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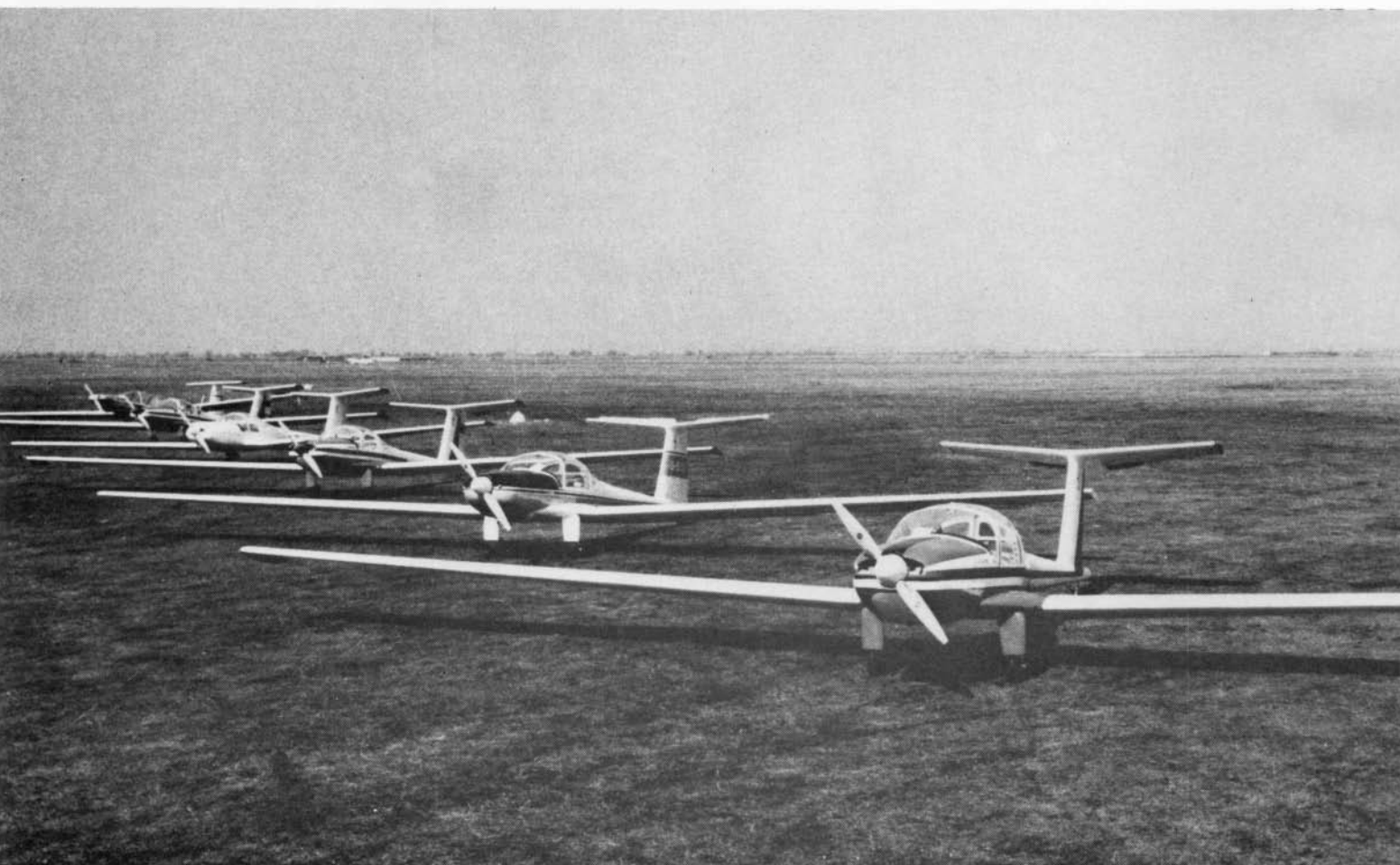
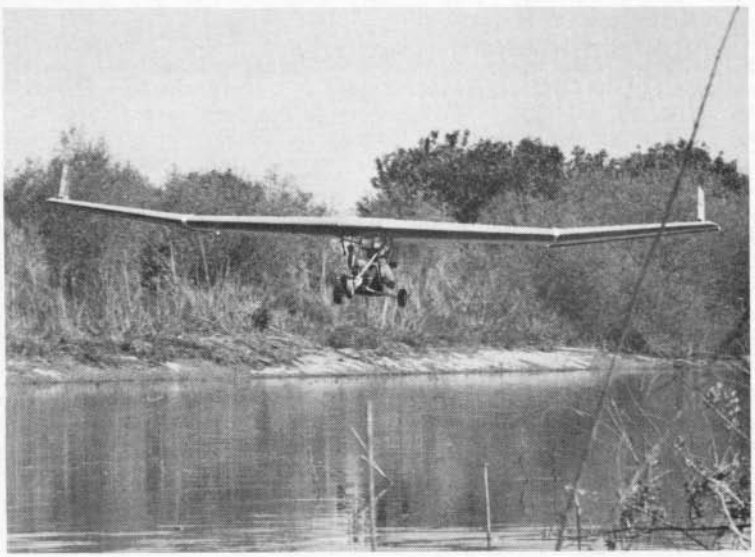


SOARING & MOTORGLIDING

The JOURNAL of the SOARING SOCIETY of AMERICA Volume 44 • Number 4 • April 1980



(*See page 12.*)

The Soaring Society of America is a nonprofit organization of enthusiasts who seek to foster and promote all phases of gliding and soaring on a national and international basis. The Society is also a division of the National Aeronautic Association (the U.S. national aero club) which represents the U.S. in the Federation Aeronautique Internationale (FAI, the world sport aviation governing body comprised of national aero clubs). NAA has delegated to the SSA the supervision of FAI-related soaring activities such as record attempts, competition sanctions, issuance of FAI Badges, and the selection of a U.S. team for the biennial World Gliding Championships. SOARING is the Society's official journal.

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Cover: Interest in mountain flying is growing (see page 13). This stunning picture of Ted Schirtzinger skimming along a Sierra massif shows why. Photograph by Sandor A. Aldott, Master of Photography, ASP ©

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Correspondents who want action should contact their SSA Regional Director or the Executive Committee (Names and addresses of Regional Directors are in the *SSA Membership Roster,* **and the names of the three Executive Committee members are given at the close of the Executive Director's Report which is published in** *SOARING* **following each Directors' Meeting.)**

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SOARING MAIL

FTE's Using Comparison Vehicle

Although I have always found Dick Johnson's "Flight Test Evaluation" articles some of the best and most interesting reading in *Soaring*, and I know how much they influence buyers and thereby producers around the world, I feel that comparison flights give a much more accurate picture of which glider is the better at what speed and flap-setting. So during the Danish nationals when we had days with absolutely no convection above 100 meters, we decided to do something about it. We had five different 15-Meter racers available: AS-W 20, LS-3, PIK-20D, *Mosquito*, and *Mini-Nimbus*, but only four tugs. We agreed to compare four gliders at the same time and to leave the *Mini-Nimbus* out, as we did not expect it to be significantly different from the *Mosquito*, having exactly the same wing.

During the tests we lined up abreast and were photographed from behind by one of the tugs. By measuring the span of the gliders on each picture, it is easy to determine any height gain or loss within the formation.

All gliders were flown at the same wing loading (33 kg/m²), except the AS-W 20 which later turned out to have flown a little heavier (34 kg/m²).

We made three test runs at 100, 150, and 180 km/h, each lasting three minutes. The photos showed that at 100 km/h the AS-W 20 was 5% better than the PIK and *Mosquito*, which, in turn, were 5% better than the LS-3 (which had the Johnson flap-fuselage sealing). At 150 km/h all four gliders were within 3% of each other. We did not find this significant, but at 180 km/h the AS-W 20 was 10% better than the rest, and these were all within 1%. In this way, we did not determine the L/D of the gliders but used Johnson's data to calculate the difference at each speed. All gliders were as from the factory with only normal sealing, and all speeds were as indicated in the *Mosquito*.

In all fairness I want to add that I am the Scandinavian dealer of the French-built AS-W 20F, but that is a direct consequence of our tests, and I was flying the PIK.

About Dick Johnson's bug test, I find it very interesting, but it is my experience that some flap profiles get more than twice as many bugs as others during the same time, and this seems more important.

NIELS TAARNHOJ

Holte, Denmark

Dick Johnson on Flight Testing Techniques

I would like to make the following comments in reply to the letters of Niels Taarnhoj (above) and Bruce Tuncks (*Soaring*, Nov. '79) on sailplane flight test evaluation procedures:

1. It is well-known that sailplane performances differ, not only from model to model, but *between sailplanes of the same model coming from the same molds*. New, and as yet unpublished, test data of a second LS-3A, serial number 3421, show better performance than SN 3399's recently published data. The factory says they were fabricated in the same molds, and both appear to be of equally fine finish, smoothness, and sealing. The performance differences were measured by still-air sink-rate measurements and then rechecked by double-towing to 9500 feet and comparing the differences while flying #3399 side-by-side with #3421. No obvious reasons are apparent to me for the performance differences. The wing maximum thicknesses measure the same within about 1mm (.04 inches). I personally suspect that the wing airfoil profiles may differ enough to change airflow characteristics, but as yet no templates have been made to check this. As this is written both Wolfe Lemke and Walter Schneider are scheduled to come to Dallas before the SSA Convention to make flight and ground measurements of the two LS-3A's themselves, and we hope they can unravel the mystery then.

2. Wing molds are known to be flexible to varying degrees, and the differing techniques used by craftsmen using the same molds can easily result in wings of differing thicknesses and airfoil profiles. This was especially true of first generation GRP sailplanes where considerable differences often existed between left and right-hand wing panels. If unconvinced, make a template (preferably to the designer's intended coordinates) fitting one wing panel. Then try fitting it on the opposite wing panel at exactly the same span station.

Manufacturers are becoming much more aware of this problem now, and they are improving both the accuracy and rigidity of the new molds. I believe this mold improvement is absolutely essential if extensive low-drag laminar flows are to be consistently achieved.

3. For the above discussed reasons, owners and pilots of similar-model sailplanes as those tested by DGA should not feel that our measured polar characteristics are necessarily the same as those exhibited by their sailplanes. By the law of averages, some will measure better and others worse. Perhaps some day when perfect molds and manufacturing techniques have been developed, all same-model sailplanes will indeed have the same polars.

4. As for polar measurement accuracy — no method is perfect and each is subject to limitations. Paul Bikle (Edwards Flight

Test Center) and Hans Zacher (University of Braunschweig) both made extensive use of highly-calibrated (in still-air sink tests) pacing sailplanes where sink-rate comparison measurements were made with the test sailplane while flying side-by-side at various constant airspeeds. Because both sailplanes are flying in the same air mass, good results can be achieved, even when there are some vertical air motions present. More equipment and personnel are obviously required for this method, and it is completely dependent upon the assumed polar of the "sacred cow" pacing sailplane. Bikle used a modified HP-14 sailplane for a pacer and the Germans use a 1970 model 17.75-meter *Cirrus*. Both are subject to temperature and aging deformations, surface dust and roughness, incremental altitude measuring accuracy, and pacer piloting techniques. German polar measurements of a specific model of a *Cirrus* sailplane showed an L/D maximum of 39 whereas Bikle's measurements of the *same model* showed L/D max of 37. These two separate tests show significant differences between sailplanes of the same model.

Dr. Gus Raspet, who did most of the pre-Bikle U.S. measurements, used principally the single-sailplane sink-rate measurement method, and his work was widely recognized and successful. The reasons for Raspet's success with the single-sailplane measurement method lay, at least partially, in the fact that they were performed in a *suitable geographic area* where the ground surface was essentially flat for many miles in all directions. This minimized the occurrence of orographically induced atmosphere waves. In addition, the southern latitude of his Mississippi test area minimized the upper-level jet stream effects upon the air vertical motions. Even then some degree of vertical air motion almost always exists, and this requires that a number of flights be made and their data points averaged to arrive at credible polars. If the air were ever truly still, just one flight could accurately define a polar.

In mountainous regions such as the western U.S. where Bikle made his measurements, the air is seldom still enough to make meaningful single-sailplane sink-rate measurements. That is a good reason for his choice of the comparison method. He used some of the rare still days there to calibrate his HP-14 pacer sailplane. On the other hand, our Dallas test site is situated in a southern flat area very similar to Raspet's Mississippi site. At Dallas we often find the air to be still enough for good sink-rate measurements, and that, combined with lower costs and personnel requirements, is the reason that we prefer to predominately utilize the single-sailplane technique. Our funds are limited, and only volunteer assistance is available to perform our DGA tests. Braunschweig, on the other hand, is apparently supported by both a university and manufacturers, and they do excellent testing there.

5. In regard to Niels' description of the impromptu Danish test last summer, I think it was great that they used the occasion to do so, and I am not surprised that their results might have differed somewhat from our DGA test data. The 100-km/h run using the *Mosquito* airspeed system errors measured here calibrates to about 54 knots, which is too slow to show the best AS-W 20 or LS-3 performance. Our published data show the AS-W 20 achieves best L/D at about 57 knots, and the LS-3 at 59 knots. The best part of both the AS-W 20 and LS-3 polars occur in the 58 to 70-knot regions when unballasted.

The next test point flown was at 150 km/h, which by DGA tests calibrates to about 76 knots, assuming the Danish *Mosquito* used the same factory pitot and static vent system as that of N46898, our test *Mosquito*. At this airspeed the advantages of the AS-W 20 and the LS-3 are less great, at least by our measurements.

