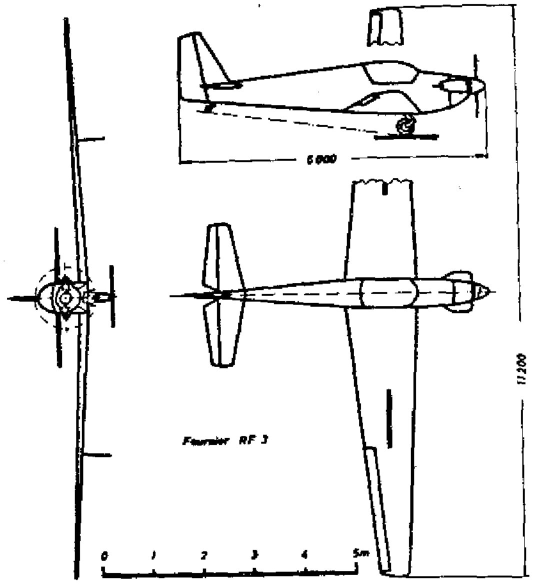


Fig. 1. Single-seater SLS RF-3.

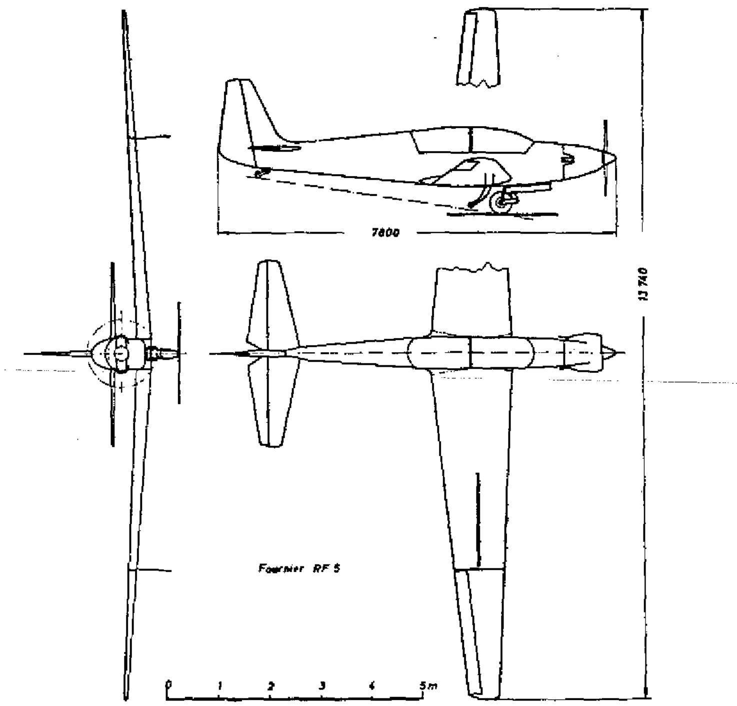


Fig. 2. Two-seater SLS RF-5.

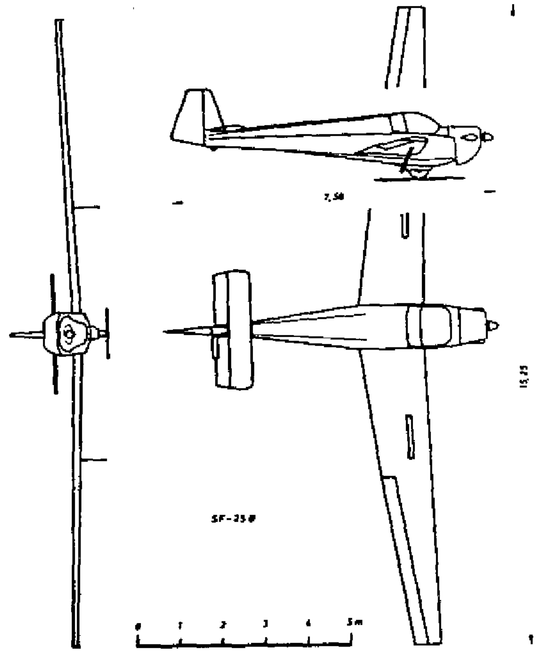


Fig. 3. Two-seater SLS SF-25B.

