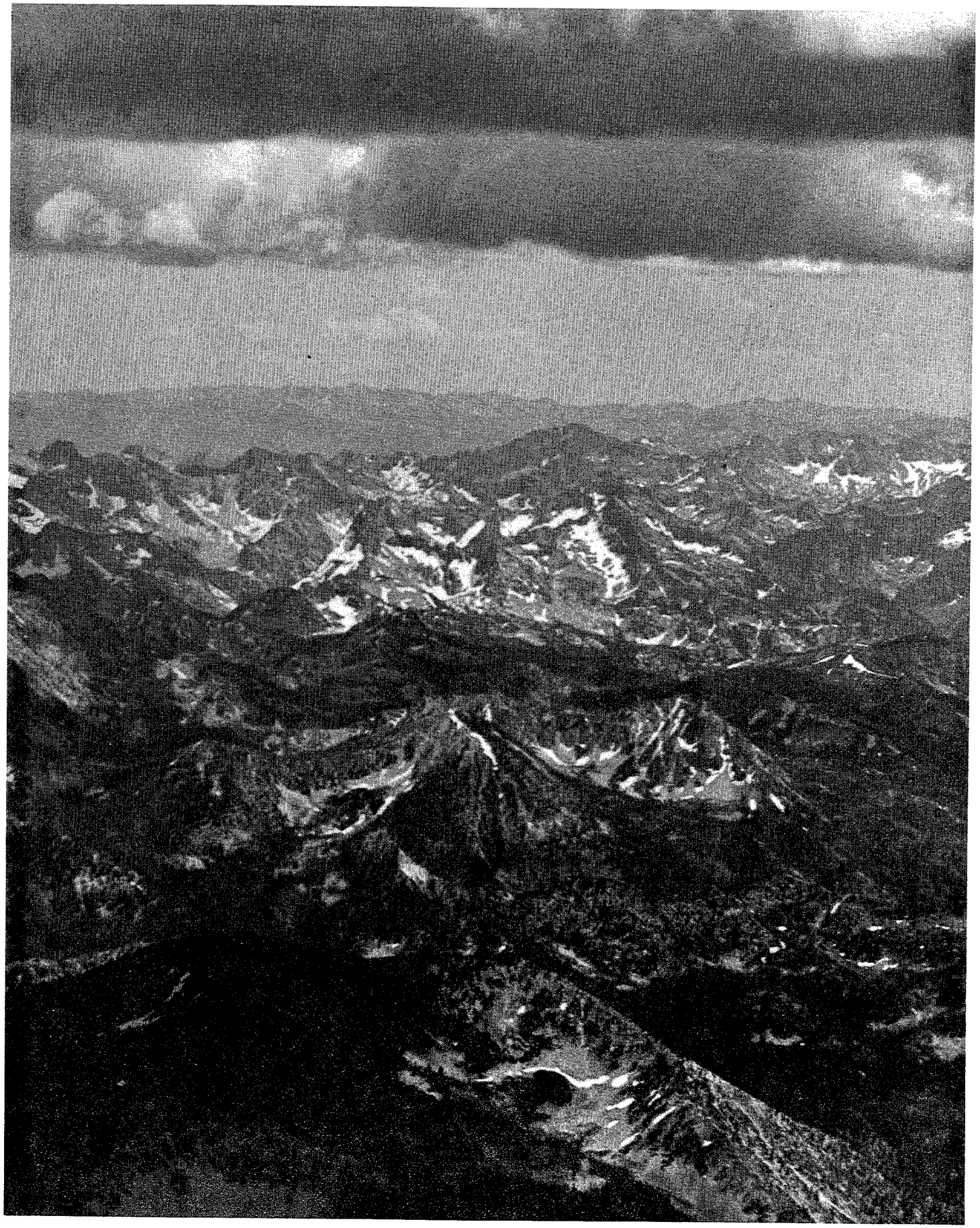
MOTORGLIDING

NOVEMBER 1973



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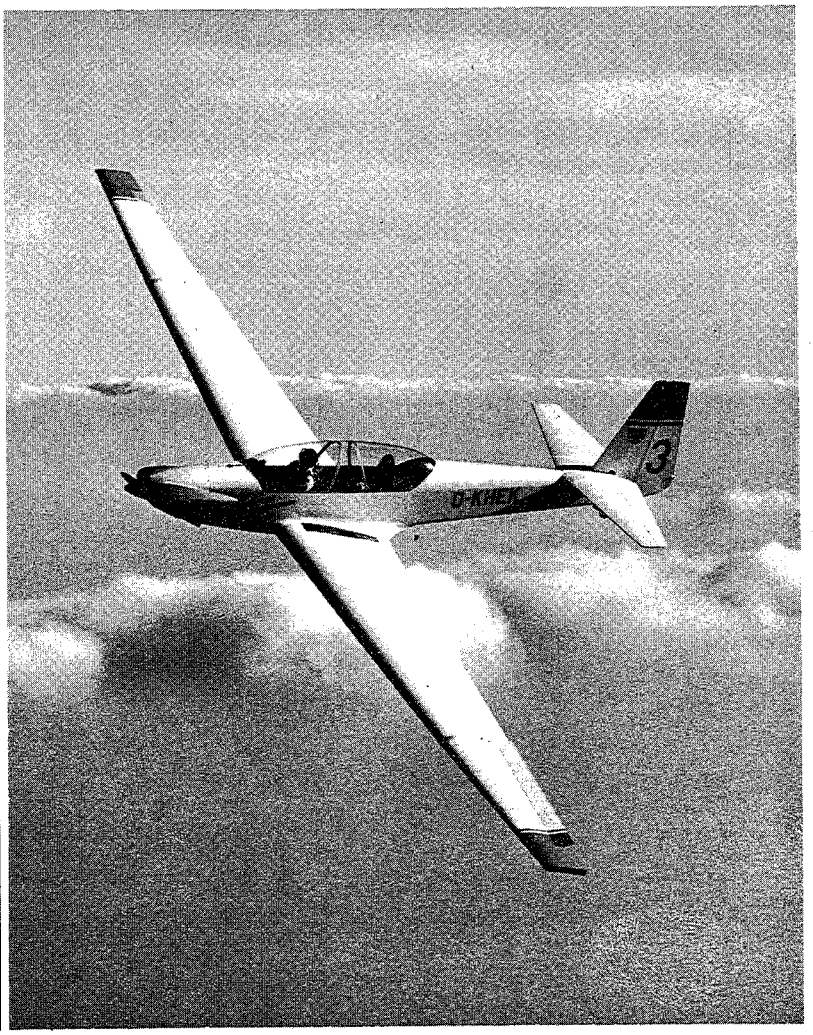

SFS 31 **RF 5 B**

TYPE	SPAN	L/D	PRICE*	DELIVERY	SEATS	HP	ENGINE	MIN R/S
RF-4D	37 ft	20	DM 33,600	6 months	Single	36	VW	4.0 ft/sec
SFS-31	49 ft	29	DM 37,800	6 months	Single	36	VW	2.8 ft/sec
RF-5	46 ft	22	DM 50,400	6 months	Dual	68	VW	4.6 ft/sec
RF-5B	57 ft	26	DM 52,390	6 months	Dual	68	VW/Frank	2.8 ft/sec

Standard equipment includes: Airspeed indicator(s), Altimeter(s), Variometer(s), Magnetic compass, Gear warning light and horn, Safety harness(es), Seat cushion(s), Tail antenna, Cabin vent(s), Recording tachometer, Oil pressure gauge, Battery, Oil Temp. gauge, Ammeter, Starter (elec.), Exhaust silencer(s).