DICK JOHNSON

Dallas, Texas

January Centerfold

Ever since I became a glider pilot, I have dreamed of flying gliders in Switzerland. Your January centerfold struck me like a rush of St. Elmo's fire; to me that photo was as intensely phrased as any invitation ever extended. "This is it," I silently screamed as I happily flew a vicarious approach. I could see myself walking to the bridge from the train station one sunny day, looking into the sparkling water, and blessing the forces that had made my visit possible.

If you would be so kind as to put me in touch with the magician who took the photo or tell me where this little burg is located, I am sure my life will never be the same. When the fates make my journey possible, I will bring you a story of a beautiful village, a guest house par excellance, fresh bread and cheese, and soaring to inspire.

In gratitude and anticipation I await your reply in green air.

EARL HIPP

St. Paul, Minnesota

* * *

After seeing in the January issue of *Soaring* the painfully beautiful centerfold titled only "Swiss idyll," I certainly would like to know the name of this place (or the closest village), Switzerland being my second home country, not to mention all the jitters I get when looking at this beauty. How could you omit this vital information? Because of this one is tempted to wish you all the blue holes in the coming soaring season . . . but I am not that grouchy.

S.O. JENKO

Mansfield, Ohio

* * *

The beautiful centerfold picture in the January issue of *Soaring* was taken in Saanen, Switzerland, where a soaring camp is held every summer and is attended by numerous regional Swiss soaring clubs.

I have an apartment in Gstaad, which is about 3 kilometers from Saanen, and every summer I go over and fly from the Saanen airport as a member of the Zurich Oberland Club. I have seen the view depicted in the centerfold many times on final.

C.B. KNISKERN

Miami, Florida

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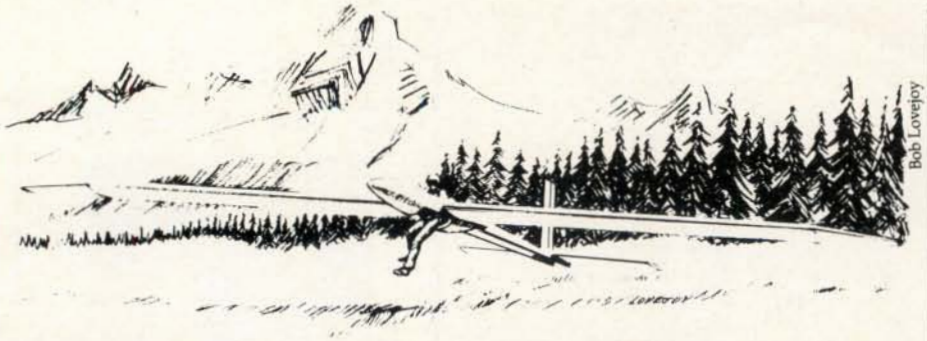

RP-1 Critique

This letter is written in response to the article entitled "CAPGLIDE and the RP-1" (*Soaring*, Feb. '80).

I feel quite certain that many readers will infer from Dr. Helwig's article and Bob Lovejoy's drawing that the RP-1 will be a *practical* foot-launched ultralight. In my opinion it will not.

First, let me say that I thoroughly enjoyed the article, and the aircraft design, and the structural advances that it represents. I am excited about its R & D which surely will advance the area of ultralight flight. But to suggest that we may soon be able to build or buy an RP-1 and use it for foot-launched cross-country flights is stretching credibility to the extreme.

Under "laboratory" conditions, it would seem possible to foot-launch this ship with (1), a 15-20 mph wind coming directly up a smooth hill and (2), at least two trained helpers able to aid and control the ship for the first few running steps of the pilot. In short, an *aided* takeoff would seem possible. It is the landing which I believe would present the problem and invalidate the practicability, if we are thinking in terms of a foot landing. Again, under *special conditions* it is conceivable that the RP-1 could be foot-landed on level smooth ground with a steady 15-mph wind. But in the real world of cross-country flying, the pilot must be able to accept a no-wind landing and less than perfection in the levelness and smoothness of the landing area.

I note that the designers have considered this problem and show a skid in the photo (if not in the drawing). If we are willing to admit that most landings will be made on the skid, or if a wheel (or wheels) can replace the skid — which I believe would be much better — then the concept becomes entirely different and a real possibility. However, even then, I believe that we should not get our hopes too high.

Why not? Well, because although the RP-1 would have great promise as an ultralight soaring machine (once it is airborne) the difficulties associated with transport, takeoff, and landing would be much greater than most readers would assume and more than most pilots would endure. For example, the ship would undoubtedly need a trailer. Climbing up a tortuous 4-wheel drive dirt road is a normal requirement of most cross-country foot-launch sites. A trailer greatly complicates this process. Secondly, obtaining two highly qualified helpers for all launches is an added burden which soon becomes excessive. Thirdly, waiting for the required 15-mph wind and perfect wind direction would call for extreme patience and further reduce viability and practicability. (In my judgment, at the sites where I have launched, a 15-mph wind would be the minimum for a ship with the performance figures given by the author.) Fourthly, even with the highly desirable addition of wheels instead of a skid, the landing at the end of a cross-country flight will have major difficulties. Remember, there are no windsocks; the use of an air-deployed smoke bomb is the only reliable method of obtaining information on wind direction and velocity. So let's assume that the pilot uses a smoke bomb. He also will normally require spoilers for glide slope

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control. (Spoilers didn't seem to be included in the RP-1 design.) But let's assume the pilot lands safely with the aid of wheels, a smoke bomb, and spoilers. He still has the possibility of a major problem in the event of a strong (over 15-mph) ground wind. The very goal, light weight, which the designers have worked so hard to achieve, now becomes the problem. With the possible exception of airports, help from another human being is very rare at off-field, cross-country landings. The pilot could very conceivably be pinned down without being able to exit the cockpit for the duration of the wind. This could be hours. And remember, strong ground winds are normally gusty and very changeable in direction. The problem of a strong wind is not insurmountable, but it is something which the average sailplane pilot would not expect to be as serious as it is.

Let me make one thing very clear. The RP-1 is but one example of designs which hopefully are foot-launchable and foot-landable. There are many others, including the Swiss *Canard*. All of them have the problems and impracticabilities of the RP-1. But if we forget the idea of foot-launch and foot-landing, many of them might make rather attractive ultralight sailplanes. If we make the mental alteration of thinking of them as sailplanes, and if we also shift to towed takeoffs and gliderport landings, it becomes an entirely different and more viable concept. That's my whole point: The RP-1, and all the other similar ships (including *Canards*, etc.), are not, in my judgment, practical as *foot-launched* or *foot-landed* soaring machines.

There is one final consideration of the RP-1 (and all the others) which must be mentioned. At the present time, there is no provision for obtaining U. S. or world records in them. And even with extreme effort on the part of many enthusiasts, the changes which would have to be made in the NAA and the FAI codes would take years to accomplish. Without the stimulation afforded by world record possibilities, the concept of the high-performance ultralight soaring machine will probably continue to be only a dream and an ideal which I believe at present may be still many years away.

GEORGE WORTHINGTON
San Diego, California

★*The CAPGLIDE program is mainly an educational program to design and fabricate composite structures. To limit the man-hours of designing and building a glider, the ultralight glider was chosen. The design was not oriented toward marketing, but to allow students to complete the project during their stay at Rensselaer Polytechnic Institute. Costs and simplicity were major considerations.*

The program contributes design ideas for ultralights, not only for foot-launched gliders. The glider can be foot-launched, but it should be landed on the skid. If the pilot is unable to make or has to interrupt his start, the glider should come to a fast stop. For this reason the skid was preferred over the wheel.

At this point let me assure the readers of SOARING *that all the points which are mentioned in the letter have been discussed at R.P.I. many times, especially with respect to the practicability of the RP-1. The next glider R.P.I. has on the drawing boards will be a motor-equipped ultralight glider (about 5 hp) such as mentioned by Paul MacCready in the item "NASA Flight Testing the Gossamer Albatross" (*SOARING *Feb. '80) and similar to the RP-1 in design and fabrication.*

Perhaps it will take time to get full recognition for the ultralight as a competition soaring machine. Maybe the ultralight movement is a dream and an ideal, but this is the best reason for R.P.I. to go on with this challenge. Let's dream and make it real! — H. GUNTER HELWIG

To Cut Costs: Primaries for Initial Training

It seems to me there is an obvious way of reducing the costs of initial training in gliders. A crash-worthy primary could be inexpensively constructed, and, with appropriate limitations, blessed with an ATC. A two-place for dual for the apprehensive might be possible. With one pasture, one jeep, one instructor, 5 students, and 2 weeks, 100 flights shouldn't cost any more than $250. If we could get such a machine designed, built, and FAA approved, I'll start an operation within a year following.

B. G. RUTLEDGE
FPO, New York

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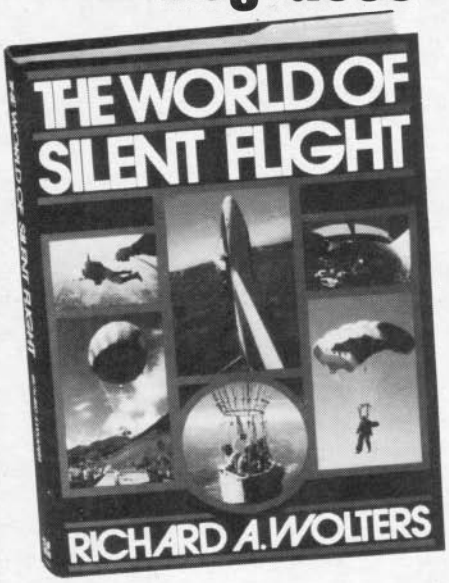

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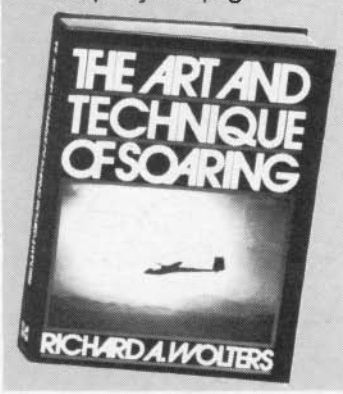

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S 480

Tail Design Criteria

I would like to add some comments regarding the letter from Jack Wilson (*Soaring*, February 1980) concerning horizontal stabilizer aspect ratio selection. I found R. T. Jones' lazy man's answer to Wilson's inquiry surprisingly inadequate — surprising because I'm sure Dr. Jones knows the *full* story very well.

The rest of the story on horizontal stabilizer size optimization involves several major factors besides the idealized induced drag relation presented originally by Dr. Jones in his *Soaring* article (October 1979). Assuming we have decided to put a conventional horizontal stabilizer on the airplane, and have defined its necessary area and location (tail moment arm and vertical position), we may then proceed to the detailed optimization of its span, aspect ratio, and shape. To perform this final shaping we follow good wing design procedures to select the best values of span, taper ratio, sweep angle, and so on, *noting carefully* that induced drag is only *one* criteria for span selection.

Now, given a lifting surface (wing, stabilizer) of specified *area*, we select the final configuration of the surface on the basis of *at least* the following criteria:

1. Induced drag considerations, which tell us (according to Dr. Jones) that the span should be large.
2. Airfoil profile drag (viscous drag) which tends to *increase* as chord (and hence Reynolds number) *decreases*.
3. Structural weight which tends to increase much more rapidly than span, as span increases.

The last two effects are relatively small but never *negligible*, and the optimum horizontal tail will be the one which strikes the best balance between *all three* criteria. Note that the second and third factors require a small span, large chord (and hence low aspect ratio) surface.

A final point: Aspect ratio is a derivative quantity which describes the shape of the surface (long and narrow, short and broad). In the shaping process we should consider aspect ratio to be a *consequence* of the proper selection of the actual wing dimensions (i.e., span, chord, and area), and not the primary size parameter.

$$\text{Aspect ratio} = \frac{\text{span}}{\text{average chord}} = \frac{(\text{span})^2}{\text{area}}$$

Now add cost, aeroelastic effects, aesthetics, and so on, and we have the horizontal stabilizers which the manufacturers present to us.

JOHN MCMASTERS

Burton, Washington

New Task Proposal: A Many-Sided Question

Roy McMaster's suggestion for an improved contest task ("Soaring Mail," Feb. '80) will surely test the imagination of any individuals bold enough to attempt such a revolutionary form of transit. Undreamed-of-records will doubtless be set as they speed about that five-sided quadrilateral, dumping ballast over a truly imaginary finish line. I, personally, will be very content to stay on the ground, charting the progress of the courageous pilots of space/time . . . .