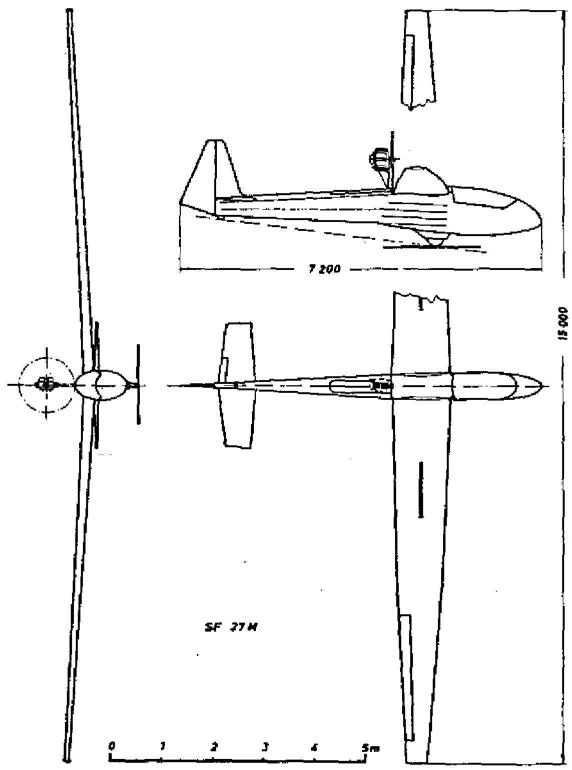


Fig. 4. Single-seater SLS SF-27M.

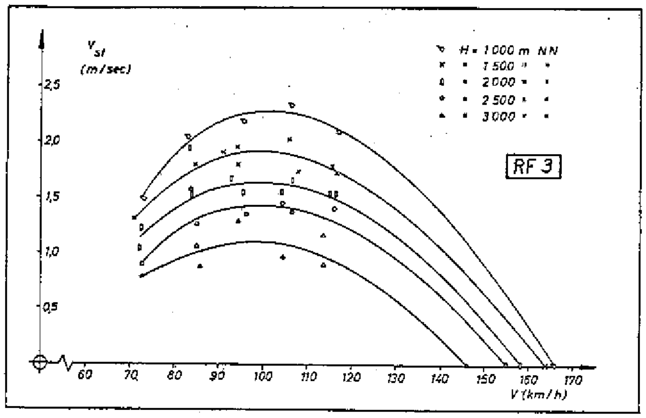


Fig. 5. Climbing speed polars of the RF-3 with the data points at different altitudes (example).

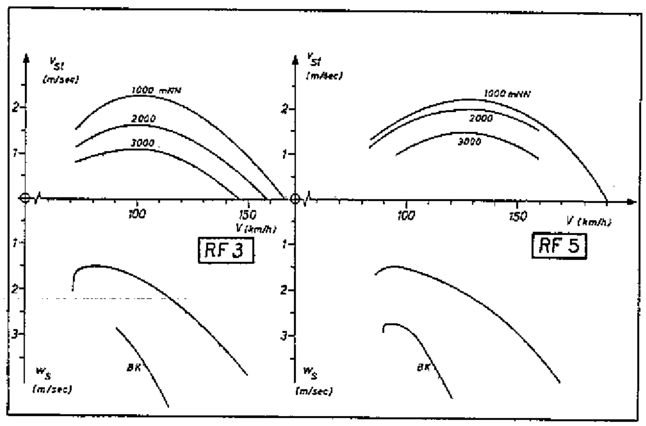


Fig. 6. Climb and sinking speed polars of the RF-3 and RF-5.

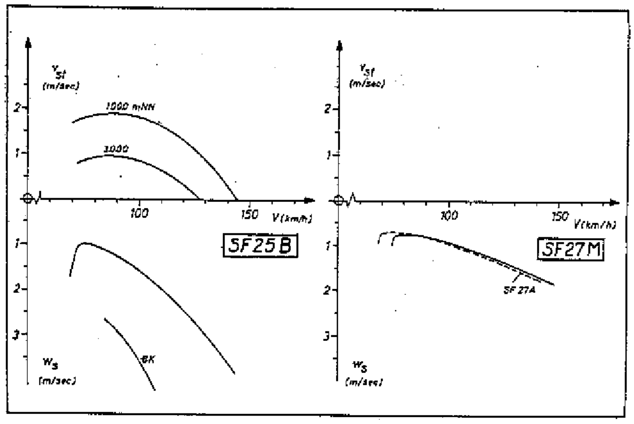


Fig. 7. Climb and sinking speed polars of the SF-25B and SF-27M.

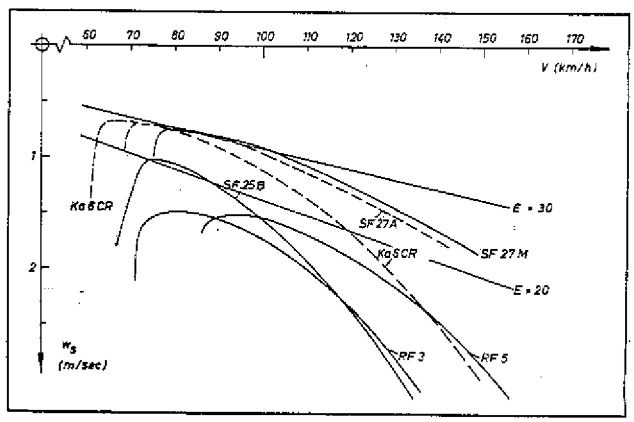


Fig. 8. Sinking speed polars of four SLS's compared to two sailplanes.