* Ex-factory. We regret that we shall have to increase our prices by eight percent on January 1, 1974. Orders received before then will be accepted at the current price.

SPORT-AVIATION INC.

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MOTORGLIDING

Donald P. Monroe, Editor

Vol. 3, No. 11 Published by The Soaring Society of America, Inc. November 1973

Contents

Cover: Salmon River Mountains, of Idaho, by Doug Barritt. (Approximately 200 miles south of Skopil's course line. See page 2.)

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Circulation of the October 1973 issue was 780.

SOARING A POWERED SAILPLANE

by Arnold Skopil

This spring I installed an additional fuel tank in my sailplane (powered *Bergfalke;* see April 1973 *Motorgliding*—Ed.) for the yearly (ferry) flight to eastern Washington, since in the past, landings for refueling had proved to be too time-consuming.

Taking off from my home port, Hoquiam, Washington, with a fuel capacity now of 15 gallons, I flew nonstop across the Cascades to Ephrata, an air distance of about 250 miles.

This city had been host to the Standard Class National Soaring Championships a few years ago and the area is well known for excellent soaring conditions. The Boeing Club uses the airport as the base of its activities during the summer months. My sailplane really looked quite antiquated among all that glass: several *Libelles,* a *Cirrus,* an AS-W 15, and a *Diamant.*

Since a person has to get used to the different soaring conditions in the Columbia Basin as compared with the coast, I first made some exploratory flights. Then I got ideas about a 500-km flight into the Rockies. On July 22, the barograph was sealed by an observer, a starting gate was set up and I was on my way at about 11 a.m. In dry thermals I climbed to about 6000 feet, chased dust devils for some time above the wheat country, and continued east to the foothills of the Rocky Mountains. The lift was not spectacular, but spotting cumulus above some mountaintops, I decided to press on into the unknown. The lift started taking me gradually higher while the ground below kept climbing. It was a relief to finally drift at 9000 feet over the scenery. I like to fly in the mountains. There was nothing but trees below as far as one could see, with some logged-off areas on the slopes. A winding road was only partly visible through the overgrowth in a deep canyon, and there a lonely car with two white faces beside it looking skyward. They probably wondered who would choose this desolate area for soaring.

I was lost. The many powerlines crossing below were not on my chart. Feeling that I had drifted too far south, I headed in a northeasterly direction, to see what was over in the next valley. Flying now at only 1000 feet above the peaks, I couldn't see too far ahead. Suddenly a beautifully located little town came into sight. St. Regis, Montana glittered in the late afternoon sunshine. It was comforting to note that an emergency strip was mapped a little further east. After just barely crossing the next two ridges, I saw some high mountains ahead, rising like a steep wall from the valley floor to 9900 feet (McDonald Peak). It was a very impressive sight. I was too low and the air was suddenly smooth. Later I found out it had been raining in the area earlier in the day. There was plenty of time to make a decision. I had soared for 270 miles. Land and claim Gold distance? No. I had exceeded the 300 km distance many times before and I did not want to chance an off-airport landing.

Not finding any lift, I turned back toward the little city of Arlee, and picked a landing spot on the outskirts in case my engine failed to start. However, the restart was successful and I wondered what the people might have thought of such sudden noise, or if anybody noticed at all. I flew south, and then around the ridge I had crossed not long before. I bypassed the Missoula airport because it had a control tower and I do not carry a radio. Then I turned west, homeward into the setting sun. Looking back I could see fair looking cumulus past Missoula. Perhaps I could have gone further if I had been more observant and had stayed further south. Humming around the ridges I soon sighted the landing strip at Superior and cut my engine. Some people there were flying model airplanes. They told me they were the only ones using the airport, and that

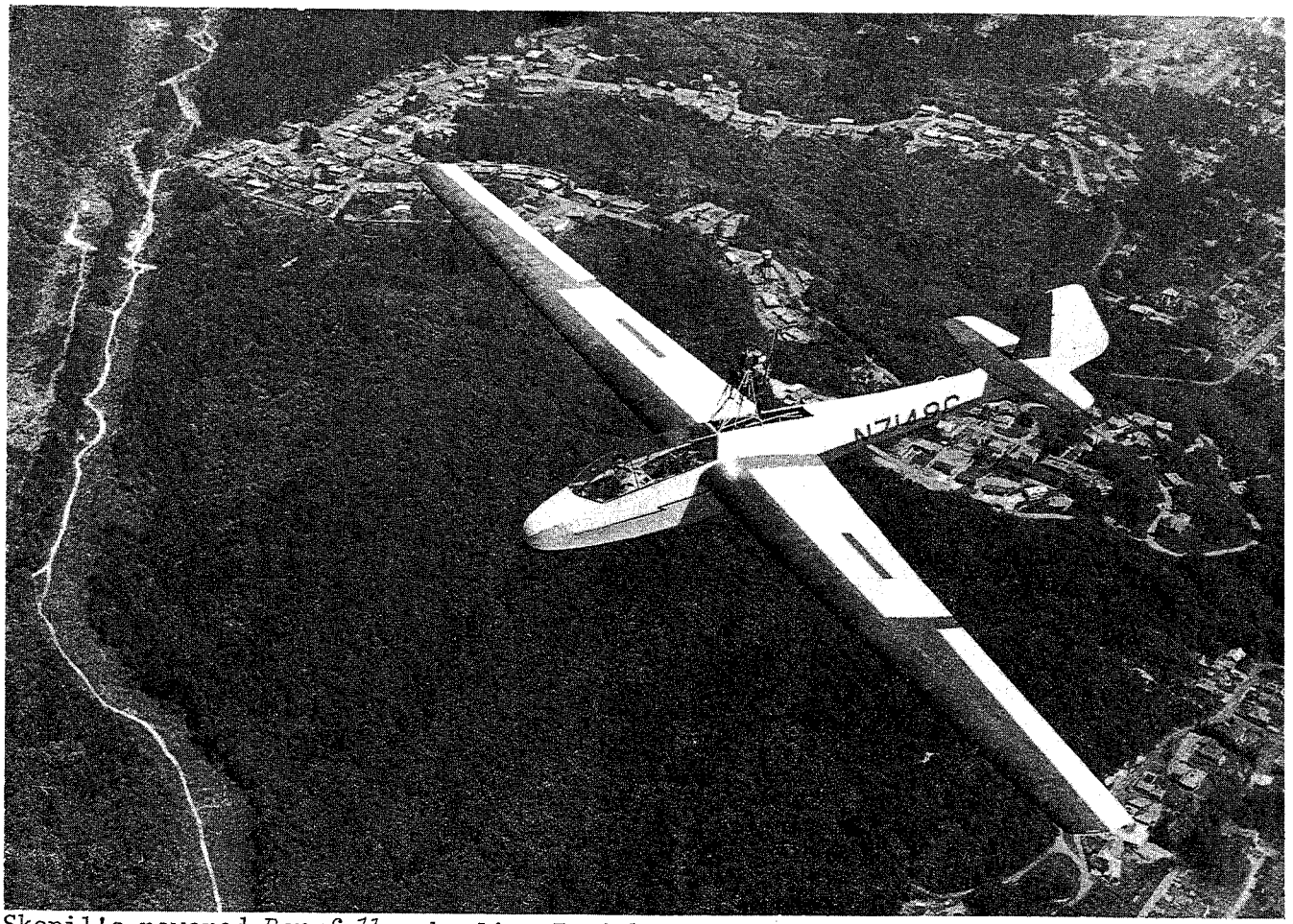
they had never seen a sailplane before. I stayed overnight at the home of some very friendly people. They helped me get gas from town, and all turned out for the takeoff back to Ephrata next morning.