DOUGLAS BARR

Cambridge, Massachusetts

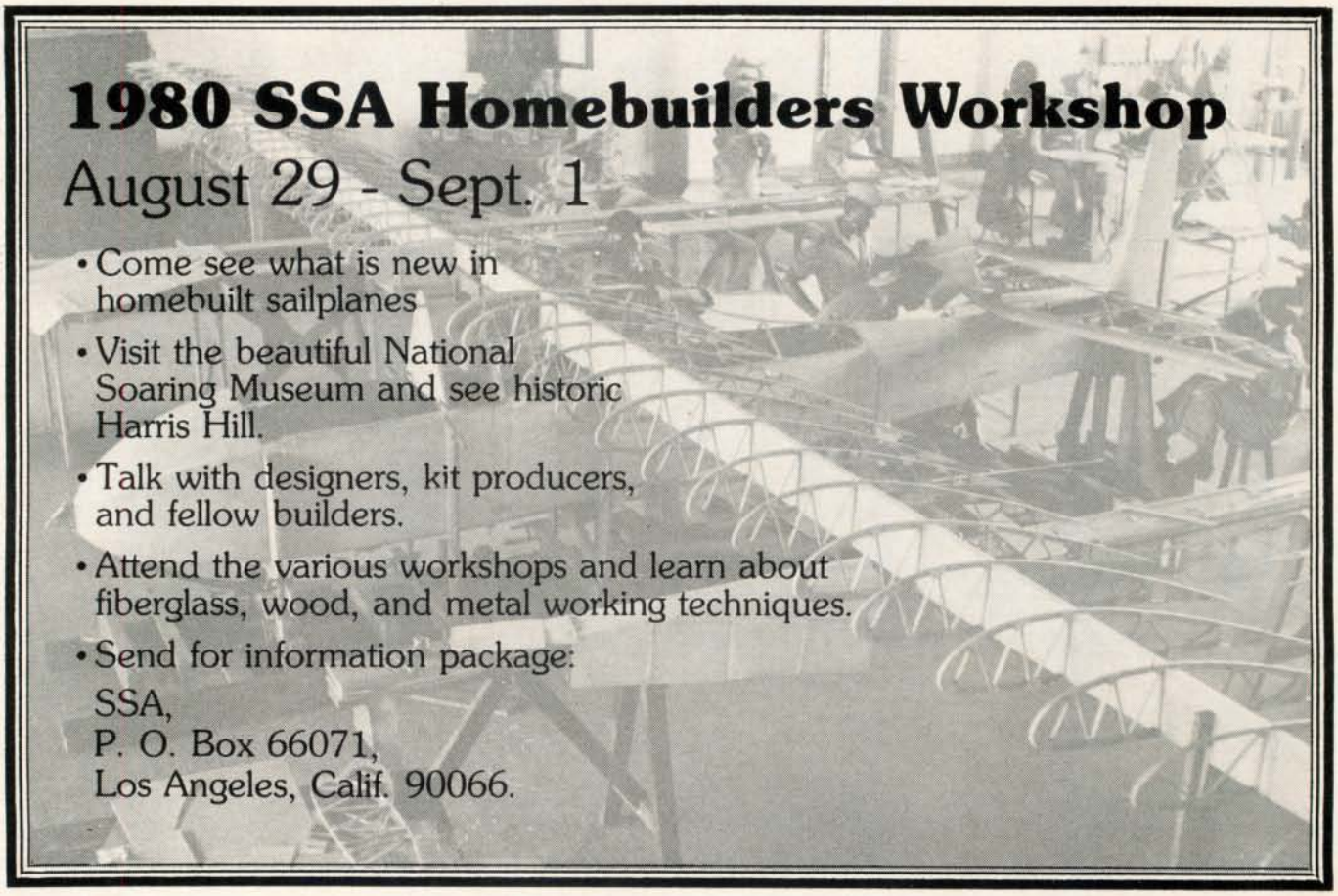
* * *

I have just read and reread Roy McMaster's comments regarding changes in our Regional and National Contest Rules, and I must confess this feeble old head needs help. Try as I might, I was quite unable to construct a five-sided quadrilateral. (And all these years, I foolishly thought I understood such things.) Directing my attention to the geometry of a four-turnpoint triangle was an equally hopeless exercise. Have things really changed so much? Next, I wrestled with logic behind constructing a triangle to "circumnavigate restricted or controlled airspace" if, in fact, this cannot be done today. And is it realistic to suggest that a course line might be routed around marginal weather? I'm obviously confused . . . .

JACK GREENE

Boonton, New Jersey

★*It's been some time since I took geometry — I accept the digs. I should have written "polygons" so options would be O & R, triangles, quadrilaterals, or pentagons (these could include criss-cross type courses). And routing a course line around the weather may not be realistic in mountainous terrain, as Jack Greene points out, but this is probably not so obvious in the plains.* — *ROY MCMASTER*



Lark Rudder Pedal Hang-Up Hazard

As I am quite interested in flying new and different types of sailplanes, I requested a checkout in order to fly a two-place *Lark* at a gliderport I visited during a soaring vacation in the U.S. After the third check flight, I was cleared for solo. The tow on my first solo flight was to about 4000 feet AGL and I released without incident.

In the course of continuing to get the feel of the ship, I tried a steep right turn followed by a full-stick, full-rudder rollout from the right turn into a steep left turn.

I suddenly found that the rudder was jammed in its full-left position — it would not come off!

I had the presence of mind to figure out that if the rudder was jammed left, I had better continue flying left turns while I considered the matter further. By applying as much right pedal pressure as I dared without breaking the control cables, I found that the rudder pedals would come back about 70 percent of the distance to neutral. However, when pressure was relaxed, the pedals returned to the full-left position!

After experimenting with hard right-foot pressure a couple of times while continuing left turns, I noticed my seat twisting each time I pushed hard with the right foot. Reaching and fumbling behind the seat back, I discovered the problem — the rear-seat left rudder pedal bar was hooked behind my seat back by my left hip.

Some jiggling in my seat allowed the fiberglass seat back to shift slightly to the right. The pedals suddenly came free and I was able to straighten up and push my heart back into my chest cavity from my throat.

On landing, the *Lark* was immediately grounded pending a solution to the seat/pedal problem. Several days later the *Lark* was returned to service with a seat which had been modified by notching each side in the area of the rudder pedals. This was then reinforced with an additional layer of aluminum neatly riveted to the area around the notch.

After my return home, I happened to be relocating my library of *Soaring* magazines when, to my surprise, the January 1979 issue dropped and literally fell open (on page 3) to a sketch of the *Lark* seat showing the suggested modification! Thus the theorem is proven: "... it pays to read your *Soaring* magazine closely and save yourself. ..."

In my opinion, this *Lark* seat problem could be potentially fatal to some pilot who does not figure out its solution in time. I would hope that *Lark* owners would take note and make this modification without delay. I don't know if a requirement for such a modification is circulated to all registered *Lark* owners, but it certainly should be.

ARTHUR A. SCHUBERT, JR.
Markham, Canada

★*Both the manufacturer and the FAA have issued AD's detailing corrective measures to be taken. In addition, a spokesman for the LARK's U.S. distributor indicated further notification will be sent to owners of this sailplane.* — *ED.*

Dive & Zoom Okay Sometimes?

In regard to the very good article in the February "Safety Corner," on The "Dive-and-Zoom Approach," let me say that what was stated therein is quite true. One does not gain by the dive-and-zoom method, *as long as the sink rate remains normal.*

However, anytime one encounters very heavy sink, the proper approach is to lower the nose and get the hell out of it. This is also true if the heavy sink occurs on final. Otherwise one just sits and watches the ground rush up to meet him. Diving through this heavy sink, the benefit of the ballistic curve experienced in the zoom over an obstacle *can* be a life saver. As a matter of fact, failure to understand and use this technique can result in an accident just as surely as using it at the wrong time.

Of course, if one finds himself in this situation, it is most likely due to an improperly planned pattern, but those do happen. A student should be aware of the method and the appropriate circumstances in which to use it. It has saved my ship on at least two occasions.

FRANK E. CONNER
Wauchula, Florida

* * *

Contrary to what guest columnist Tom Cooper stated in the February "Safety Corner," the dive-and-zoom method of clearing an obstacle is a reliable and useful way of squeaking into a field when apparently caught short — but only in special circumstances!

When flying in strong winds there is al-

most certainly a low-level wind shear and, as a result, a reduced headwind closer to the ground. In such a situation, a final that appears to be falling short by a small margin may be retrieved by diving to a low level and then pulling up sufficiently to clear any fence or similar obstacle. The reduced headwind close to the ground stretches the glide by allowing greater forward progress.

A further advantage of this technique under these circumstances is that there is no temptation to pull the nose up to improve (?) the angle and then get caught by the shear. Diving through the shear ensures a good margin of airspeed above the stall during the transition.

Other than this, however, I agree with Tom's comments, and even in a strong wind the dive can only be made if the obstacles between the glider and the intended point of landing pose no real hazards and the margin by which the pilot is falling short is only a few feet.

LLOYD M. BUNGEY
Port Mellon, Canada

Byars/Holbrook Symposia Proceedings Reprint

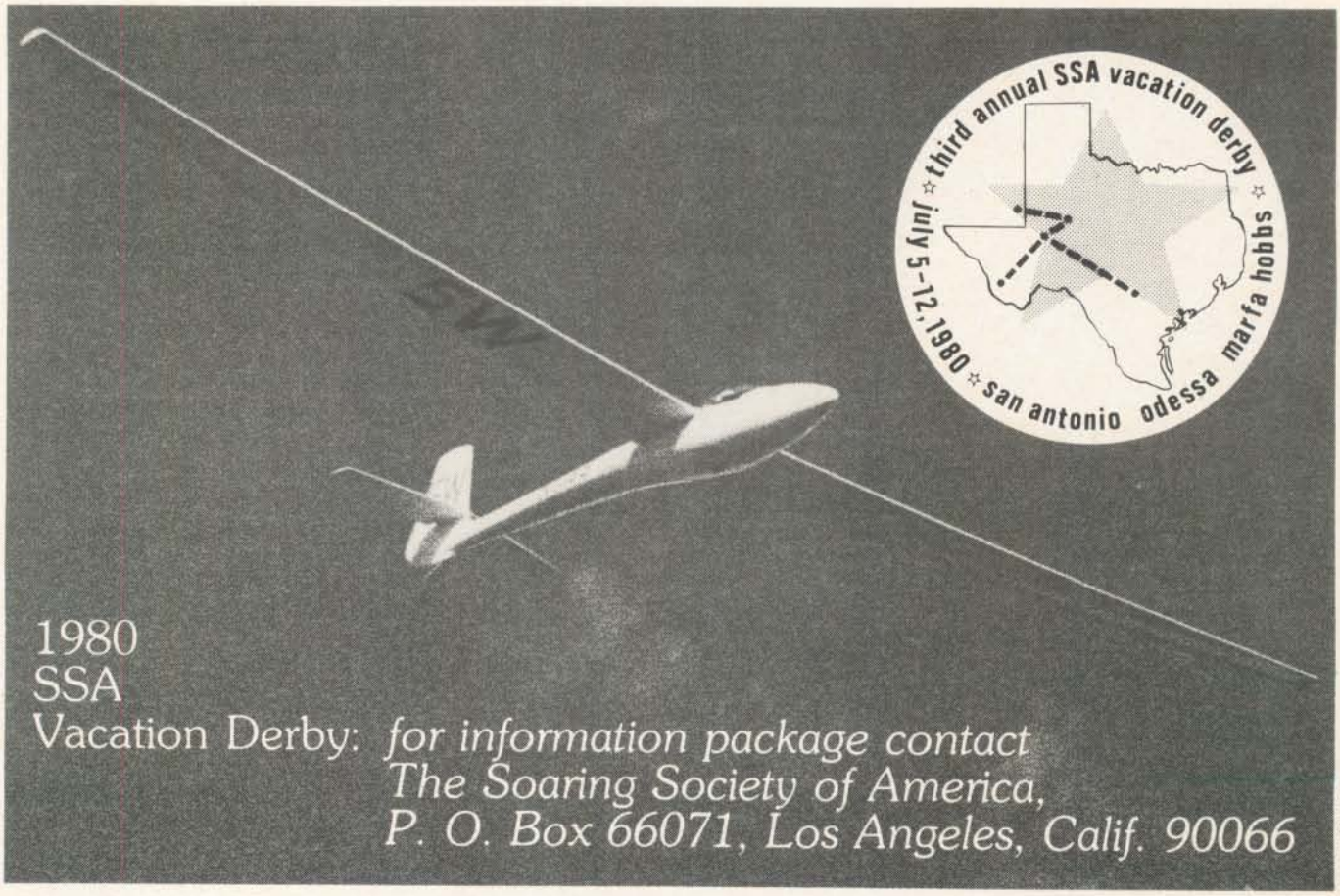
Relatively new soaring pilots (like myself) may have tried to obtain one of Ed Byar's and Bill Holbrook's *Proceedings* from one of their 1969, 1970, or 1971 Symposiums on Competitive Soaring and been told they were out of print. Take heart! With the cooperation of the SSA's library and Messrs Byars and Holbrook these are available once again. Mr. Gene Moore's talks at the 1969 and 1970 symposiums on variometers and total energy compensation, which are of course included in the *Proceedings* from these symposiums, have also been excerpted and made into a separate booklet titled *Variometer Systems*.

If any readers think these are for competition pilots only, they will be surprised at the wealth of soaring information that applies to weekend sport flying and badge work, as well as competition. When you have people like Dick Schreder, A. J. Smith, George Moffat, Gene Moore, Paul Bikle, Klaus Holighaus, etc., giving lectures on various aspects of soaring, as well as sailplane and instrumentation preparation and design, and with question-and-answer periods after each session, you can imagine the pearls you can find.

My thanks to Messrs. Byars and Holbrook for letting me copy the *Proceedings* and especially to Mrs. Sophie Holbrook (the power behind the throne — and all of you thought Bill was the smart one) for her coordination and help, and to Mr. John Dezzutti and Ms. Cindy Brickner of the SSA staff for their help in getting the library copies of these *Proceedings* to me for copying.

I hope the information in these will be as fascinating and helpful to you as it was to me and if you are unable to locate a copy please let me know.