	maximum weight (kg)	climbing speed (m/sec)	minimum speed (km/h)	glide ratio	sinking speed (m/s)
ARB England	750	1.25	75	1:20	-
FAA USA	-	1.00	-	1:20	1.0
FAI CIVV	750	1.25	75	1:20	-
LBA Germany	700	1.25	(65)	-	1.5
L+A Switzerland	600	1.25	60-65	1:20	1.0
USSR	600	1.50	65	1:17	1.5

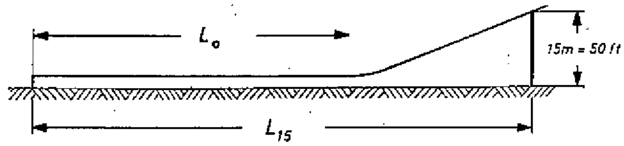
Table 1. Powered glider "Definitions" of different organizations. (January 1970)

Type	Profile	Span m	wing area m^2	aspect ratio (no units)	empty weight kg	flying weight kg	wing loading kg/m^2	minimum speed km/h	minimum sinking speed at V (m/sec)	(km/h)	best glide ratio at V (no units)	(km/h)	sinking speed at V (sinking speed in m/sec) V = 100 km/h	120 km/h	150 km/h	engine	climbing speed in m/sec at V(km/h) at altitude H(m)
RF 3	NACA 23015 23012	11.2	11.0	11.4	280	370	33.7	71.3	1.49	80.5	16.1	94.0	1.74	2.37	4.0	Rectimo 4AR1200 39 PS	2.3 100 in 1000 m
RF 5	NACA 23015 23012	13.7	15.1	12.5	470	650	43.0	86	1.52	95	18.0	105	1.56	1.92	2.9	Limbach SL1700E 68 PS	2.3 125 in 1000 m
SF25B	Mü 14%	15.3	17.5	13.4	360	540	31.0	67.2	1.02	75	21.1	81	1.65	2.55	-	Stamo MS 1500 45 PS	1.9 88 in 1000 m
SF27M	FX 61-184 60-126	15.0	12.1	18.6	280	370	30.5	75	0.77	83	31	95	0,92	1.28	(1.9)	Hirth F10A1a 26 PS	(1.6) 105 in 1000 m
for comparison																	
SF27A	FX 61-184 60-126	15.0	12.1	18.6	222	312	25.8	68	0.70	75	31	87	0.95	1.33	(2.0)	-	-
Ka6CR	NACA 63_3-618	15.0	12.4	18.1	185	275	22.2	61	0.68	67	29	78	1.13	1.70	3.05	-	-

Table 2. Data and performance values for SLS's (with comparative values for two sailplanes) at 90 or 180 kg loadings.

	RF 3	RF 5	SF 25 B	SF 27 M	for comparison Ka 6 CR
Cockpit	good good visibility	fairly good good visibility	average (tight for 2 people) very good visibility	very good good visibility	average somewhat un-comfortable excellent visibility
Stalling behavior	abrupt nose down pitching, but control-lable	nose down pitching, controllable	wallowing without pitching	gentle nose down pitch-ing	mushes, controllable
Maneuver-ability in normal flight	very good good re-sponse excellent flaps	very good good re-sponse moderate flaps	good moderate response excellent flaps	good good re-sponse good flaps	good good response excellent flaps
Slip	not useful	moderately useful	moderately useful	useful	useful
Air start-ing	through di-viding with compression release	electrical starter	mechanical pull cord or dividing at 140 km/h	mechanical pull cord	-
Turn rever-sal time +45°roll to -45°roll at 1.4 V_{min}	3.2 sec	3.7 sec	5.2 sec	3.8 sec	4 sec

Table 3. Flying qualities of powered gliders.



(Requirement, 600 m = 2000 ft)

Type	Weight kg	Output hp	Take-off L_o (m)	Take-off L_{15} (m)	climbing speed m/s	sinking speed m/s
Krähe	340	23.0		440...750		
Motorspatz	345	25.0		300...850		
SF 27 M	370	26.0	210...260	410	1.60	0.70
ASK 14	360	26.0				
RF 3	350	39.0	200	340	2.30	1.50
RF 4	390	39.0	160...200	300...410	1.75	1.40
Motorfalke SF 25 A	490	25.0	120...200	320...480	1.25	1.20
Falke SF 25 B	540	45.0	120...240	300...430	1.80	1.00

Table 4. Measurements at SLS contests 1962-1970. Field height=600 m.