It had been a most enjoyable flight and it showed me that if one wants to make Diamond Distance, (especially with antiquated equipment) it cannot be done by just leisurely soaring cross country. I had also been handicapped by an erratic rate-of-climb indicator. The problem was later traced to the static line, which will have to be relocated. Total energy compensation would also have helped.

After self-launching, one soars like any other sailplane. The big advantage of having an engine is for self-retrieving, and for emergency use. I was told by some sailplane pilots that having an engine ready for emergency use takes the excitement out of soaring. This is not so. There is additional excitement because of the possible, more versatile, use of the powered sailplane. It is up to you just how far (or low) you want to go. One day I mentioned that I wanted to land where I could get gas. Some purist snapped: "This is something I don't have to worry about". I agree. The tow-pilot and his crew do it for him and he has to use a lot more power (and gas) for his soaring than a powered sailplane pilot does.

A week after this flight I made a Diamond Goal triangle. The barograph stopped in flight, so there is no claim.

And would you believe a sailplane pilot asking, after looking my plane over,"Does that thing fly?"



Skopil's powered *Bergfalke*, by Linn Emrich

FOREIGN SCENE

by S. O. Jenko

Two interesting design projects are mentioned in the July 1973 issue of the French *Aviasport* magazine. The somewhat condensed translation is presented here.

NEW DESIGN PROJECTS AT PILATUS AIRCRAFT, Ltd. (Switzerland)

In view of the successful B-4 all metal, performing sailplane designed and manufactured by Pilatus Aircraft, Ltd. (even being exported to Germany!) two versions of a new project design are under consideration. The sailplane manufacturer has wisely decided to explore first the preferences of prospective users for the two proposed design versions:

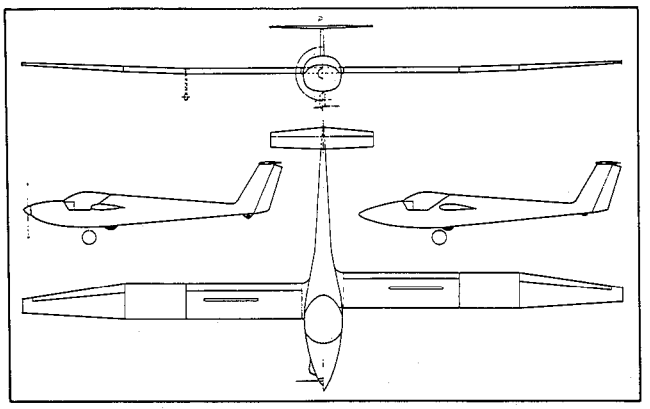
(1) a two-place performing sailplane

(2) a two-place auxiliary powered sailplane of somewhat lesser performance

Depending on the outcome of this inquiry one of the two, or even both design versions may reach the production stage.

This new two-place design project is a direct development of the all metal B-4 single-place sailplane, now in production. It has an 18-meter, three-panel wing equipped with dive brakes and camber-changing flaps, a T-tail and a side-by-side seating arrangement. While the fuselage is basically the same for both versions, the longitudinal position of the wing is slightly forward for the auxiliary powered version to keep the cg within proper limits. Also, the undercarriage is longer to provide the necessary propeller clearance; in addition, there are outriggers. A powerplant of 60 to 70 hp is anticipated.

The three-view sketch shows both versions: on the left is the auxiliary-powered sailplane version, on the right is the pure sailplane. The projected delivery target date is 1975; the estimated prices are: sailplane 40,000 Sfr and 55,000 Sfr for the auxiliary-powered sailplane (3 Sfr is approx. 1 $).

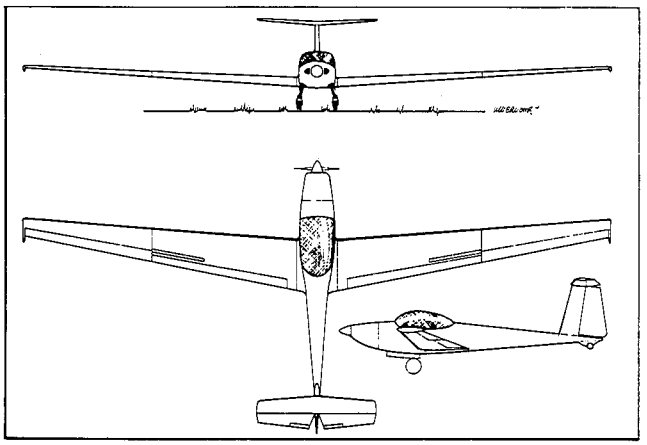


Design Data	Sailplane	Auxiliary-Powered Sailplane
Wing span (ft)	59	59
Length (ft)	25.5	26.1
Aspect ratio	18.9	18.9
Wing area (ft^2)	186	186
Gross weight (lb)	1230	1540
Wing loading (psf)	6.6	8.3
Glide ratio	36 at 56 mph	32 at 62 mph
Minimum sink	2.2 fps at 53 mph	2.6 fps at 60 mph
V_{NE} (mph)	174	157

PROPOSED ROMANIAN TWO-PLACE AUXILIARY-POWERED SAILPLANE

Romanians presented two high-performance sailplanes at the recent International Aircraft Exposition at Le Bourget, France: single-place, open class IS-29-E and the two-place IS-28-B. Both are all metal of superior workmanship.