PHILIP E. MORRIS
R.F.D. #5 Country Squire
Statesboro, Georgia 30458



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SSA IN ACTION

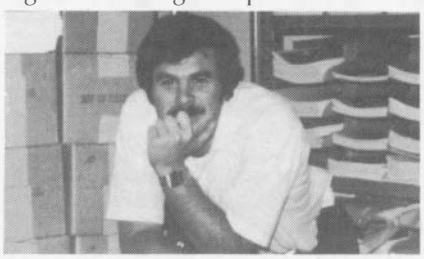
1980 CONTEST RULES

Copies of the revised rules for SSA-sanctioned contests have been mailed to all seeded pilots and officials. The revisions were developed by the Competition Pilots Committee based on the comments and recommendations of contest pilots.

The 1980 version has been placed in a loose-leaf notebook for easy reference and updating. Future revisions to the rules will require only the substitution of revised pages rather than the entire set. New competition pilots may get a copy of the rules from a contest official at the time of the contest or by writing the SSA office. — JOHN DEZZUTTI

SSA OFFICE STAFF CHANGES

To assist members with inquiries in reaching the right person in the SSA office, attention is called to the following recent changes in personnel:



David Aranda has resigned his position as Assistant Operations Manager to move up to a new, but related, career position with a real estate firm based near the Santa Monica Airport. Though David is in his early twenties, his long employment in the SSA office made him a senior member of the "office family." As a boy, he started as a "go-fer" when his mother, **Mrs. Shirley Aranda,** a former SSA secretary, brought him to the office after school to help with various chores. A little later he began working during summer vacations and eventually came on as a full-time employee after high school graduation. His responsibilities increased with multifarious duties in purchasing, mailing, merchandising, advertising, and in-house publications, among others. Such tasks usually provide ample opportunities for personality friction, but David's pleasantness and genuine affability were recognized and appreciated by all.

Ron Guess will be replacing David. Ron has an aviation background as well as business management training and has had extensive experience in communications techniques for a nationally telecast southern California church. He has a wide range of interests ranging from song writing to film production and is currently working on a film script in his spare time.

Shelley Hoose

Nancy Evans will be returning to college following three years as SSA's FAI Badge Coordinator and Record Homologator. Her interest in soaring is as high as ever, and her determination to win her final Diamond in her 1-26 is undiminished. (Read an account of Nancy's part in her partner's off-field landing adventure elsewhere in this issue.) She says she will be dropping by the office to help out now and then, especially with the Women's Soaring Seminar which she successfully organized and staged last year.

Cindy Brickner who worked as a receptionist last year, will be returning to SSA to take over Nancy Evans' chores. Cindy is not only interested in processing FAI Badges, but also in securing some of her own. She is a soaring pilot herself.

LOOKING BACKWARD

by T. E. Sharp

In 1940 I enrolled in aeronautical meteorology at Harvard. It was taught by the late Karl O. Lange, a meteorologist and sailplane pilot. Dr. Lange served as "met man" at several of the early soaring contests at Elmira, and he taught the course as if the students were familiar with sailplanes. Here is a story I remember from one of his lectures:

In the early days before the advent of radiosonde meteorgraphs to analyze the upper air, soundings could only be made by taking a meteorgraph aloft in an airplane or sending it up with a balloon. The first was expensive and frequently the planes were grounded due to bad weather and meteorgraphs sent aloft by balloon often would not be returned for months after a hunter or farmer found the instrument in the woods or fields.

The Blue Hill Observatory, some twenty miles southwest of Boston, developed a system employing a series of box kites tied together with piano wire with the meteorgraph attached to the top kite. The first kite was sent aloft and then a second was affixed to the wire and then a third at an appropriate interval to achieve a maximum altitude.

On one occasion, as the series of kites were aloft, a northwest wind freshened until the strain on the wire exceeded its breaking point when the operators attempted to reel it in. The kites, meteorgraph, and a length of trailing broken wire took off on a southeasterly course across southeastern Massachusetts.

The wire, of course, provided virtually no resistance to the ground and soon the kites were losing altitude. When the lowest kite hit the ground or the trees, it immediately provided enough resistance so that the two airborne kites would gain altitude anew. Then, when the ensnarled kite was finally demolished, the wire, providing no resistance, would slither across the countryside with the upper two kites falling as before. This continued until two major events occurred.

A wire sliding across rural country must inevitably lead to high voltage transmission lines and a large area of eastern Massachusetts was suddenly and mysteriously blacked out. Equally unavoidable were railroad tracks. In that era (1930's) trains provided transportation over even modest distances. In this instance a train on the Boston & Taunton Railroad happened by at the wrong time and picked up the wire in its locomotive's wheels which were soon hopelessly ensnarled with piano wire. No one was around to see whether the last kite and the meteorgraph rose as this unusual drag appeared on the system.

SSA'S 2ND ANNUAL WOMEN'S SOARING SEMINAR

SSA's 2nd Annual Women's Soaring Seminar, a seminar and soaring camp to be held from August 27 - September 1, will be hosted by **Doris Grove** and **Tom Knauff** at Ridge Soaring, Inc., Julian, Pennsylvania. All soaring enthusiasts are welcome to attend, although this six-day event is intended primarily for women. Daily presentations, post-flight discussions, and Sports Class competitions are scheduled. Planned topics cover badge and record soaring, cross-country, wave flight, competition, and ship maintenance. Speakers will include world and national record holders and high-ranking competition pilots. Sailplane rentals, instruction, and lodging will be available commercially from Ridge Soaring. For further information contact the Soaring Society of America, Box 66071, Los Angeles, California 90066.

— NANCY EVANS

ULTRALIGHT FUN

Dick Clawson lives on a 5-acre plot just outside Visalia, California. You can see his house just to the right of the wheel of his *Mitchell Wing's* power cage. Just to the left of the wheel is a barn-like structure where he assembled his kit. The vacant lot next door is long enough for a runway for powered takeoffs and landings. Dick apparently doesn't fly the foot-launched version.

"There's a ridge about twelve miles east of town. Why should I bother to trailer over? When the wind's blowing, I just fire up the McCulloch, motor over, turn it off, and slope-soar until I've had enough, start it up again, and motor home again. No fuss, no muss."

Dick explains that the San Joaquin Valley is frequently clamped with an inversion in the summer, but that he soars thermals when the opportunity presents itself.

"That's the highest," he says. "It's my own personal magic carpet. I feel then like I'm really flying. I can hear people and sounds from the ground, smell the odors and fragrances of the valley, be free from the vibration and noise of the engine. Not that I'm knocking the engine. It's a great equalizer. I mean, if the thermals are so widely spaced that it would take a 40:1 glass job to go cross-country, I can't hope the *Wing's* 16:1 glide slope will get me very far. But with a little moderate use of the engine now and then I can stay airborne, cover the ground, and still get back home without having to have a ground crew."

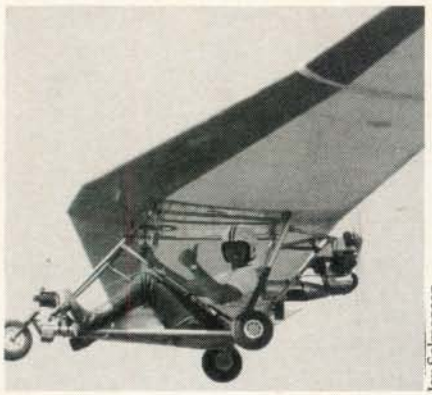
The accompanying photos were taken by **Jay Solmonson** for the *Visalia Times-Delta* which notes that "field workers stand up and shade their eyes and tractor drivers peek a look as [Dick's] shadow passes over alfalfa, corn, citrus, or even strawberry patches. Clawson and his craft are combined into one [like a bird]. In fact, on several occasions birds shadow the red-haired pilot and his flying machine."

Fun, huh?

Jay Solmonson

Jay Solmonson

Jay Solmonson



Jay Solmonson

Jay Solmonson

CONTINENTAL DIVIDE FLIGHT PLANNED

For six years **Bill Kantz** has made an annual summer pilgrimage from his home in Irving, Texas, to Taos, New Mexico's soaring camp. Like many another pilot, Bill was anxious to fly along the great mountain ranges of the Continental Divide. The Taos Soaring Camp format was out-and-return flying each day, and some remarkable flights have been made and reported in *Soaring*. However, when a turnpoint was reached, pilots frequently found the exciting terrain stretching on beyond almost irresistible. Inevitably, at the hangar flying sessions at the end of a day's soaring someone would ask, "Why don't we keep going north? That would be real cross-country soaring."

That made sense to Bill, and he recently has been organizing the first Great Continental Divide Flight.

"We'll start in El Paso, Texas, near the Mexican border and fly to Kalispell, Montana, near the Canadian border — in effect, a transnational flight. At this time our tentative itinerary in between includes Taos, New Mexico; Aspen, Colorado; Saratoga, Wyoming; Rock Springs, Wyoming; Driggs, Idaho; and Helena, Montana. These are 250-300 mile distances, but it's possible to do much more than that — even 600 miles — in high-performance sailplanes. If someone really gets going, there's no reason why he can't leapfrog to the next stop and wait a day for the rest to catch up!"

However, since some of the routes are over formidable territory, Bill says this first flight should be considered exploratory. "We won't be pushing," he explains. "It's intended as a fun flight, not a race, but I don't intend to take my wings off once." So far, besides Bill and his *Nimbus IIB*, it appears the group will include an AS-W 20, a *Zuni*, an LS-3, a *Mosquito*, a *Mini-Nimbus*, a *Speed Astir*, and two *Januses*. He has a Cessna 185 towplane and tow pilots lined up as well as an oxygen truck and driver so that the expedition will be self-contained. He's also planning photographic coverage of the event, pointing out the two *Januses* and the towplane should provide an ideal platform for air-to-air coverage.

Kantz figures expenses for the tows and oxygen portage should be in the neighborhood of $10,000, and he is presently seeking sponsorship to reduce or eliminate this cost. Lacking this, however, the participants will be expected to divide the cost. With ten pilots presently lined up, he plans to close the membership after "two or three more" have been chosen. Anyone interested should phone (214) 259-5014 or write Bill Kantz, 2101 MacArthur #124, Irving, Texas 75061.

Paul Rendel

When **Paul Rendel** heard about the Great Divide Flight, he said, "That's exactly the kind of soaring I've always dreamed about doing." Paul's work as a professional illustrator in Pittsburgh doesn't allow time to trailer his *Mosquito* out West and back, so he painted himself in the accompanying picture (made when he owned a *Concept 70*). "I love soaring along the Appalachians and Alleghenies," he explains, "but they're not as dramatic as great ranges like the Rockies, Alps, or Andes." He points out that the accompanying scene is not intended as a literal depiction of the Great Divide or any existing mountain formation. "It's out of my head," he says. "It's a construct without geographic coordinates, a sort of mountain soaring Shangrila."

HOMEBUILDER NEWS

Bob Gibbons, 709 Parkview Cr., Richardson, Texas 75080, decided to see if he could improve the performance of his Schleicher Ka-6E by smoothing its wings using a Featherfill rather than microballoons and epoxy. "We did complete before-and-after polar measurements . . . under the direction of **Dick Johnson.** The performance of the unaltered 12-year old sailplane matched the factory's 33:1 and agreed with Zacher's results on a new Ka-6E." Bob filled 0.1" sags between ribs on the first 30% of the chord, expecting even better performance, but except for very minor improvement at higher speeds (a decrease in sink rate of 30 fpm at 80 kts) there was none. "The final conclusion is that for a sailplane with an airfoil such as the Ka-6E's, performance has decreased very little over the years."

Bob Fingerle, 39639 Embarcadero Terrace, Fremont, California, and his partner have been working on their *Duster* for three years so far. They've finished the open woodwork on the fuselage and tail. They're now involved in contouring wing ribs and spars for covering with plywood. "This is where all of our 'sins' come back to haunt us when we try to make sure everything is lined up." Curiosity evidently got the best of **Stan Hall** (who is a near neighbor in Sunnyvale) and he came over for his first look at a *Duster* under construction. "He had a few reassuring words, and some good suggestions. Both were very useful," Bob writes.

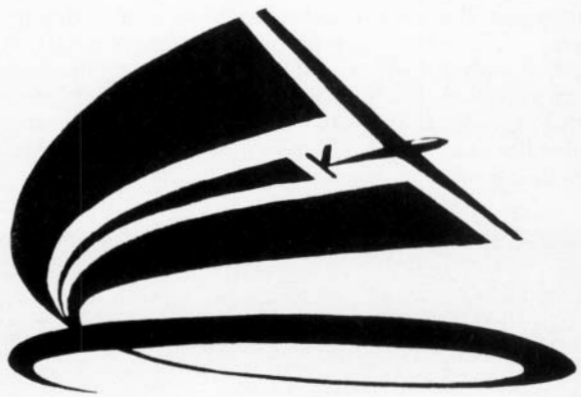
Barnard E. Smith, 5316 Howard Avenue, Western Springs, Illinois 60558, started as editor of the *Eaglet Newsletter* in February. "The publication will continue to cover engineering changes, construction procedures, flight experience, tool exchanges, and materials sources," he says. "Subscriptions are six dollars in the U.S. and eight dollars overseas."

Ken Striplin, P.O. Box 2001, Lancaster, California 93534, says that a FLAC builder in North Dakota has been testing out skis for Striplin's tailless ultralight kit during the depths of winter. Hats off (unless you're susceptible to frost bite) to the enthusiasts who fly on "those beautiful, clear, cold, crisp days of winter." Ken says the two main skis weigh 3 lbs. each and the nose ski 2 lbs. They are available for purchase.