type	supplier	year	wing span (m)	wing area (m2)	aspect ratio	empty weight (kg)	flying weight (kg)	powerplant	nominal power	wing loading kg/m2	power loading kg/hp	self-launching	seats
Mü 13	Akaflieg München	1937	16	17	15.3	175	285	Kroeber M4	18.0	16.8	15.8	yes	1
C 10	Akaflieg Chemnitz	1940	12.5	12.0	13.0	170	300	Kroeber M4	18.0	25.0	16.7	yes	1
Hi 20 "Mose"	Hirth, Nabern	1942	14.8	18.7	11.7				20.0			yes	1
LK 10 A	Eilers, Bremen	1956	15.2	15.7	14.8	310	395	Lloyd 400 cm^3	12.0	25.2	33.0	no	1
AV 36 CM	Bölkow, München	1958	12.0	14.3	10.0	158	240	Solo	12.0	16.9	20.0	no	1
Dohle I	Pützer, Bonn	1956	13.2	18.0	9.7	300	420	Lloyd LP 400	13.5	23.4	31.0	no	1
Dohle II	Pützer, Bonn	1957	13.2	18.0	9.7	325	450	Ilo F2 376	24.0	25.0	18.0	yes	1
Illerfalke I	Obermeier, Illertissen	1956	19.0	21.2	17.1	310	500	AVA 4A	25.0	23.6	20.0	no	2
Illerfalke II	Obermeier, Illertissen	1962	19.0	21.2	17.1	370	550	Brändl ZB 700	30.0	26.0	18.4	yes	2
Motorraab R	Meulen, Oberhausen	1957	13.7	18.6	10.0	405	625	STAMO 1400 B	42.0	33.7	14.9	yes	2
F 77	Sterz, Augsburg	1956	14.4	16.8	12.2	250	350	AVA 4A	25.0	20.8	14.0	yes	1
Mü 23	Akaflieg München	1960	20.0	24.0	16.7	475	600	various types	(30.0)	25.0	(20.0)	yes	2
SF 1 - WM	Wezel, Reutlingen	1959	10.0	9.3	10.8	180	300	Wezel WR 3 G	25.0	32.2	12.0	yes	1
Krähe I	Raab, München	1957	12.0	14.4	10.0	230	340	Brändl ZB 300 S	18.0	23.6	14.2	yes	1
Krähe II	Raab, München	1961	12.0	14.4	10.0	230	340	Brändl ZB 300 SG	23.0	24.0	14.8	yes	1
Krähe V6	Raab-Blessing, Hamburg	1960	11.8	14.0	10.0	246	340	Pollmann HEPU 40/3500	40.0	24.3	8.5	yes	1
Motorspatz A	Scheibe, Dachau	1957	14.1	11.8	16.7	220	340	Brändl ZB 300 S	18.0	28.8	18.9	yes	1
Motorspatz B	Scheibe, Dachau	1962	14.1	11.8	16.7	225	345	Solo 560	25.0	29.2	13.8	yes	1
La 16	Landmann, Dresden	1961	12.5	12.5	12.5	170	275	Kroeber M 4	18.0	22.0	16.3	yes	1
La 17	Landmann, Dresden	1961	13.0	20.4	8.3	228	420	Zschopau BK 350	15.0	20.6	28.0	no	1
MS 60	Pützer, Bonn	1961	15.5	16.0	15.0	410	520	Ilo F2 376	30.0	32.6	17.3	yes	1
H 30 TS	Hütter-Kensche-Allgaier, Uhingen	1961	15.0	9.5	23.5	240	370	BMW 8026 turb.	(45 kp)	39.0	(8.2 kp/kp)	yes	1
SF25A Motorfalke	Scheibe, Dachau	1963	16.6	17.7	15.5	300	(460)	Solo 560 A	25.0	(26.0)	(18.4)	yes	2
SF25B Falke	Scheibe, Dachau	1967	15.3	17.5	13.4	335	530	STAMO 1400 C	45.0	30.3	11.8	yes	2
SF 27 M. "Illerschwalbe"	Scheibe, Dachau and Obermeier, Illertissen	1966	15.0	12.0	18.7	250	380	Solo-Hirth F 10	26.0	31.7	14.6	yes	1
K11 Lückenbüsser	Kaiser, Poppenhausen	1964	12.8	12.6	13.1	200	310	Solo	25.0	24.6	12.4	yes	1
K12 - ASK 14	Schleicher, Poppenhausen	1967	14.3	12.6	16.2	230	360	Solo-Hirth F 10 A	26.0	28.6	13.9	yes	1
MS 45	Blessing-Gomolzig, Wuppertal	1965	15.5	16.0	15.0	420	520	STAMO 1400 S	45.0	32.5	11.6	yes	1
K 8 B Stihl	Bruns, Münster	1965	15.0	14.2	15.9	205	310	Stihl SK 120	7.0	21.9	44.2	no	1
K 8 B Wankel	Fichtel & Sachs, Schweinfurt	1967	15.0	14.2	15.9	200	310	KM 48 Wankel	10.0	21.9	31.0	no	1
K 8 B - 2 M'	Hennige, LSV-Detmold	1968	15.0	14.2	15.9	220	310	Stihl SK 120/137 Fi	2x7	21.9	22.0	yes	1
Ka 6 Stihl	Bruns, Münster	1969	15.0	12.4	18.1	210	310	Stihl SK 120/137 Fi	8.5			no	1
RF 3	Pützer, Dahlemer Binz	1963	11.2	11.0	11.4	240	350	Rectimo 4 AR 1200	39.0	31.8	9.0	yes	1
RF 4	Pützer, Dahlemer Binz	1966	11.2	11.0	11.4	265	390	Rectimo 4 AR 1200	39.0	35.4	10.0	yes	1
RF 5	Pützer, Dahlemer Binz	1968	13.8	15.1	12.3	380	650	Rectimo AR 1600	68.0	43.0	9.6	yes	2
K 7 Stihl	Auweiler, Köln	1968	16.0	17.5	14.6	320	480	Stihl SK 120	2x10.0	27.4	24.0	no	2
Gleitermax	Blessing, Hamburg	1968	15.3	18.5	12.7	490	690	Porsche	52	36.0	13.0	yes	1
RFS 31	Pützer, Scheibe	1969	15.0	12.0	18.7	310	420	Rectimo 4 AR 1200	39.0	35.0	10.8	yes	1
D 37	Akaflieg Darmstadt	1969	18.0	13.8	24.8	329	445	Wankel KM 914	18.0	34.0	24.7	no	1
Sirius	Rhein-Flugzeugbau	1969	17.5	13.8	22.0	290	400	Nelson	43.0	29.0	9.3	yes	1
fs 26	Eppler-Akaflieg Stuttgart	1971	12.4	13.2	12.1	290	360	Solo-Hirth F 10 A	26.0	27.2	13.8	yes	1