The tandem two-place IS-28-B, with a glide ratio of 32 at 54 mph, is the base for the proposed auxiliary-powered sailplane IS-28-M2, to be used as a trainer. The forward swept wings, tail, and the rear portion of the fuselage are taken from the IS-28-B sailplane. The forward portion of the fuselage is being redesigned to permit a side-by-side seating arrangement as well as to take the VW-Stamo MS 1500/2 engine of 45 hp. To improve visibility the wing was lowered to a low-wing configuration. The undercarriage, consisting of two wheels which retract forward into the fuselage, exhibits a rather narrow tread (3.26 ft).



DESIGN DATA

Length	24.6 ft
Wing span	55.7 ft
Aspect ratio	15.8
Wing area	196 ft^2
Empty weight	968 lb
Gross weight	1430 lb
Wing loading	7.26 psf
Takeoff distance (ground)	820 ft
Climb	434 fpm
Max. airspeed (level flight)	99 mph
Glide ratio	29
Minimum sink	2.8 fps

THE DEFINITION OF CATEGORY MOTORGLIDER (One Man's Opinion)

by Tasso Proppe

The closer we (and the FAA) move toward the recognition of a separate category "Motorglider", the more it seems to be necessary to crystallize the definition for whatever that is to be.

There is some confusion because the term "motorglider" means different things to different people, depending on which of the variety of uses they have in mind. Even the Europeans haven't settled down to a finalized definition yet.

Here is a list of usage concepts. Let's call them types:

Type 1: Enjoy the pleasures of soaring without committing yourself to all the cumbersome procedures of purist soaring (towing, queue line, waiting for sufficiently suitable weather), without restriction to an area, and without the trailer-retrieve after an off-site landing.

Type 2: Practice and training, to hone your skill, without risking an off-site landing, but also be able to do that under marginal conditions where thermals are too weak to remain airborne—unless you have a very expensive ship (which you

should not use for that kind of practice anyway).

Type 3: Explore lift conditions and areas not readily accessible by aerotow: smog shearlines, mountain slopes downwind from the operating base where it will be difficult to return to home base without power; climb to high altitude waves (I personally don't think that this is within the present motorglider capabilities).

Type 4: Return to home base from whatever you did (like ferrying home after a cross-country flight).

Type 5: Dual glider instruction at considerable cost-savings and with greater efficiency.

Type 6: Create a new discipline for competitive flying, championships, records in distance, altitude, duration. (I can only think of a record in terms of economy like "miles per gallon", or better yet: "mile per total operating cost, including investment and depreciation")

The technical features to match the dreams of these prospective users (types) are not common to all. Let's look at the features:

(a) Self-launching, the ability to take off on its own power, is not necessarily required for Types 2 and 3. There are two engine installations in existence which only provide sustaining flight, they have to be launched by other means (winch): Stihl and I10-Wankel. It seems that Type 6 requires self-launch and nothing else.

(b) Stretch L/D, augmentation of insufficient lift by adding a little power as necessary to prevent a premature landing—applies to Types 1, 2, 3,5; certainly not to Type 6 as it is visualized by most competition-minded pilots (who would not make any championships in my economy competition).

(c) Extended periods of cruise capability (rather than climb only) for ferrying, proceeding to an operating area, exploring. Probably not required for Type 5 and 6.

There are four more features to be discussed that pertain to more or less all of them. They represent additional costs, an investment in independence, convenience, and sometimes safety.

(d) Taxiing capability, independence of ground crew, operate out of commercial airports.

(d) A wider speed range between slow (thermaling, landing) and fast (cross-country distance soaring and powered cruise), a general performance quality that the Type 5 probably would relinquish in favor of sturdiness and simplicity.

(f) Climb angle or rate of climb: Getting out of a narrow mountain area under density altitude conditions becomes a safety concern. The authorities are looking at the rate, but it's the *angle* that counts.

(g) Engine air start (restart) capability: (Type 6 probably don't care for it at all). For a true motorglider, it becomes the most important safety feature (see "Motorglider Safety", August *Motorgliding*).

Now if we develop design criteria to satisfy this matrix of usage versus desired or required features with an eye on establishing a common envelope of limitations to define a category of "Motorglider", we can fix at least one common denominator: It is a sailplane.

Compared with "Airplanes, Utility, FAR 23", sailplanes are slow, i.e. their forward speed at min sink/min power is somewhere around 40 to 50 mph. This speed determines the thermaling diameter you can fly. A 50 mph ship misses already some narrow but good thermals at low altitudes. For record flights in record weather (the Type 6 people), this does not count; but that's an exception. The bulk of future motorglider pilots do not have time and do not want to wait for "the big day".

Another design characteristic of a sailplane, a good gliding angle, (L/D max), is also common. There should be a lower limit, say L/D = 18 to 20, for two reasons: The motorglider should behave like a sailplane if used for practice and learning; but for safety reasons, it should have the same horizontal maneuverability (selection of landing site) in case an engine failure reduces its safety to that of a sailplane. There is, of course, no upper limit for the best L/D

that money can buy—I use the engine for extending it over the 20 value.

Minimum rate of sink is a function of the two previous parameters.

So is wing loading.

This means that there is no point in using these for additional criteria.

Within limits, you can bend the direct interdependence between those four functions a little, using flaps (camber control) and water ballast. Experimenters should be allowed to do that and still call the machine a motorglider. The "consumer pilot" Types 1, 2 and 5 doesn't have the means to pay for it.

Power loading is a parameter that requires some definition: Whose power? Engine or effective propeller power, at max thrust (takeoff) or during climb? (Cruise is of minor importance).

I would rather like to see a safety requirement for minimum *climb angle* in Standard Atmosphere, no matter how it's achieved.

The lowest limit should be around the same value as the minimum glide angle requirement, 1 in 20. Engine power, rpm, reduction gear, and propeller efficiency have to add up to whatever is needed to achieve that climb angle.

A footnote: My experience is that extremely-low-speed machines get a considerable boost from climbing into a wind gradient. I feel underpowered only on a very calm (and high density altitude) days.