NORTH REGION 5 NOTICE

In past years, pilots entering the North Region 5 Championships at Chester, South Carolina, were notified of their entry acceptance by the mailing of the new contest rules to each entrant. With SSA's recent (and wholly admirable) decision to distribute new contest rules automatically to every pilot on the competition seeding list, individual contest staffs have been relieved of this chore, except in the cases of newcomers not yet listed in the seedings.

As an alternate (and effortless) indication that entries for the North Region 5 Contest have been received and processed, a canceled entry-fee check should be considered irrefutable evidence that all is well. Any pilot whose entry check has not cleared within a month of issuance should make inquiry about his/her status directly with me. If this year's preregistration exceeds the pilot quota (as it often does), those pilots languishing on standby status will be promptly notified and subsequently updated by direct mail. — GREN SEIBELS



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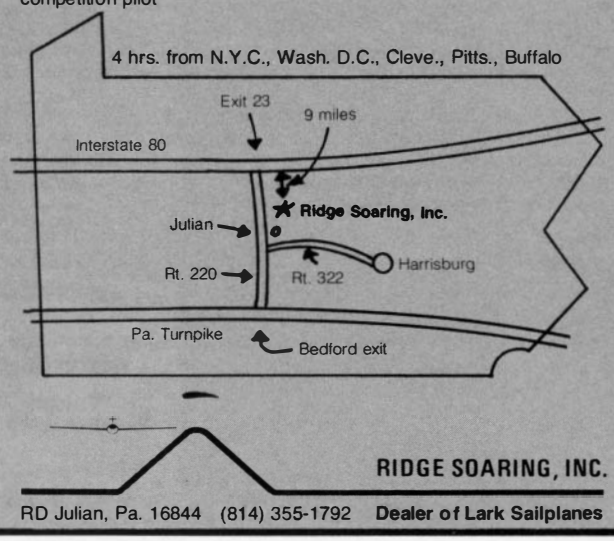

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Circumstates Adventure

Photos and text by HAL LAWRENCE

There once was a man from the West
who loved adventure with zest.
He embarked on a Lark
and outdid Lewis and Clark
by circling the States without rest.

—Roland Weeks

I first saw the all-metal, side-by-side, two-place *Lark* motorglider at the Paris Air Show last year, and I knew I'd have to figure out some way to get to fly it, maybe even some excuse to get to own it. Here at last was the answer for people like me who wanted a motorglider that was not only a decent soaring machine, but also offered a superior environment for sharing the soaring experience. Shouting at the back of someone's head (or trying to look around it) wasn't my idea of optimum comfort in a motorglider.

After a flight demonstration that included some mild aerobatics, I watched it taxi in through the gate between the rows of pavilions and head for the Romanian exhibit. That was another plus: with its conventional 2-wheel undercarriage it could taxi without wing-walkers, meaning it could operate from regular airports as well as glider strips. I followed the *Lark* to its tiedown and later climbed inside with the pilot to discuss the ship's specifications and examine its creature comforts.

As I watched this intriguing bird take off and do its thing on subsequent days at the airshow, I began to wonder what I might do with such a ship. It would have to be something adventurous, perhaps a flight never before attempted, and one suited to the aircraft's special capabilities. It would have to be something to be shared with others, and it would have to be fun.

At first I thought of barnstorming around the country, carrying a sleeping bag and a few changes of clothes in the right-hand seat. But that didn't really meet the specifications. Maintenance away from home base could be quite a problem. So could ground transportation, food, and lodging. I felt there must be another answer.

There was. A concept suddenly appeared on my mental horizon, complete in almost every detail. The flight would be the first around the entire borders of the contiguous 48 states. And it would be a fly/drive

adventure; two pilots, one airplane, and one motor home. The pilots would alternately fly and drive.

Would I be able to find anybody else crazy enough to want to participate in that kind of a boondoggle? I placed a small ad in *Soaring* magazine and soon discovered that there are a lot of us out there! I concluded it would be better to split the flight into a half-dozen or more segments since the ad had produced over a hundred replies and a bonanza of enthusiastic and qualified potential copilots, every one of whom I would have liked to fly with. But eventually I settled on seven.

For the first leg — Palo Alto, California, to Klamath Falls, Oregon — I chose Roy Pomel of Las Vegas, Nevada, to fly the *Lark.* Roy was 43, a retired Air Force colonel, 6000-hour pilot, F-111 driver, Diamond glider pilot, and FAA Designee. Word of our adventure had reached the media, and when we arrived at the airport, we were greeted by a small army of TV and newspaper cameramen, reporters, and supporting crews recording the scene on paper, film, and tape.

After much interviewing and picture-taking, Roy finally got in the *Lark,* finished his check list, called the tower, got clearance, released the toe brakes, and pushed the throttle to the firewall. . . . Five seconds later, he chopped the throttle, hit the brakes, slowed down, and sheepishly turned off at the first intersection! A reporter had leaned too heavily on the canopy just before Roy taxied out, and he had knocked one side off its track so that it began to flap loose as the prop turned up full blast. No matter; in moments Roy had both the canopy and the flight back on track, and three minutes later he and his bird were just a speck on the horizon. . . .

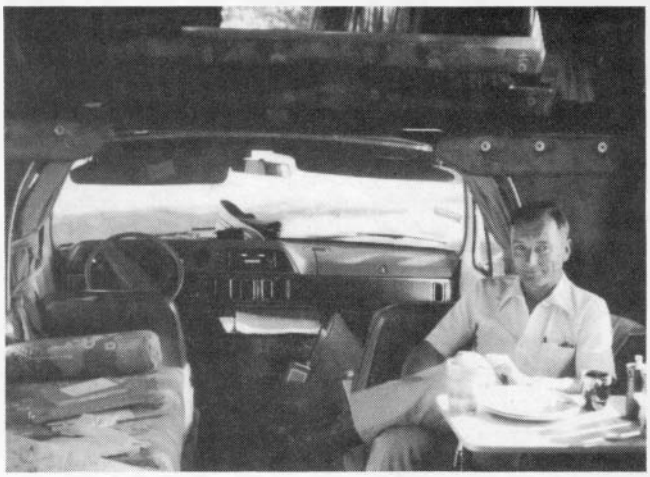
Twenty-four hours earlier, Roy had strapped himself into the left seat of the *Lark* for the first time and begun to take notes on a very business-like kneepad. In no more than a half hour, he had found and learned to use all the bells and whistles on the little bird, had shut down the power plant, feathered the prop, sampled some thermals, restarted, exercised the flaps, spoilers, and trim adjustments, and seemed thoroughly at home. On the landing rollout I asked Roy if he wanted any more dual. "Nope," he said, "I'm ready."

And he was. It takes a cool pilot to solo an unfamiliar aircraft on television, but Roy is that kind of pilot. And the farther along we went, the more impressed I became. But let Roy tell his story. . . .

Finally, "Circumstates" was off the ground. I said, "Yea" — I don't know what Hal said. I made radio contact with Bravo Ground and learned Hal was still waiting for the license plates for the motor home and would see me in Klamath Falls, Oregon. My first stop was Chico, California. I didn't wish to bollix the first leg, so I waited until very near Chico before shutting down and soaring awhile.

Later, on departure, there were good vibes and best wishes from Chico Tower. Overcast to the north left only the lower half of Mt. Shasta visible. Heavy rains fell on my flight into Klamath, where I met Dr. Hugh Currin and his wife who own and fly a motorglider. We swapped stories awaiting Hal, who arrived quite late.

Roy Pomel in the motor home that served as a base of operations for 15,000 miles overland.



On Day 2, Roy and I traded places. He moved into the driver's seat of the motor home and I slipped into the left-hand side of the *Lark's* cockpit.

The weather wasn't so hot east of the Cascades during the first part of the day. I explored Crater Lake and flew in rain and snow. But when the August sun began to burn off the weather, I was able to shut down and play around underneath the cumulus. Decided to try to make Bend, Oregon, airport without firing up. No problem. Chatted with old friend Gerry Smith, the Squire of Bend, and pushed on for Sunnyside rendezvous. Now Roy continues. . . .

I met a cropduster the next morning — Air Force type, retired Lt. Col. Brown. He had been in on the original design of the F-111 which I was flying at retirement, so we conversed at length about the bird.

Day 3. Fly day to Ephrata where we saw a motorized adaptation of the NIMBUS and its builder Arnold Scopio. Outstanding workmanship! Next stop Henley Aerodrome, Idaho, where we saw some excellent replicas of WWI aircraft which were mostly flyable.

I'm sorry Roy couldn't have flown with me on Day 4. It was just the most spectacular flight in memory.

I was out of Henley early, poking around Lake Pend Oreille, hoping to find a hole to get up through. I found one and immediately got into unexpected wave and shut down the engine thousands of feet above cloud deck and mountaintops. There were beautiful lennies above running parallel to the ridge lines. I hoped to stay in wave all the way to the Canadian border. Incredible scenery. Through a hole, I glimpsed snow on the mountaintops and got out my camera to capture ever-changing cloud scenes. I was aware of risks soaring cross-country above clouds but somehow felt unconcerned (it helps to have VOR headings on radio and a little four-banger up front). I finally headed southward again to meet Roy at Helena. That evening we visited with Nils Pearson, a Connecticut glider pilot now high on Helena.

Day 5. Fly day for me. There was light wave action and lots of lennies to the south on the way to my stop at Billings, Montana. Then it was on to Miles City with 70-plus miles of great soaring on the way. Next morning I gave a flight in the LARK to a relative who said she enjoyed it, but given a choice over engine-off in the LARK and engine-on in her 411, would opt for the two hummers.

Day 6. Drive to Williston, North Dakota. The countryside is certainly getting flat.

Day 7. Fly day to Minot, North Dakota. Low overcast the entire way. Every other field was fallow, so it was wall-to-wall landing areas from takeoff to touchdown. That completed my portion of Circumstates. Hal and I bade each other adieu and he departed on a side trip to Bismarck and I was in Vegas that evening.

I enjoyed flying the LARK. It is docile, performs quite well, and the Limbach is most reliable and economical. I believe the motorglider is the answer for student training; we should really push the Feds on certification.

And so it went. For 49 days, 18,000 air miles, 15,000 ground miles, 300 air hours, 150 engine hours, and a lifetime's worth of extraordinarily good flying and camaraderie.

The people experience, more than the flight experience, was the real success of Circumstates. It proved to me once again that glider pilots are a breed apart. There is no way I would want to spend seven weeks (let alone share a $30,000 piece of equipment) with seven strangers including an engineer, an airline pilot, a tavern owner, a newspaper publisher, a physics professor, an air force pilot, and a restaurant owner. But I had few misgivings about taking on seven glider pilots who happened to include an airline pilot, a restaurant owner, an air force pilot, etc., etc. There was some risk, to be sure, in assessing their flight proficiency by means of a questionnaire and turning them loose with only minimal instruction. But in one case I had enough faith in the essential simplicity and gentleness of the motorglider to even increase this risk deliberately to check out my theories concerning the ease of instruction in an aircraft such as the *Lark* IS-28M2. This particular pilot had not flown power in many years, and in his questionnaire disclaimed knowledge of, and interest in, the technicalities of communications and flight in controlled airspace; he was essentially a glider-guider, a typical fly-for-fun sailplane pilot/homebuilder/hobbyist.

After the first 30 minutes of dual, he was ready to call the flying quits, drive the motor home, and let me fly the rest of his segment. However, following the next flight, he felt a bit more at ease in the ship. But the *next* flight was the real turning point; we were able to shut down in good lift and enjoy some delightful soaring. That did it. He soon soloed, and thereafter flew the *Lark* like he was part of it.

Matching the pilots to the itinerary was an interesting exercise, and as it worked out, each pilot was able to either start or finish near his home base. Though we had a prearranged time frame for ex-

Grant Smith and copilot Richard, age eleven, shared the cockpit from North Dakota to Michigan.

Tavern owner and Aztec jockey Bill Maher, who also drives motorcycles.

Spectacular scenery wasn't limited to cockpit views, as any good crew-car driver can tell you.

Author Hal Lawrence, left, Bill Maher, right, and Paul Schweizer, center, enjoy visiting at Elmira airport.

changing pilots as each segment was concluded, there was enough flexibility so that we were under no great time pressure. There was perhaps less time for soaring than we would have liked during the second segment because we lost three days in Duluth, Minnesota, waiting for flyable weather. But my fly/drive partner for that segment, Grant Smith, and his 11-year-old copilot son Richard knew how to make up for lost time. (In his "other life" Grant is a pilot for United Airlines.)

Highlights of the segment flown by Bill Maher, who runs the "biggest little night club in Piqua, Ohio," included stops at the airport in the valley below Harris Hill where we were made to feel very welcome by the Schweizers, and at Sugarbush, Vermont, where they treated us to both wave and thermal soaring conditions. Asked to comment on the flight for *Soaring* readers, Bill said:

Dr. Robert Long joined the safari in Maine and completed his leg near his home at Clearwater, Florida.

To me the Circumstates Adventure with the LARK was the pleasure of cruising along at 70 knots enjoying the beauty of this great country. It was marvelous to be able to feather the engine and ride the thermals, soar with the eagles and the hawks, drink in the wonders of nature, and enjoy the silent splendors of soaring along a ridge. I enjoyed gliding as if time were standing still and the only rush that of the wind passing the windscreen. It was fun meeting and talking with the people of many different regions and enjoying the comradeship of the aviation fraternity.