Table 5. A compilation of data on German SLS's.

FOREIGN SCENE

by S. O. Jenko, Dipl. Ing. ETH—AMTECH SERVICES

Several European flying magazines carried articles about a new Polish auxiliary-powered sailplane *Altostratus*. The following account is based on articles in the French *Aviasport*, the German *Aerokurier* and the Polish *Skrzydlata Polska* magazines.

Altostratus was designed and built by a group of Polish homebuilders* from the town of Wroclawia; one of the participants was the noted designer Josef Borzecki. This design features several interesting items, one of them being the empty weight of only 196 pounds which includes the engine and the battery. Conventional wood-plywood-fabric construction is used.

The 10-meter (32.8-ft) wing consisting of two panels is tapered; the airfoils used are G 535 (root) and G 549 (tip), a rather unusual combination.** The ailerons extend over the entire wing span and are interconnected with a V-tail (90° canted surfaces). The cantilever wing has a main spar which with the nose

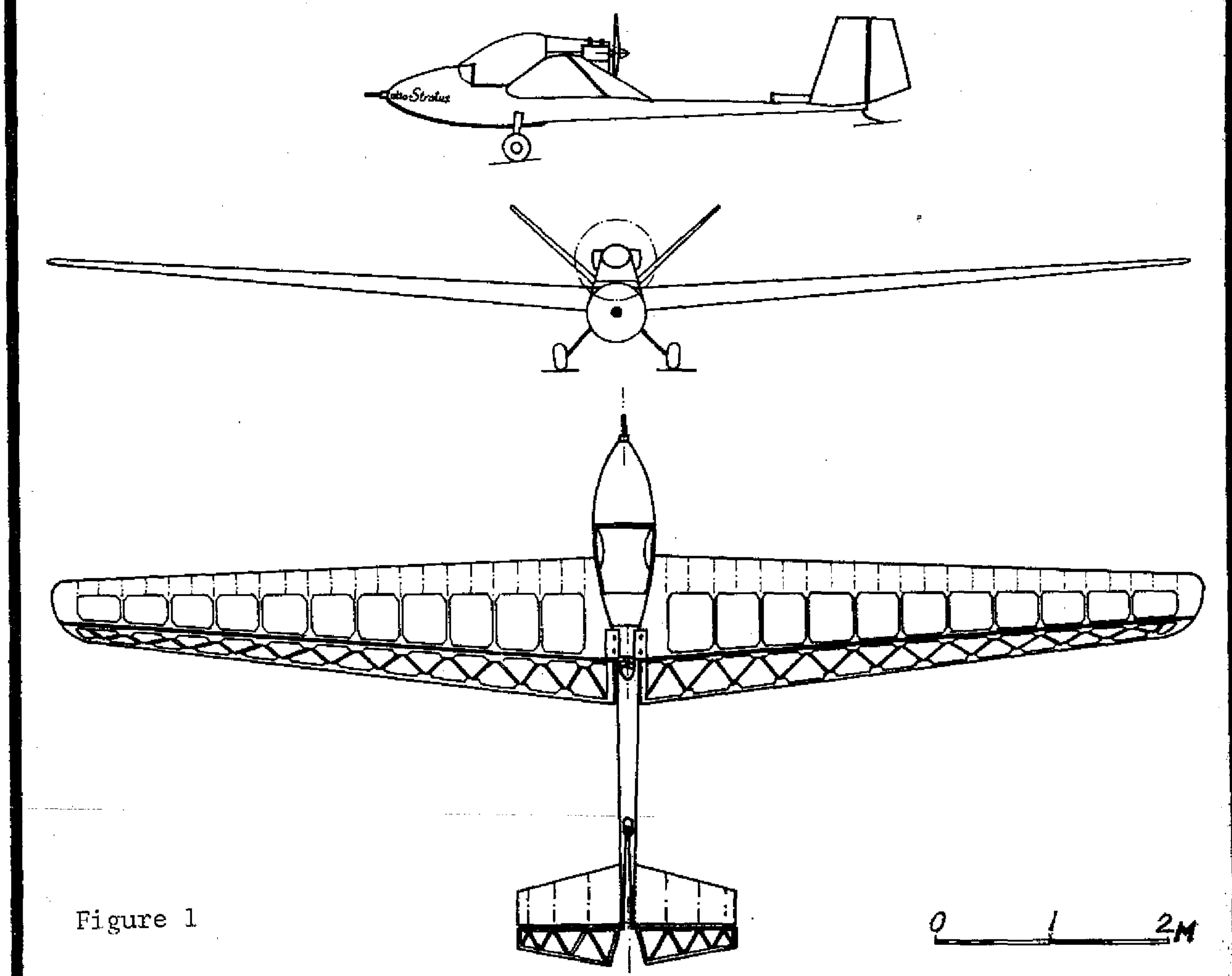


Figure 1

* Another outstanding Polish design by J. Janowski which could be easily converted into an APS by increasing the wing span is featured in an article in March '73 issue of *Sport Aviation*, page 30.

** These two airfoils were the "airfoils" of the best prewar sailplane designs in Europe, although always used separately and not in the above combinations. While the G 535 airfoil was on the early birds, the G 549 (root) and M12 (tip) became the classical combination of the winning sailplanes in late '30s: *Olympia, Weihe, Reiher*.... It appears that the G 549 airfoil was the first partly laminar airfoil ever used, although this feature was not known at that time—only the results.

plywood cover forms the usual D-tube. Behind the main spar the wing is covered with fabric.