Engine restart reliability, in my opinion, should be made a part of the category's requirements. This may sound too restrictive, but without it, I visualize more bureaucratic restrictions later, when accident statistics turn out a high accident rate of motorgliders, caused by non-responsive engines, but blamed on pilots, operations, and the category itself. (For a detailed analysis and justification, see "Motorglider Safety", August 1973 *Motorgliding*.

Competitive ships may establish an exempt status. If a guy knows he has no engine availability, he organizes his flight as a pure gliding operation. (It does not make sense to me, though, because I think of the Types 1 through 5 uses, and my competition goal "economy of operation" requires air start as a major contributor to this economy.)

I found another feature worthy of a few words: Engine vibration at low power (sink rate zero, loitering). A comfortable low-power engine operation is extremely desirable for Type 2 activities—and some engines just don't do that. However, I don't feel strong enough about it to suggest that as a design requirement.

That holds for taxiing capability, too. I don't have that capability right now but I sure would like to. For a minimum cost operation, you can do without, providing you stay away from commercial airfields.

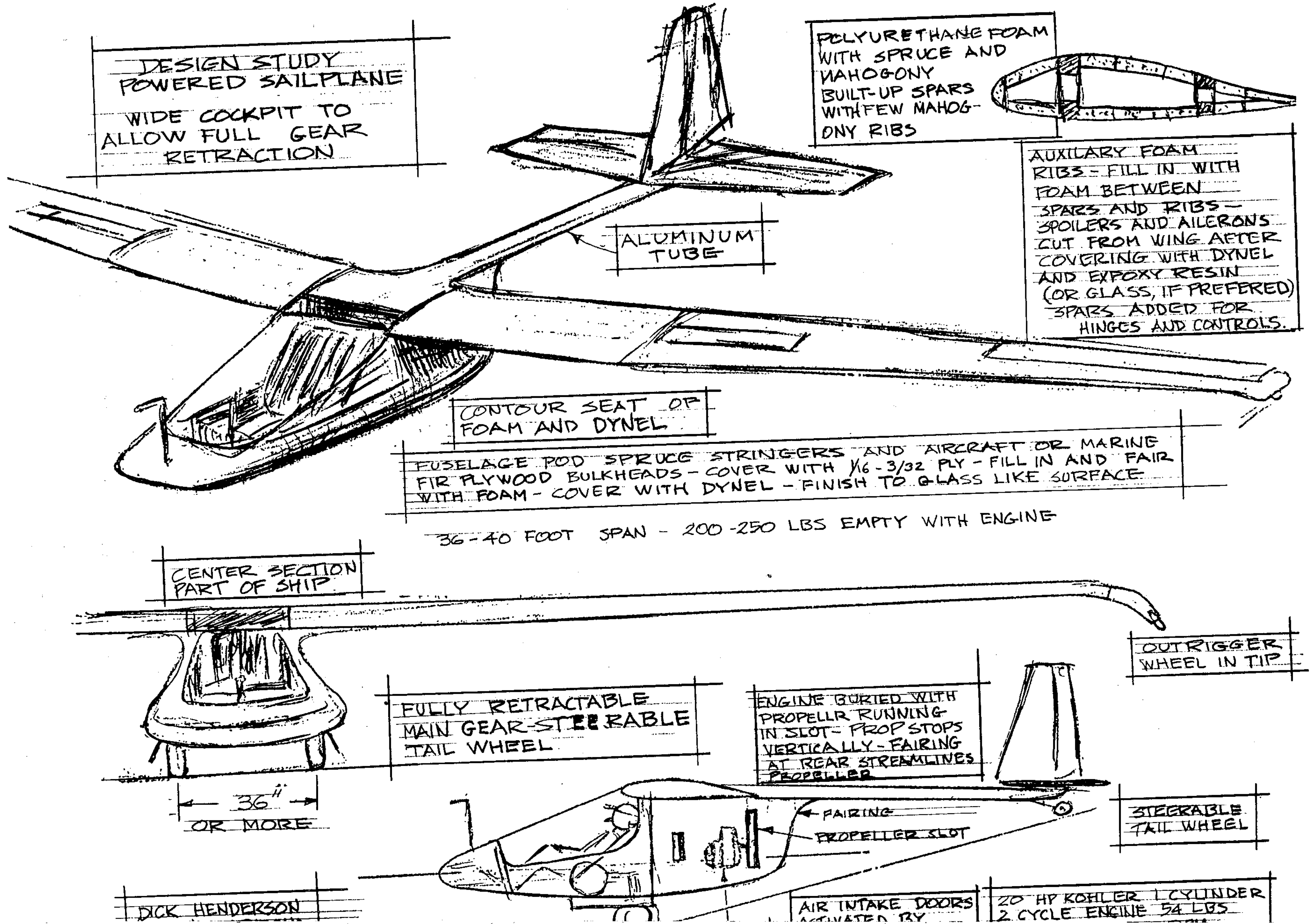
Two items which I do not want to see as a requirement for restriction to define the category: dual ignition and fuel quantity restriction.