Bill changed places at Bangor, Maine, with Dr. Robert Long, a retired physics professor from south-central Florida. Besides the fun of flying together, we shared some interesting experiences in some interesting airports. One evening, in Robert's home state, we were to rendezvous at a grass strip which was a *real* grass strip. It was a gliderport by day, but by sunset was deserted and, well, *spooky*. I floated in engine off, just at dusk, and as it grew darker and the Florida mosquitoes began to home in on me, I climbed back into the ship and closed the canopy.

An hour or so later, Robert drove up in the motor home. As we were putting on the canopy cover, the law arrived in a big 4-wheel-drive complete with a searchlight big enough for a Hollywood premiere. He zeroed in on us. It was easy enough, later on, to see why we attracted the attention we did. The sheriff, who lived directly under the final glide path of the airport, had spotted a strange aircraft coming in dead-stick. If it was what he thought it was, he might be able to add another notch on his crossbow. But to catch us with the goods, he'd be patient and wait for a truck to show up to receive the airborne cargo.

Sure enough, the truck (motor home) arrived, and the sheriff followed soon after. Fortunately, Robert spoke the local dialect and quickly convinced the sheriff that we weren't smugglers. But when he learned what we were really doing there, he shook his head like we were some kind of nuts. *Flying a glider all around the border of the whole country?*

Another Florida adventure involved a lightning strike when I was flying over Key West. After it happened, I called the tower and told them I thought the aircraft had been hit, and they answered, "Yeah, we were watching you through binoculars but didn't see any pieces fall off. Cleared to land."

As it turned out, the only evidence of the lightning strike was charring of the ends of the lightning wicks on the tail. But I was very glad that the Romanians had installed electrical bonding wires at every conceivable connecting point on the ship; it's good insurance against having the controls welded.

At Clearwater, Florida, the next pilot arrived in style in his own jet-prop. But publisher Roland Weeks didn't have the luxury of much time because he had a date for a wedding — his own — that same evening in Gulfport, Mississippi. He never said whether he feathered the prop. What he did say was:

I have no trouble remembering the day I flew One-Two-Bravo from Tampa to Biloxi, Mississippi. That was the day I met Hal, flew his LARK all day long above the

beautiful Gulf of Mexico coast, and got married to a beautiful lady.

On the way an interesting thing happened to me when I landed at a quiet little airport near Cross City, Florida. A man took one quick look at me taxiing in from the runway and called the press to come out for a picture and a story about the U-2 that had just landed. I figured the sheriff would show up, discover that my flying machine was built behind the Iron Curtain, and hold me for the CIA. I got out of there in a hurry.

I almost missed the wedding. I had trouble starting the engine in Fort Walton Beach, Florida, and got to Biloxi at 6:10 p.m. I raced to the jewelers to pick up a ring, showered, and got to my 7:00 p.m. wedding at 7:06 p.m. My bride was relieved but not happy. She got happy later after our fourth bottle of champagne, shared with a few friends.

One of those friends replaced me as a member of the Circumstates crew. I was ready to fly on toward California, but my new bride objected — strenuously. So Hal spent a long harrowing day teaching Tom Simmons to fly One-Two Bravo. Tom and I have played The Red Baron and Waldo Pepper in air shows for years; I thought he would learn quickly. But Tom talks a lot when he's supposed to be listening. That probably had something to do with it.

Tom left Biloxi on a hot day wearing a leather jacket, flying gloves, and a long white scarf. He returned in just a few days telling stories that no one could or would believe. But if just half of them are true, I picked the wrong time to get married.

Tom and Roland are birds of a feather, fly formation aerobatics in biplanes, and do crazy things like crossing Lake Pontchartrain in a balloon. So having briefly met and flown with Roland, I was prepared to like Tom, even sans questionnaire. But here, on the letterhead of "The Landing," Tom's salubrious restaurant on the beach in Gulfport, is Tom himself:

As you may have guessed, my wingman, Roland Weeks, is forever getting into situations over his head where invariably he volunteers me (usually without my prior consent) in order to rescue the situation. In the latest instance, however, fortune indeed smiled upon me. No doubt finding your beautiful Romanian glider much too sophisticated for his clumsy flying technique, he once again called upon me to help him over the hump, or in this case, to the Rio Grande. (Such is war. A wingman must look after his wingman, even a clumsy one. Besides, I like him.)

Hal, my friend, what a storybook flight it was. Motorglider One-Two-Bravo and I riding those long, tapered, beautiful wings through blue skies, clear and clean, leaving the white beaches of the Mississippi coast, crossing the lush wetlands and swamps of southern Louisiana, now and then lifting lightly under white fluffs forming in the deep blue of the afternoon sky. I remember flying through the gossamer veil of a gentle summer rain and softly, at end of day, touching the earth as the sun touched the great western horizon.

Always there followed the admiring and curious gathering of airport folk, all touching, looking, and asking questions about your exotic Romanian LARK, playing the game airport bums love.

There were evenings of camaraderie and a chance meeting with Skip Thigpen, a friend with whom I have flown airshows, who, stepping from his big twin to examine the strange little bird parked next to his, laughed in surprise to recognize me climbing from the cockpit.

In the mornings when I taxi out for takeoff, I always hear the words used to describe one of man's earliest dreams, "To rush at the wind, to lift, to soar, to fly!"

With the morning sun at my back, I playfully race westward. I frolic across the flatlands of the Texas coast. At Corpus Christi the bird takes on fuel, I, water, and both of us soak up the fun of being interviewed by TV news crews.

We now fly west-southwest, crossing barren salt flats to intercept and follow the lonely shoreline of Padre Island, slowly curving southward toward the mouth of the Rio Grande and Mexico.

Limerick-writer Roland Weeks, his Mitsubishi MU-2 in background.

Tom Simmons stops laughing long enough for a self-portrait over Padre Island, Texas.

Hans Neumann admires the Quickie during a stop at Mojave Airport. Its builders report the diminutive staggered tandem wing is being flown as a motorglider in Canada.

The beach invited us down to play, and down we went to within a few feet of the waves sweeping onto the endless stretch of sand that flashed just beneath the LARK and me, the shadow of my left wing cool in the green and frothy surf while the shadow of my right wing baked over the hot sands of the shore. It was a halcyon day.

And turning back for San Antonio you were tricky, Hal, calling me on the radio and only later telling me that everything I was saying went out "live" on AM radio to the citizens of San Antonio! In spite of that, it was a fine welcome the LARK and I received there . . . how well it was planned . . . good company, food, music, and drink, and to top it all off, I remembered, when someone mentioned the date, that it was my birthday — the best ever I've had!

There are few things on this earth finer than that of sharing adventure in kindred spirit among friends. For such an opportunity, granted to me by you, by Roland, by Circumstates Adventure, I shall ever be grateful.

At Marfa, Texas, Fritz Kahl admires the Lark's unique hand-grip with built-in time computer.

Tom reluctantly headed back eastward, and the safari was joined by Hans Neumann, the only one of the pilots whom I had known before we started. We headed out for Marfa, an easy day's soaring away — but didn't arrive for a week! Southwest Texas was hit by the remains of a tropical hurricane which dumped more water in a few days than they normally get in years. We sat it out in Del Rio, and I learned much more than I ever wanted to know about what goes on in a Weather Bureau station. But it wasn't all bad; we enjoyed walking across the border to Mexico, exploring the Amistead dam and reservoir, and hangar-flying with other stranded airmen.

Then on to Marfa where Fritz Kahl dispenses good Texas hospitality, and through El Paso, Tucson, Yuma, and points west. Southern California was socked in along the coast, so we stayed inland and visited some interesting airports such as Mojave where we parked alongside one of Burt Rutan's creations. But then a dust devil danced through and we were underway again.

If the amount of fuel consumed was any measure of the true soaring ability of the Circumstates pilots, Hans Neumann was far and away the soaringest. As a veteran 1-26 competitor, and a strong one, he is used to having to work hard to locate and stay in the lift. So in the long-winged luxury of the *Lark*, Hans ranged across the Southwest in the best energy-saving tradition. He used the Limbach engine for little else but getting up to "release" altitude.

Detouring up to Estrella Sailport on the way to Tucson, Hans chatted with a glider pilot about the *Lark*. After his departure from Estrella, the pilot called Hans on the radio to ask some more questions about the ship. Hans said, "That fellow was really interested in the *Lark*. I didn't get his name, but I'll bet he ends up getting one." He did. The pilot's name was Richard Bach. The day he took delivery of his ship it took him all of 20 minutes dual to get together enough confidence in the bird to take off on a 300-mile flight into the leading edge of a front. I suspect that sometime in the not too distant future, Richard may have something to say in print about his own *Lark*.

In the meantime, I'd like to warn the unwary about one hazard of flying a bird like this: It's addictive. By the time our expedition reached the California coastline, I had settled so comfortably into the fly/drive routine, felt so much at home in the bird, and was so "high" on the pleasures of this unique way of seeing the country, that I was extremely reluctant to see it all come to an end. But it really hasn't ended. I'm still hooked, and when I need a fix, all I have to do is pump a little 100-octane into the tank and head for the Nevada desert. Costs less than a single tow to get there from San Francisco.

As Hans says: "The *Lark* is a hybrid, but the fun is pure."

And that just about says it all.

Even if there should be an MG-2, it's clear that the MG-1 is a very special accomplishment. . . .

HOW I DESIGNED AND BUILT THE MG-1

Photos and text by CHARLES KERESTESI

My desire to build a powered sailplane came after 15 years of flying and owning several types of gliders. I'd always had to travel 30 to 60 miles each way to find towplanes or ships to fly. And, of course, I always had to depend on people to help me get airborne. Finally, I decided there had to be an easier way, so I started to study the problem. The Nelson *Hummingbird* became my ideal. Its price even then was quite high, and I had limited means, so I decided the best way was to design and build my own.

I was on my way.

My first design had a retractable Nelson engine with a wood wing and a steel-tube, fabric-covered airframe. When I finally had most of the stressing and detail design finished, I thought I'd better write to the manufacturer to see how much the engine would cost. After recovering from the shock, I threw the piles of drawings and calculations into the wastebasket and that was that.

I still didn't give up, though. From my magazines and pictures file I pulled the Fournier RF-1 and said, "This is the right idea!" But I decided my version would be all-metal to withstand the elements better when tied down outside. The design paper work began. This was 15 years ago and to many it will look outdated when compared with some current designs. Its appearance is also affected by my wanting to do most of the work myself; therefore it was designed to be constructed with the limited skills I could muster. For me it is more fun to design and build it myself than build one from someone else's plans or put a kit together.

These are the specifications I laid out for the preliminary design:

Span	45 feet
Length	21 feet
Wing Area	150 square feet
Wing Chord	40 inches
Aspect Ratio	13.5
Airfoil	NACA 64_2-415
Fuel Capacity	4 gallons
Gross Weight	750 pounds

Wing

The wing has a constant chord which incurs a high drag penalty, but I was not building a super ship, only hoping that it would have an L/D of 20 and a minimum sink of 3 fps. This configuration would be easier to build as well, since I only had to make two form blocks for the ribs. I later realized the airfoil I had chosen was a mistake because the wing surfaces would be too rough for maximum performance.

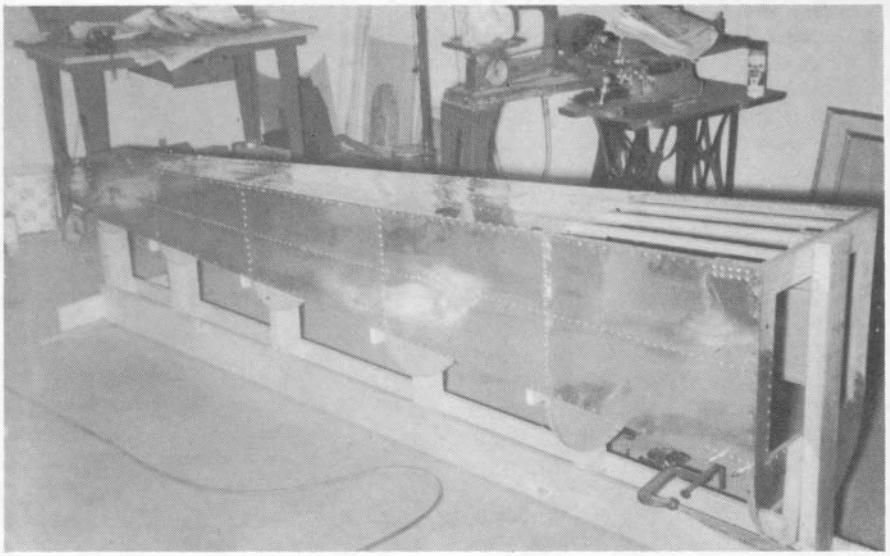
The spar is located at the 35% chord station for maximum depth. The "C" section spar is made from aluminum angles and bars riveted together. The wing maximum depth was only 6 inches and the spar became very heavy by the time I had figured out the spar cross-section at the root. I should have used an 18% section. The ribs are spaced at 12-inch intervals; to stiffen the skins I used bulb angles in the inboard sections between the main and rear spars.

To facilitate wing construction and to get it out of the basement where all the sheet-metal work was done, I made each wing in two parts consisting of a 12-ft. inboard section with a 9½-ft. outer panel. Instead of dive brakes, I used trailing edge flaps with a 90° deflection-down capability. The flap lever quadrant has four positions: 0°, 10°, 70°, and 90°. We began the flight tests without the 70° position, but added it after the first time the 90° setting was used. The trailing edge of the inboard panel is all flap and the outer panel all aileron. The flaps and ailerons are operated by push-pull tubes. The tips are squared off and have plywood endplates. Outrigger wheels near the tips are used to keep the wingtip off the ground while taxiing.