The pod-type fuselage has a closed cockpit and a fixed two-wheel (280 x 80mm) undercarriage, similar to a power plane. Above the wings is a small engine which was assembled from parts of other engines. This four-cylinder, two-cycle engine develops 16 to 24 hp at 4000 to 6000 rpm and drives a 31.5-inch diameter pusher propeller.

The 3-view is shown in Figure 1, the mechanism of the interconnecting controls is presented in Figure 2.

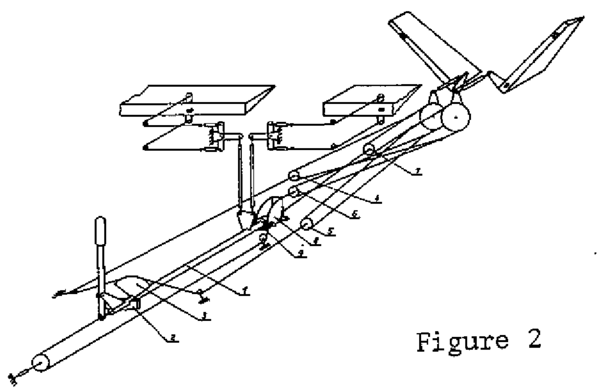


Figure 2

The weight of various components is as follows:

Wing panels	83.6 lb
Tail	13.2
Fuselage	46.2
Undercarriage	14.8
Power plant	35.2
Battery	2.6
	195.6 lb

Other technical data are:

Wing span	32.8 ft (10m)
Wing area	66.6 sq ft
Aspect ratio	12
Empty weight	196 lb
Wing loading	4.9 psf
Glide ratio	20
at	43.5 mph
Minimum sink	2.96 ft/sec
at	35.4 mph

ANOTHER HISTORICAL NOTE

The Swiss *Aero-Revue* (September 1973) contains a few interesting facts:

The development of the auxiliary-powered glider began at Wasserkuppe during 1924—50 years ago! (Let's celebrate all year long!)

The first successful flight was made in 1935 by Peter Riedel flying the *Motor-Condor*.

The year 1938 brought the first "Motorglider Meet" at Rangsdorf.

The year 1959 was the year of the first postwar meet devoted to auxiliary-powered sailplanes, organized by Franz Medicus.

In all fairness we should also mention the prewar efforts of the known designer Egon Scheibe (SF-27M) and his friend Kurt Schmidt who were designing and building the Mu 13 performing sailplane series (L/D = 24.