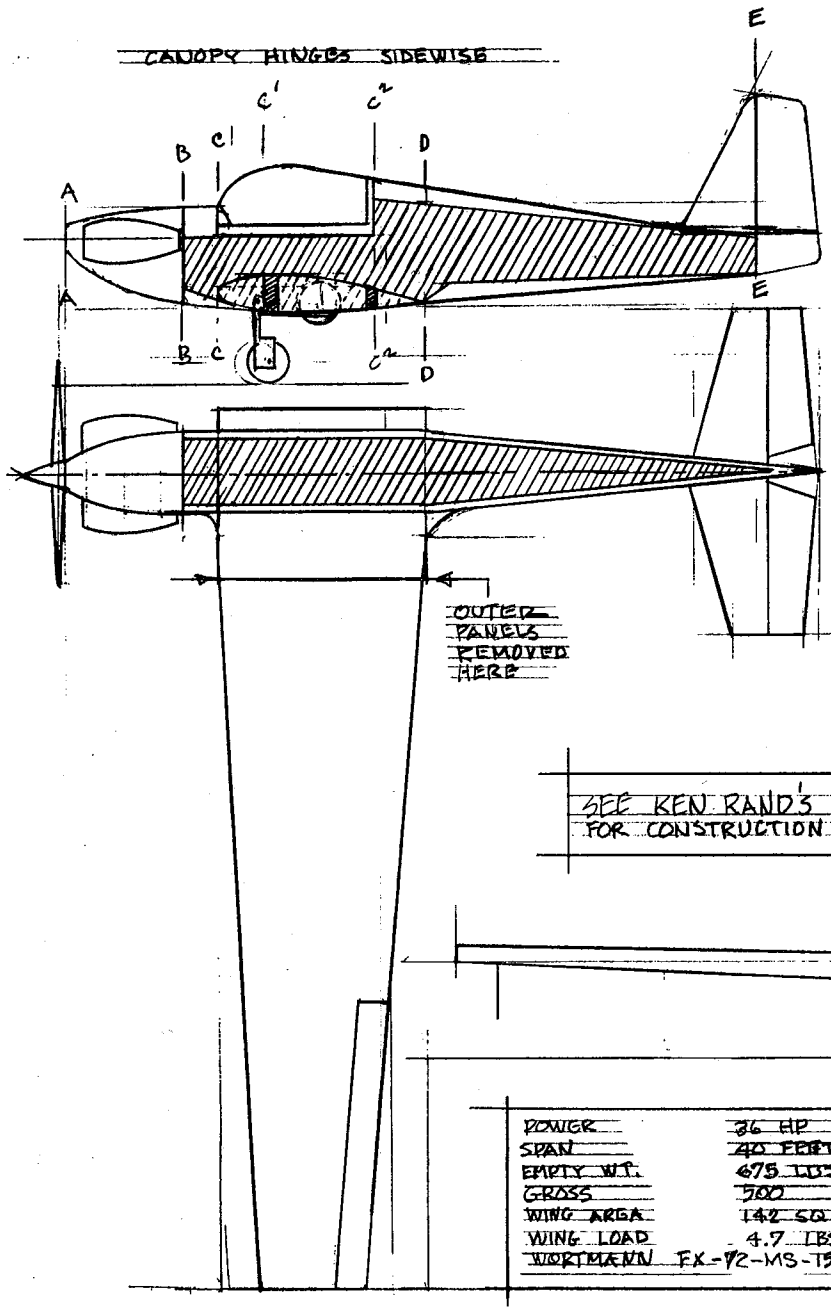
A dual ignition system is not only useless but unsafe (see "Motorglider Safety," August 1973 *Motorgliding*).

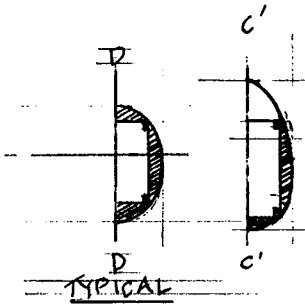
So is a restriction in the amount of fuel to be carried. For operational safety, I want to rely on at least three hours of available engine time for any type of flight—exploring, return to base, loitering, or ferrying. So far, my highest usage was 1 hr 40 min on a 4-1/2 hr flight which began in weak thermals. I can easily imagine soaring a downwind mountain ridge, requiring three hours of upwind power flight to return to the base.

SUMMARY

It is this author's opinion that a category "Motorglider" vehicle should be defined as a "Sailplane, FAR", with a gliding angle better than 18 to 1 and a minimum rate of sink not more than 5 ft/sec, having a propulsion system capable of providing a climb angle of 18 to 1. There are no further requirements other than good common engineering practices in regard to fuel safety; load, stress, and speed restrictions are to be in accordance with sailplane requirements. Fuel safety doesn't have to be any different than that of automobile application.


DESIGN STUDY
POWERED SAILPLANE
WIDE COCKPIT TO ALLOW FULL GEAR RETRACTION
POLYURETHANE FOAM WITH SPRUCE AND MAHOGONY BUILT-UP SPARS WITH FEW MAHOGONY RIBS
AUXILARY FOAM RIBS - FILL IN WITH FOAM BETWEEN SPARS AND RIBS - SPOILERS AND AILERONS CUT FROM WING AFTER COVERING WITH DYNEL AND EXPOXY RESIN (OR GLASS, IF PREFERED) SPARS ADDED FOR HINGES AND CONTROLS.
ALUMINUM TUBE
CONTOUR SEAT OF FOAM AND DYNEL
FUSELAGE POD SPRUCE STRINGERS AND AIRCRAFT OR MARINE FIR PLYWOOD BULKHEADS - COVER WITH 1/16 - 3/32 PLY - FILL IN AND FAIR WITH FOAM - COVER WITH DYNEL - FINISH TO GLASS LIKE SURFACE
36 - 40 FOOT SPAN - 200 - 250 LBS EMPTY WITH ENGINE
CENTER SECTION PART OF SHIP
OUTRIGGER WHEEL IN TIP
FULLY RETRACTABLE MAIN GEAR - STEERABLE TAIL WHEEL
ENGINE BURIED WITH PROPELLR RUNNING IN SLOT - PROP STOPS VERTICALLY - FAIRING AT REAR STREAMLINES PROPELLER
36" OR MORE
FAIRING
PROPELLER SLOT
STEERABLE TAIL WHEEL
DICK HENDERSON
AIR INTAKE DOORS
20 HP KOHLER 1 CYLINDER 2 CYCLE ENGINE 54 LBS

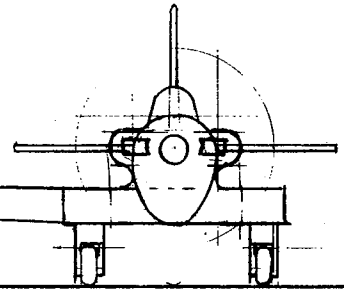




SHADED AREA OF FUSELAGE INDICATE LIGHT BOX STRUCTURE OF THIN MAHOGANY PLY 1/16" & 3/32" ON 5/8 OR 3/4 SPRUCE LONGERONS.

POLYURETHANE FOAM FORMERS ADDED FOR CONTOUR (SEE ABOVE) - THEN PLANKED WITH FOAM AND COVERED WITH DYNEL - WINGS BASICALLY SAME. MINIMUM OF PLY RIBS - 2 OR 3 PER WING FOR SHAPE ONLY - FILL IN BETWEEN SPARS AND RIBS WITH FOAM - COVER WITH DYNEL. ALL MOVABLE SURFACES FOAM WITH SPRUCE SPARS FOR HINGE ANCHOR.

SEE KEN RAND'S KR-1 FOR CONSTRUCTION TECHNIQUES



RETRACTABLE GEAR BASICALLY SAME AS KR-1

POWER	36 HP VW
SPAN	40 FEET
EMPTY WT.	475 LBS
GROSS	700
WING AREA	142 SQ FT
WING LOAD	4.7 LBS SQ FT
WORTMANN FX-72-MS-150A	

POWERED GLIDER/LIGHT AIRPLANE

DESIGN STUDY - 5-29-73

DICK HENDERSON

LETTERS

Lewis Tuttle, who sent Motorgliding *a copy of his response to the FAA on the expected rule-making (printed in the October issue), had previously written a letter on the same subject on the back of a SSA survey information form. This letter was forwarded to Bernald Smith for reply. Here are Tuttle's letter and Smith's answer:*

SSA some time ago embraced the motorglider movement, by action of the Board. Great, I agree. But perhaps Bernald Smith can answer my question. The current interface between SSA representatives and FAA, and Schweizer, relative to Federal "criteria" for motorgliders. What is the objective, really? From the limited information I've been able to obtain, I'm beginning to feel it's another instance of the sport asking for trouble. When SSA representatives took their posture at the May '73 symposium with FAA at Harris Hill, chaired by Ernie Schweizer, what inputs had been obtained in advance from the 60-odd motorglider *owners* in the U.S.?