Fuselage

The fuselage is composite. The forward section (which ends behind the pilot) is constructed of steel tubing, and from there aft it is semi-monocoque aluminum. The steel-tube section was welded up by my friend, Art Johnson, an A-1 welder and SSA member. I avoided compound curves, so there are a lot of flat surfaces except for the semi-circular top of the aft section. It is bolted to the forward section by four AN5 bolts. The wings are attached to an aluminum center section spar passing through the fuselage just below the pilot's knees at the forward end of the seat. This spar connects to the fuselage with an AN5 bolt on each side. The bolts take shear loads only, since the spar caps take the bending loads.

Two AN12 bolts fasten each wing to the center section; leading-edge and rear-spar bolts take torsion and drag loads. Assembly and disassembly is not done in a matter of minutes, but I don't intend to take it apart except to bring it home in the fall. The side panels on the steel-tube section are aluminum sheets secured by sheet metal screws into nut plates on tabs welded to the tubing so panel removal can provide good access for inspections. The windshield is fixed with a hinged canopy for ease in entering the cockpit. They are sort of crude, but I made them real quick so I could get to fly and plan to build up a better one later.



Aft fuselage and jig.

Landing Gear

The single landing gear uses a 5 X 5 Goodyear wheel and hydraulic brakes. It retracts forward up into the fuselage between the pilot's feet and is operated by a hand lever on the left side of the cockpit. The tailwheel is steerable by cables attached to the rudder cables; all cables are inside the fuselage.

Tail Surfaces

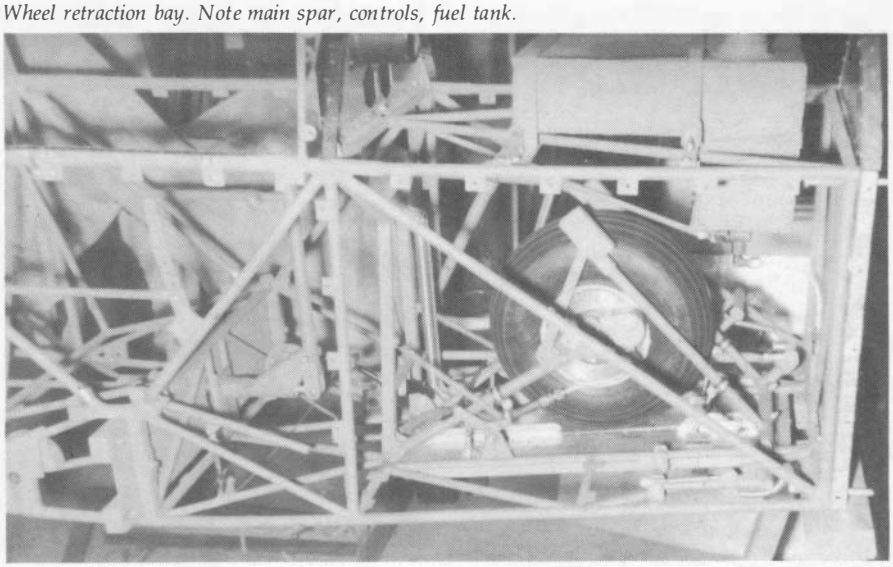
For the horizontal tail surface I used an all-moving stabilator instead of the conventional two-part surfaces. The 14-sq.ft. stabilator looks small, but has ample power. I didn't static balance it 100% yet, but will before taking the ship out this year. Vertical surfaces are all-metal. I used as few parts as possible: spars, three ribs, and metal skin in both the fin and rudder. They are very light and stiff. Horns on both rudder and stabilator are out of the airstream.

Engine

I used a 1200 cc VW engine, but I increased the size with larger cylinders and pistons to about 1385 cc and 50 hp instead of the original 40 hp.

I purchased the engine already converted, but I had trouble getting it

Wheel retraction bay. Note main spar, controls, fuel tank.



started so I took it all apart to see what was wrong. After getting the combination on how to start it, I did not have any problems except that the oil temperature runs a bit high, so I plan on installing an oil cooler. While I was at it, I decided to make a muffler which works well and reduces noise. A 54-inch diameter propeller was made of wood by Ray Heggy. It has about 4 degrees too much pitch, and, as a result only gets 3100 RPM out of the engine. The fuel tank holds 4 gallons and is right behind the firewall. The engine cowling is also rather crude because, as with the canopy, I put it together quickly so I could get the ship done.

Test Flying

In July 1979 I finally got the Kerestesi MG-1 out to the Elgin Airport and passed the FAA inspection. I made the initial taxiing tests but not the first flight. I have not flown much in the last few years; I did not want to bend it by being too eager. My test pilot was Marv Krushopf, a United Airlines Captain and good friend who also flew my first project 22 years ago.

September 7 was the long-awaited day. After several fast taxi runs and short lift-offs, he said he would like to go up with it as everything seemed to be fine. I said it was up to him. We fired up the engine and away he went. It was a thrill to watch him take off and climb out — that's a feeling that can only be shared by one who has actually put together a bird and watched it go up into the blue!

After two flights we had to halt because of a tailwheel problem. Its travel arc had no stops, so on the second flight's landing the tailwheel twirled a couple of 360's and jammed up the rudder cables (the wheel was attached directly to them). Marv lost directional control, but there was no damage. I then strengthened the tailwheel and added a tether cable which restricted the arc, solving the problem.

As test flying progressed, we corrected problems as they arose. The main runway we used has lights on each side and is not very wide, so directional control has to be good. Marv found that in a strong crosswind he could not hold the ship straight with the rudder as it would weather-vane on the one wheel. The rudder was not powerful enough, so we increased the travel, but performance was still marginal, and as a result we decided not to fly on that runway with a strong crosswind. This problem appeared only on landing when the ship slowed down. During takeoff it was satisfactory. However, the rate of climb will not take your breath away — about 300 fpm.

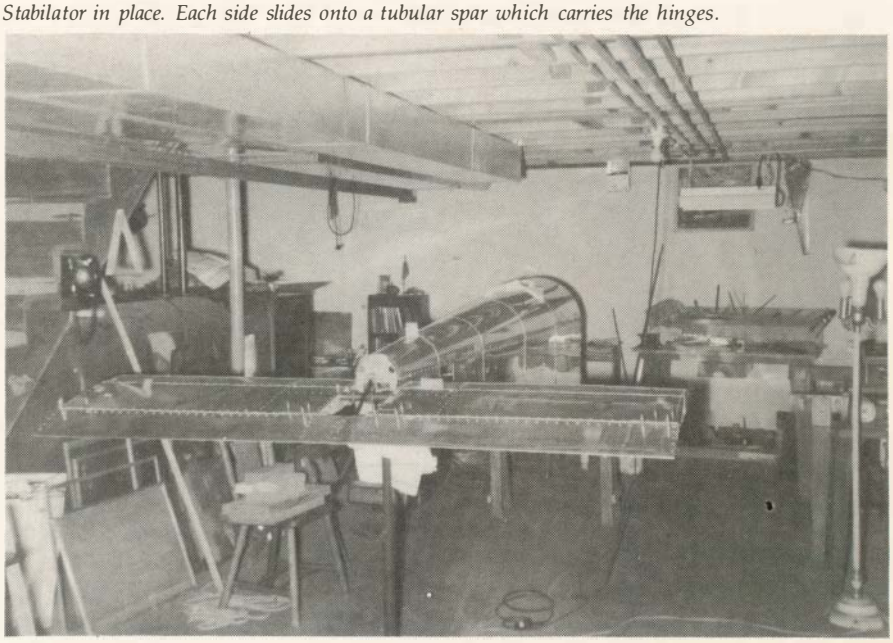
Wing inner section.

Marv ran a few tests to approximate the minimum sink rate and the glide ratio at 60 mph with the engine idling. The performance was not as good as what I had hoped for. The sinking speed works out to be around 5 fps, and the glide ratio is about 15:1.

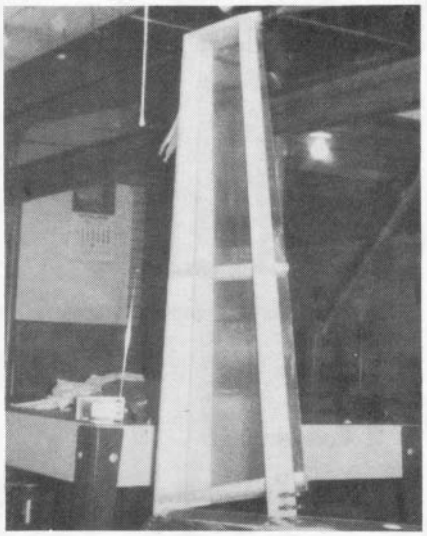
The initial landing approaches were made with 10° flaps and the final glide was long and flat. I told him to shorten his pattern and use full flap. He did, and the glide path was so steep he hardly rolled after touching down. That's when I added the 70° notch, which worked out a lot better. The top of the canopy is fabric covered, and when Marv used 70° flaps on final, the

When 70° flaps are used on final, descent is so steep the front canopy cover obscures the horizon.

Stabilator in place. Each side slides onto a tubular spar which carries the hinges.



Ailerons have only seven parts. This one is being skinned prior to riveting.



Vertical fin before covering

nose was so far down he could not see the horizon ahead at all.

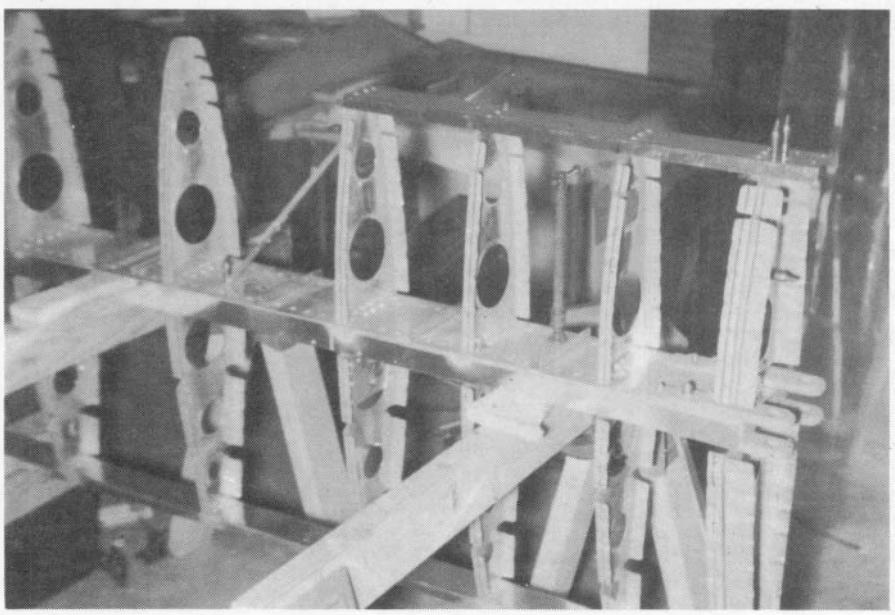
We also changed the location of the throttle and put it on the right side. This way when the engine is running on landing, the pilot can work the throttle or flaps and the wheel brake with his right hand and fly with his left hand on the stick.

Marv also found the ailerons required a lot of effort to move. I cannot change the lever arms, so I will try a longer stick.

At present the engine has no starter for air starts. Marv made one flight when he shut the engine off, but it would not turn over in a fast glide so he made a dead stick landing. I intend to install compression releases on the cylinders to make starting easier. The redline speeds are 80 mph with power and 120 mph in a power-off glide. This summer I hope to test the ship more thoroughly and see how it will do with the engine off.

During test flying, one point was made clear: the Kerestesi MG-1 can be flown with no outside help whatsoever. By myself I can start the engine, untie the ropes, get in, and taxi out to the runway with no help. That is what I was aiming for. I am not belittling pure soaring, but when the facilities and equipment are not readily available, one has to work out an alternative. All I want to do is go up and soar when I can and be near my home.

Wing inboard section showing root rib, front spar, and main fittings.



"Gliding is what I always really wanted to do," says author **Charles Kerestesi,** "but I got sidetracked." He was smitten way back in 1937 when a *Wolf* sailplane appeared at the airport near St. Charles, Illinois. "Oh I had seen a primary," he recalls, "but it seemed crude and didn't turn me on. After the *Wolf*, Joe Steinhauser turned up with a *Rhönsperber* and I was really hooked."

In 1941 Steinhauser started a "Motorless Flight Institute" and Kerestesi signed up.

"I spent a week taking his Private Glider Pilot course. This consisted of one hundred pulley tows out of a farm where he operated. In one day I made twenty-eight tows!"

At Steinhauser's recommendation, Kerestesi bought plans and began building the *Wolf*.

"I was doing real good until World War II started for us. I was drafted, but before going in, I sold all the parts I had completed to a friend. But I don't think it was ever finished — he sold it to someone."

Released from the army at the war's end, he promptly took advantage of his G.I. benefits to enroll in an "Aeronautical University" where he completed a 2-year course in aeronautical engineering. He got sidetracked a second time.

"I started to design a racing plane to enter the Goodyear Races — thought I could win some of the gold they were offering. But Bill Odom crashed and air races were few and far between. Oh, I finished the project, but with a longer wing. I had fun but I wanted to get back to gliding."