The prewar German *Flugsport* (January 1938) carried an article based on information supplied by Scheibe. It contains features which are quite familiar now to many of us. (Photos on page 10.)

During 1934 Scheibe and Schmidt conceived one of the sailplanes of the Mu-series, the Mu 13. During the design provisions were made to install a small, detachable engine in the fuselage nose; a retractable wheel provided the necessary ground clearance for the propeller. The basic idea was twofold:

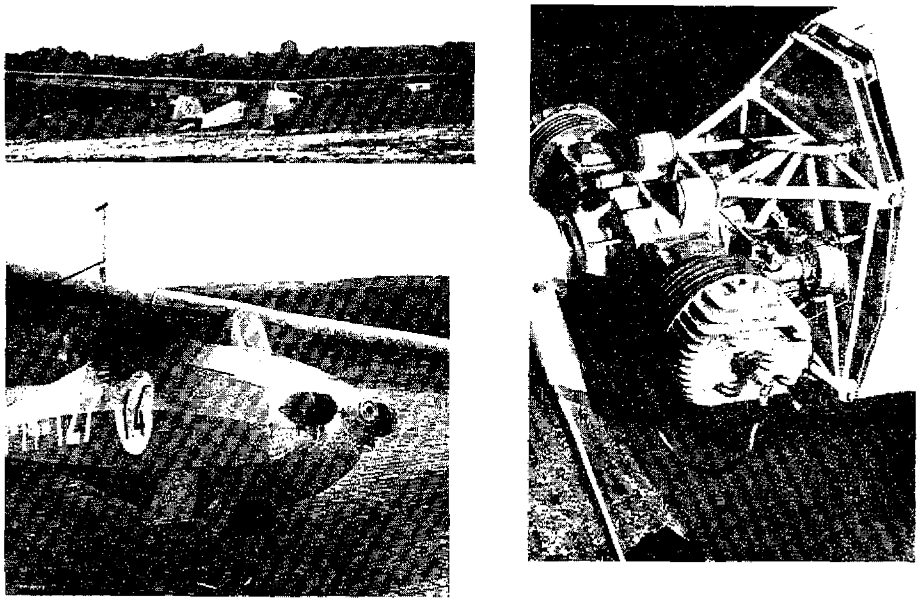
After the completion of a contest flight the fuselage nose cover would be replaced by the engine with propeller; the sailplane would be flown back to the contest site.

Those who would be willing to accept a slight decrease in sailplane's performance would remove only the propeller for the contest flight. After the landing is made the propeller would be reinstalled and the sailplane would be flown back.

Due to proper design of all details the engine installation procedure required only about half an hour to complete.

The engine was Kroeber M4, designed for light aircraft and sailplanes. It was a two-cylinder (opposed), two-cycle, developing 18 hp. With a wing loading of 3.8 psf the rate of climb was 296 fpm and the ground run about 330 ft. With the engine off (fixed pitch, ground adjustable propeller) the glide ratio was 21 (a loss of 3 points as compared to the pure sailplane), and the minimum sink was 2.5 ft/sec. The ceiling reached, engine operating, was 11,000 feet!

It all happened in 1936-1937!



Auxiliary-powered sailplane "Mu 13". Upper left: Takeoff. Below: engine run-up. Right: Engine mount (steel tubing) with the Kroeber two-cylinder, two-cycle engine "M4" (removable installation).

CONTEMPORARY SOARING NOMENCLATURE by S.O. Jenko, Dipl. Ing. ETH. Prepared for presentation at the 14th OSTIV Congress, Waikerie, Australia, January 1974.

Considerable technical progress took place during the past two decades in the field of soaring. In contrast, basic terminology in many languages is lagging seriously. English, one of the leading languages, is no exception. Because of this situation, misunderstandings occur which under some circumstances may result in undesirable consequences, hindering further technical developments as well as soaring activities. Thus the following proposal is made for adoption.

GLIDER (with or without auxiliary power) - any manned flying device which is not capable of cross-country soaring flight, without any power, under "normal" soaring conditions.

SAILPLANE (with or without auxiliary power) - any manned flying device which is fully capable of cross-country soaring flight, without any power, under "normal" soaring conditions.

The above differentiation is based on technological progress from the inception of powerless flying. First it was gliding a few feet above the slope of a hill. Then, with substantial design improvements of gliders and discoveries of various atmospheric phenomena, foundations were laid for soaring, i.e., flying without any use of power for substantial length of time, gains in altitude and long distance either in one or separate flights.

The ability to reach these basic objectives of soaring depends not only on the skill of the pilot but also on atmospheric conditions as well as the performance of the sailplane. Thus the stipulation of "normal" soaring conditions may present a problem: what is a normal soaring day in one area of a country (e.g., Texas) may be a booming day in most other areas. While one could specify a certain range for the upward air velocity component (slope wind, updrafts due to various other sources) no such attempt is made here. An upward air velocity component of 1 m/sec (approximately 200 fpm) might be considered as a lower limit of a "normal" soaring condition.