Steve du Pont's letter to Mr. B. S. Smith reflects in general my own reaction so far. Let's campaign (continue to campaign) for sensible and liberal FAA operation limitations for motorgliders (and gliders) in the experimental category, and not try to get the Feds to freeze a bunch of design criteria. It will be years before U.S. companies produce motorgliders; in the meantime do nothing, please, that will jeopardize the importation of tested and safe foreign motorgliders. The single point on which FAA Washington reps apparently are strong is that a motorglider shall not be a means of transportation. Bad! Bad! If I get stuck at 4 p.m. 150 miles from home base I want to turn on the engine and get back—even if it requires seven gallons of gas.

Lewis C. Tuttle, Jr.
Boonsboro, Maryland

Bernald Smith's reply:

My *Motorgliding* report (May '73) gave the recent background of SSA-FAA interface. The SSA objective has been to convince FAA to provide a mechanism for Standard Category certification, not presently available, for motorgliders. Without that, only a limited existence in the experimental category would prevail—completely excluding commercial use. The concurrent growth of commercial operators and soaring adherents are not mutually exclusive. In addition, there are just a lot of people who won't fly anything with "experimental" tagged on it no matter how well we explain to them the FAA folly in such a tag. And there can be no real U.S. manufacturing capability. So, the SSA policy to foster and promote all aspects relating to soaring certainly calls for urging FAA action. If successful, it means motorgliding won't be limited to just a few adherents. SSA has also promoted the expansion of the gliding fraternity in the non-self-launch-category.

We have invited communication between motorglider owners and SSA officials with *Motorgliding* magazine which although not originated by SSA has been strongly supported by us to the point that it now is one of our regular publications. And with people like Harry Perl, Dick Schreder and Ernie Schweizer for our interface group, I know we have the best. They want to hear adherents' comments, either through *Motorgliding* or directly. They may not always have time to answer every letter but certainly will read and listen. It seems like I must have said this a million times, but I couldn't agree more with Steve (du Pont) regarding the basic precepts which should be our guide in dealing with the FAA on all matters and of course, specifically regarding motorgliding category restrictions. If we and FAA remain adamantly opposed though, our choice is: accept some restrictions or hold fast and have no category definition.* As a retired Federal attorney, I'm sure you recognize the dilemma.

However, all this discussion really has no bearing on the experimental classification. Whatever, if any, certification requirements for standard category motorgliders are finally adopted would have the same effect as present standard category aircraft requirements do on ex-

* July *Motorgliding* contains a letter in response to Steve from S. O. Jenko which very well articulates the problems in this pragmatic world.

perimental category aircraft. Thanks to recent efforts by many people, new highly restrictive rules regarding experimental craft have been in the main removed except for high-performance military-type craft. So there is no reason to feel that SSA's efforts are jeopardizing the potential of continued use of the experimental category for motorgliders by those who might prefer it. The standard category for other craft does not prevent their operation outside the standard category restrictions in the experimental classification—witness the thousands of home-builts, including gliders, flying today and hundreds of imported aircraft other than motorgliders flying in the experimental classification.

I agree with you Lew, and by copy of this letter and yours, I strongly urge Harry, Dick, Ernie and Government Liaison Board Chairman Sam Francis, to take as strong a position as possible with the FAA on this matter of fuel quantity, along with other important points you and others of us have made in the past. In addition, I've forwarded your comments along with this letter to *Motorgliding* editor Don Monroe for further exposition on the matter.

Bernald S. Smith, Chairman
SSA Development Board

Editor:

It seems important that the letters to *Motorgliding* continue to be stimulating, interesting and informative. Thus if any criticism or lesson is derived from this letter, it was never stated by me, but is solely that of the reader.

Last summer Stan Hall wrote an informative article in *Sport Aviation* magazine (Experimental Aircraft Association journal) deploring the difficulty of obtaining accurate data on the horsepower and power curves of the Volkswagen engines that are converted for aircraft use, with the resulting confusion when a designer tries to design a propeller, or decide whether to reduce the engine speed at the propeller by gearing. Thus when I had a change to work out some figures from *Motorgliding* I did so. The conclusions are spectacular. First let us consider that the power going to the aircraft out of the propeller is reduced by the propeller efficiency but this loss does not come into the present calculation because the power given is based on the engine power, not the airplane power after it has gone through the prop and been degraded.

The Sport-Aviation ad on the inside cover of *Motorgliding* for the RF-5B gives the horsepower as 68. We must conclude since no other rating is stated that this is the maximum rated horsepower of the engine as used in the aircraft. The story "Ferry Flight of an RF-5B" in that issue gives some data on fuel consumption. One might assume from reading the article that the fuel consumption is based on all the fuel used including taxi, and that the time used would only be the running time of the engine in flight. This is stated as 2-1/2 gallons per hour at 75 percent power. The rate of fuel used per hour then might be considered as conservative to the extent of that used during taxiing. Of course there is an unknown on the amount of fuel actually used due to unknown accuracy of the pump meter, and the unused fuel still left in the tank after the tank was "empty." This would add conservativism to the result, reducing the actual fuel consumption. The FAA Instrument Flying Manual for 1968 gives 100 gallons of fuel as weighing 600 pounds so it seems reasonable to use 6 pounds per gallon for fuel weight.

A measure of efficiency of engines is the *specific fuel consumption*, which is the pounds of fuel used per horsepower for each hour of operation of the engine. It is usually somewhere between 0.5 and 0.6 or even 0.7 for cruise power of modern piston aircraft engines, the lower the number of course being the more efficient.

So let's put together some figures from the September *Motorgliding*. Consumption at 75 percent power, from Page 5: 2.5 gph, and using 6 pounds per gallon this is 15 pounds per hour of fuel. The specific fuel consumption is found by dividing the weight of fuel used per hour by the horsepower the engine was producing, so 75 percent times the rated power is 0.75 x 68 = 51 hp. Therefore, sfc = 15/51 = 0.294. To this I can only say WOW! Some efficient engine. Maybe Stan Hall has a point: it's hard to design props with the data we have to work from!

Steve du Pont
Fairfield, Connecticut

Editor:

I recently acquired a Nelson BB-1 *Dragonfly* which I would very much like to restore to flyable condition.