A much easier approach to establish the imaginary dividing line between a glider and a sailplane would be based on historical developments:

Glider: $L/D < 17$; Sailplane: $L/D \geq 17$.

Both criteria (normal soaring condition, L/D specification) appear to be reasonably equivalent.

ULTRALIGHT GLIDER (ULG) [including hang glider], SAILPLANE (ULS)—a manned flying device as described previously, but having a wing loading $w \leq 10$ kg/m^2 (approximately 2 lb/ft^2).

During the development of gliders and sailplanes over several decades the wing loading increased noticeably. What appeared to be a "normal" wing loading some 35 years ago is considered as "light" today. In view of the increased interest in hang gliders, man-powered aircraft and other similar, vastly improved sailplanes under development, which due to the energy shortage may well be the only means of soaring in the future, an attempt should be made to define an "ultralight" craft. Since the wing loading is one of the factors governing the plane's performance the above specified range appears to have merit.

AUXILIARY-POWERED GLIDER (APG), SAILPLANE (APS); ULTRALIGHT AUXILIARY-POWERED GLIDER (ULAPG), SAILPLANE (ULAPS)—a manned flying device, as described previously having an auxiliary engine used for takeoff purposes and to overfly with power any severe downdraft areas which would otherwise result in a landing.

Since the beginning of soaring, attempts have been made to overcome the two inherent disadvantages of a sailplane: takeoff with initial climb and to overfly large areas of sink which would otherwise necessitate a landing. Various kinds of propulsion were and are being installed as an auxiliary source of power which preferably would not decrease the sailplane's performance during the soaring phase of flight.

The above definition should cover any auxiliary-power installation regardless of whether the available power is sufficient for takeoff and initial climb or sustention of level flight only.

The expression "Self-Launching Sailplane" (SLS) for an auxiliary powered sailplane (APS) should not be used because it suggests an ultralight (hang) glider or sailplane which can be launched by the pilot's feet (i.e., without any mechanical power); it is also not consistent with the decades-old concept of an APS, described above.

Another expression, "Motorglider", denoting an auxiliary-powered sailplane (APS) appears to be inappropriate for several reasons. Most likely it is an old translation of the German word "Motorgleiter" by people whose technical and linguistic knowledge was rather poor. It is an accepted view here (U.S.A.) that there is a difference between the two words "motor" (electric) and "engine" (combustion). The bridge between the two kinds of energy conversion devices is the rocket propulsion: it can be called either a rocket motor or a rocket engine.

Furthermore, it should be noted that even the Germans have apparently preferred for some time the term "motorsegler". Unfortunately, there is no comparable, elegant translation available in English.

POWERED GLIDER (PG), SAILPLANE (PS)—a glider or a sailplane converted into a powered aircraft; the engine is essential for flying operation.

On occasion a glider or a sailplane is converted into a powered aircraft by installing an engine which produces a substantially higher power than required for flying an auxiliary powered glider or sailplane. Thus soaring flight becomes rather an exception in the usual flight operation of a powered glider or sailplane.

One, but not the only such example is the Schweizer SGS 2-32 sailplane which has been used in various development, research and promotional projects. In some extreme cases the power installation and other modifications made were of such extent that the identity of the original sailplane almost vanished.

MAN-POWERED AIRCRAFT (MPA)—a manned flying device powered only by human efforts.

This definition covers any manned flying device, heavier than air, which by its nature is an ultralight sailplane of high performance.

Concluding Remarks

One would expect that in view of substantial technological developments resulting in outstanding performance of today's sailplane appropriate terminology would be widely in use. Apparently this is not the case.

This paper presents proposed nomenclature as a starting effort to improve the present unsatisfactory condition. It should also serve as a guide for comparable improvements in other languages.

LETTERS

Editor:

... In the December issue, a letter from George Sells says in part that he can't achieve the advertised 170 fpm rate of sink in his RF-5B. We had the same problem until we tried putting the trim in neutral while soaring and keeping the 59 mph best L/D or 50-55 mph minimum sink purely with back stick pressure. The large trim tab on the elevators acts like a drag flap if put into full up trim. Sink drops from 250 fpm to 170 fpm when we fly with the trim tab in neutral.

Bill Richards
Palo Alto, California

Editor:

Am enclosing $5.00 to renew my subscription which expires in August. Keep up the good work. Please put in more articles for us homebuilders, who, would you believe, are too poor to afford a $20,000 rig. I would appreciate your suggestions as to a good two-place motorglider with good performance I can build in the near future as I am now finishing my Bakeng Duce.

Can you give me the address for the designer of the HP-17 which I believe is a single-place high-performance motorglider....

Victor Smalley
Tucson, Arizona

Write HP-17 designer Dick Schreder at Box 488, Bryan, Ohio 43506.—Ed.

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