The airframe is basically sound, but the engine will require major repairs. The engine is a Nelson H-44, and attempts to locate parts have thus far been unsuccessful.

If any of your readers have information where a complete H-44 or parts may be obtained I would greatly appreciate it if they would contact me.

Robert G. Seals
5592 Spencer Street
Las Vegas, Nevada 89119

Write Seals if you can help—Ed.

Motorgliding *recently heard about a* Duster *flying around with an engine pod on it. We asked Hank Thor about it. His reply:*

Editor:

You are quite right. There is indeed a powered *Duster* flying and as the designer I am very much involved.

As you may already know, the *Duster* was designed at its inception to be used either as a sailplane or as an "ultralight" powerplane at the owner's option. I am avoiding the term "powered sailplane", because the *Duster* is too small (13 meters) to support the weight and drag of a power pod without compromising its soaring qualities. Rather I had in mind that the powered *Duster* be used as one would use a *Cub* from the local airport (it is taxiable) or be flown to the outlying soaring sites, where the pod can be quickly disconnected turning the aircraft "instantly" into a sailplane without sacrificing performance in either mode of operation.

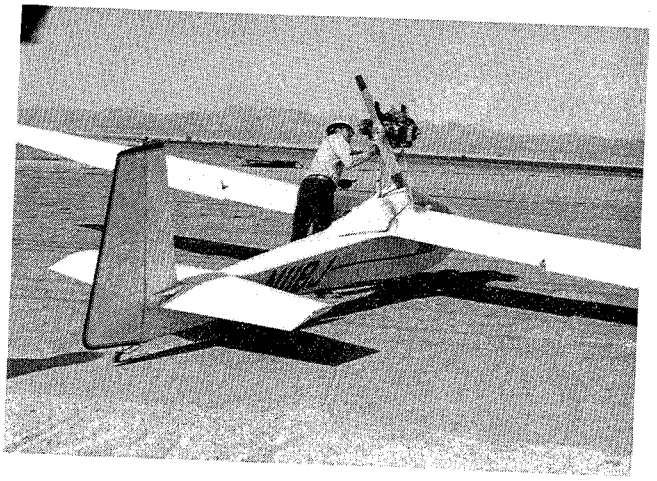
The power pod, as designed, is totally self-contained, supporting a JLO-L600M two-cycle engine of 35 hp weighing 56 pounds. The prototype has an electric starter and a 5 gallon gas tank.

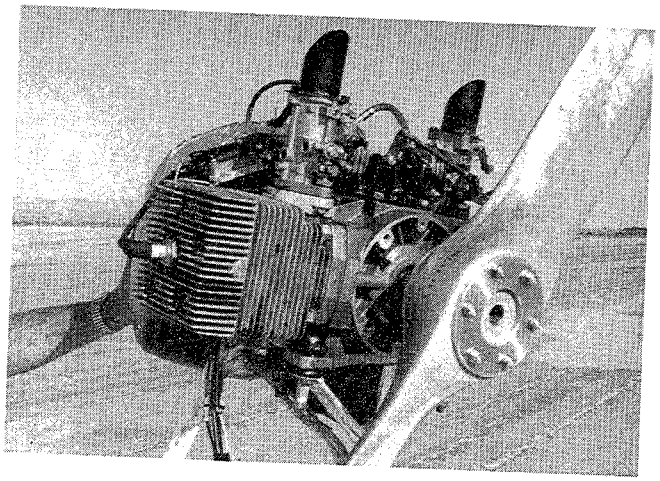
Our development program has just reached the test-flying stage and we are currently experimenting with such details as mixture control, exhaust tuning, nois control, propeller matching, air restarts etc.

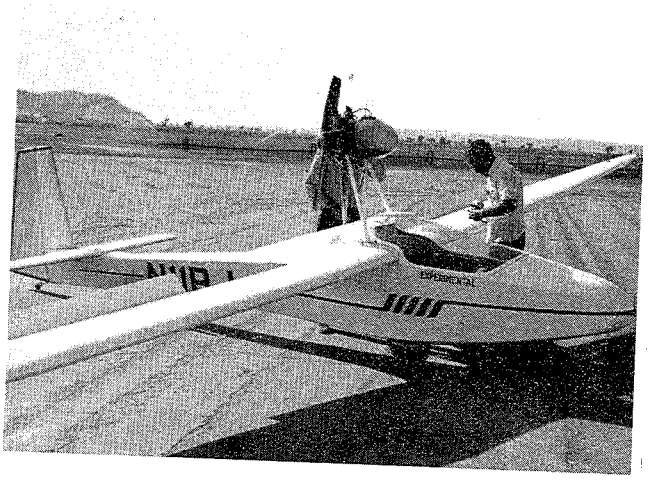
Performance, even with as-yet limi ted power at the prop, is encouraging ar I think it safe to say that 500 ft/mi and a 90+ mph cruise are attainable wit a cowled pod. The engine is of cours more powerful than necessary to achiev self-launch, but the choice was dictate by availability and our design objectives Efforts are also underway to obtain Fichtel-Sachs Wankel engine in the 20-1 range for further testing. Although found it possible to sustain power-o soaring flight in moderate lift, no at tempts will be made to measure performan until we are quite satisfied with ou engine program, and since our design ob jectives will not emphasize power-o soaring we will not go beyond the use o our present fixed-putch prop set-up. Th prop windmills down to 50 mph and star up again at 65 mph allowing easy air re starts, so we may decide to leave o the starter and use a recoil pull-ro system on the ground. This would sa about 14 pounds (battery, starter, cable etc.). The powered *Duster* is rated f a +4.4 g limit load @ 725 pounds gro weight. Without the engine the *Dust* sailplane complies with O.S.T.I.V. No mal Category criteria; i.e., +5.3 g lim load @ 620 pounds gross weight.

Needless to say I am very pleas with our results so far. The ship being flown at El Mirage during the hour FAA-restriction period, but I can say exactly when the next time will l All the work is being done in the Dus Sailplane Kits' shop, and it is second to the kit manufacturing, which ke the builders, Norman Barnhardt and Maupin, very busy. There are presen more than 160 *Dusters* under construct and each can be retro-fitted for po without any changes in the airframe. promise a more detailed report when program is completed, but can give no deadlines. I hope the enclosed p tures will be of interest to your reade

H. Einar Thor, Desig
California Sailplan







Powered *Duster*. See LETTERS

CLASSIFIED ADS

DESIGNING & BUILDING your own auxiliary-powered sailplane and in need of sound engineering advice? For free detailed information send a self-addressed stamped envelope to: Amtech Services-mg, RD 8, Mansfield, Ohio 44904.