After WWII, aeronautical engineers were a glut on the labor market, and Kerestesi returned to his prewar job as a shipping clerk in a foundry. But he never wavered in his determination as the years rolled along. With the death of his wife he not only lost a loved companion but the kind of supportive helpmate who assisted with clecoing and riveting. A couple of hip operations only strengthened his resolution which is still the same: "All I want to do is go up and soar when I can and near my home."

ADVANCED CONCEPTS IN VARIABLE GEOMETRY SAILPLANES

by JOHN H. McMASTERS *Chairman, SSA Design and Configurations Technical Committee*

"Surprisingly, the seventies was not a time of much technical development in sailplane design. As the decade started, the Nimbus I and Glasflügel 604 were already producing the 48:1 glide ratios which were not to be significantly exceeded except by Dick Butler's ultimately-tuned 604."

— George Moffat
***SOARING*, Jan. 1980, p. 38**

PART I

The Unlimited Class is dead, long live the Unlimited Class!

We have heard this refrain off and on for a number of years and regardless of the merits or faults of a class of machines which can be afforded by very few of us, they remain the pinnacle of sailplane development. Here is the ultimate frontier of conventional racing sailplane development — the technical and aesthetic excellence which is perhaps without peer in any branch of aviation. Even for those who may never aspire to own such a monster, the design challenge it represents holds a fascination which cannot easily be denied.

For almost a decade Unlimited Class competition has been dominated by the magnificent triumvirate: The *Nimbus II*, AS-W 17, and Glasflügel 604. Each of these machines can be characterized as: excellent, beautiful, damned expensive, and, by modern standards, conventional. To a technically bent but casual observer, these machines with maximum glide ratios of near fifty (plus or minus three) must represent some sort of near practical limit in achievable aerodynamic performance. And if we take the narrow view of sailplane performance, wherein maximum glide ratio is the sole measure of the goodness of the beast, then yes!, we have indeed reached a near theoretical limit in performance — short of resorting to mechanical boundary layer control to "laminarize" the entire surface of the machine.

Of course our casual observer is a fool to believe that the *Nimbus* or AS-W 17 is the ultimate sailplane — or more correctly, the ultimate soaring racer. The plateau (rather

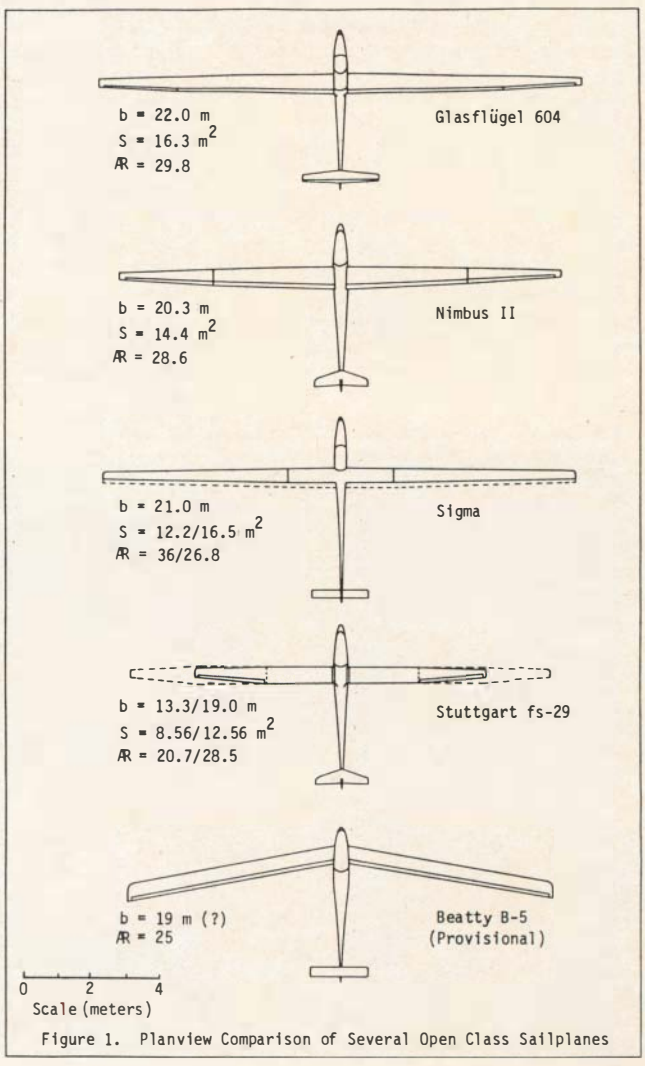


Figure 1. Planview Comparison of Several Open Class Sailplanes

than pinnacle) we have presently reached in sailplane design is that we have a more complete realization of all the factors which must be combined in careful balance to produce a machine which can climb and glide in a fashion which will maximize cross-country speed under a very wide variety of meteorological conditions. Insofar as maximum glide ratio, and the speed at which it is achieved, is a measure of this performance, then its value has merit in comparing various competing sailplanes. By itself, however, glide ratio tells a very limited story.

Of course the *Nimbus* or the 604 in the hands of a Butler, Johnson, Smith, et al., continues to win contests, but it is also possible to identify a whole range of technological advances which will make these machines as obsolescent as they in turn had excelled beyond their predecessors. Jim Nash-Webber and I (Reference 1) attempted to spell out some areas where these improvements might be made, and others (References 2, 3, 4) have done the same. But more importantly, while the big three continue to win the contests, a fair number of more advanced prototypes in this category have been built — each intended in its way to go beyond the present limit. However, while the existence of the bulk of these prototypes is known to many of us, few details of their actual performance (successful or otherwise) have appeared since the cessation of work on the original British *Sigma* project.

While the general trend in competition sailplane development has been toward use of advanced composite materials (Kevlar, graphite, etc.) and higher wing loadings, the rather obvious direction of the next purely aerodynamic advance has clearly been toward *variable geometry wings* — wings which can alter their shape at the discretion of the pilot to be more nearly optimum for a given flight condition. In modern military parlance these would be referred to as "mission-adaptive wings." Fitting a fixed wing with a simple hinged cruise flap is the easiest way to tailor it to a specified flight condition. Better (but more difficult) would be to alter the wing's overall camber, area, and/or span. Birds do this to great advantage, of course, and with better materials now at hand it is clearly only a matter of time (and money) before we too can accomplish much the same feat with the same facility with which we presently retract a landing gear. A representative sampling of existing advanced variable geometry sailplanes is shown, drawn to the same scale, in Figure 1.

As will be discussed presently, each of the schemes shown in Figure 1 has merit, and each approach has been seriously flawed in practice. The best route is presently still a bit unclear, but the variable geometry idea is going to stay with us for some time to come — until proven either useless or infeasible, or the proper approach is finally settled on. By understanding the problems encountered so far in this line of development, it can be hoped that those few brave souls who decide, against all good advice, to pursue super-span madness will be able to contribute something more than another failure to our presently meager base of experience.

Background

The idea for the present article came to mind as a result of the Third International Symposium on Low-Speed and Motorless Flight held at NASA's Langley Research Center (References 5, 6), Dick Butler's splendid use of the 604 in last summer's Nationals, and George Moffat's column in a recent issue of *Soaring* (Reference 7). How does one follow an act like a Butler or Smith/604 or Horvath/*Nimbus* combination? To my mild surprise, *none* of the twenty-eight

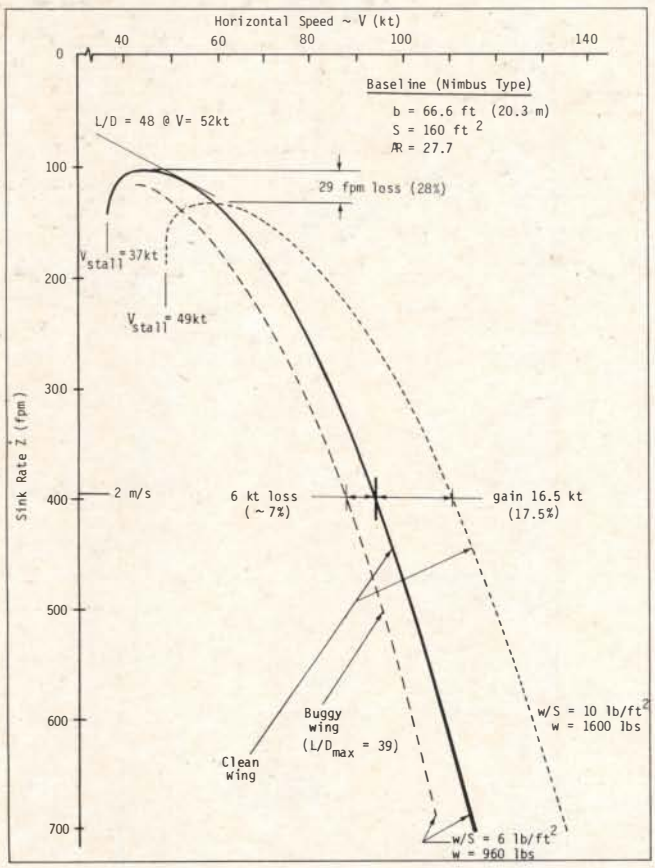
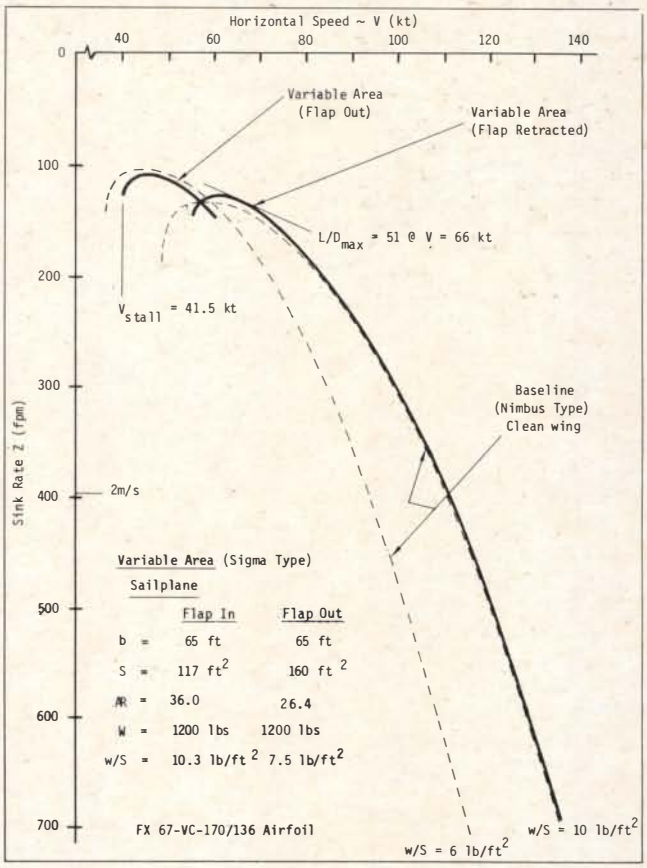


Figure 2. Nimbus Type Sailplane Performance



SHEET

Figure 3. Predicted Performance of a Sailplane with a Fowler Flap

papers presented at Langley in March '79 gave any new clues. People like Mike Teter told us rather cheerfully how to fly smarter in a contest, but nowhere was the next generation of racers discussed except very peripherally (e.g., Dieter Muser on "Advanced Composites in Sailplane Structures," Reference 6).

Well, one seldom goes to a conference only to listen to people present papers. Those are just as well read at leisure from the book of proceedings of the conference. Rather, one goes to talk to the people who attend such conferences. A couple of hundred people showed up at Langley last year, and among them (not presenting anything formally) were Pat Beatty and David Marsden. Pat has completed and flown his new B-5, and David Marsden (who should be far better known to all of us than he is) was on the verge of having his modification of the *Sigma* ready to go with a slotted flap replacing the Wortmann/Fowler flap of the original. Both of these are potentially show-stopping *new* Unlimited machines — especially if the rumored performance Marsden has achieved with his adaptation of the *Sigma* proves true.

In order to aid a discussion of the specifics of the various variable geometry schemes presently envisioned, a bit of background information on general sailplane design principles has been arranged in Boxes A and B. The more technically literate reader may skip these, but I've included the information here for completeness. Box A discusses basic racing sailplane design objectives. Box B discusses the characteristics of appropriate airfoil sections, which ultimately form the basis of successful sailplane-type wing design.

Variable Geometry Wings

Figure 1 shows the planforms of several *existing* sailplanes employing various basic types of advanced variable geometry wings presently envisioned. These schemes can be classified as:

- A wing of fixed span fitted with an *area* and *camber* changing (Fowler) flap (e.g. *Sigma* Braunschweig SB-11).
- A wing of variable span and area (e.g. Stuttgart Akaflieg fs-29).
- A wing of fixed span with an airfoil section of variable *thickness* and *camber* (e.g. Pat Beatty's B-5).
- Any combination of the above plus variable sweep and movable ballast.

The reasons which drive each designer to the choice of a particular type of variable geometry scheme are sophisticated and complex. Good rationalizations for each quite dissimilar choice can be cited amidst much arm waving. Since no measured performance data on any of the above machines have been published, however, it is difficult to assess the actual performance gains to be had from any of them and which may gain more performance than another. To put the specific discussion of the pros and cons of each on a quantitative basis, I have made some estimates of the hypothetical performance to be had from representative applications of each approach to an Open Class racer. To further tie down the comparisons, I have replotted the data from Dick Johnson's flight tests of a *Nimbus II* (Reference 8). This data, shown in Figure 2, is for Johnson's test at a wing loading (W/S) of 6.13 lbs./ft.^{2} with wings smooth and with bug simulation together with my calculation of the

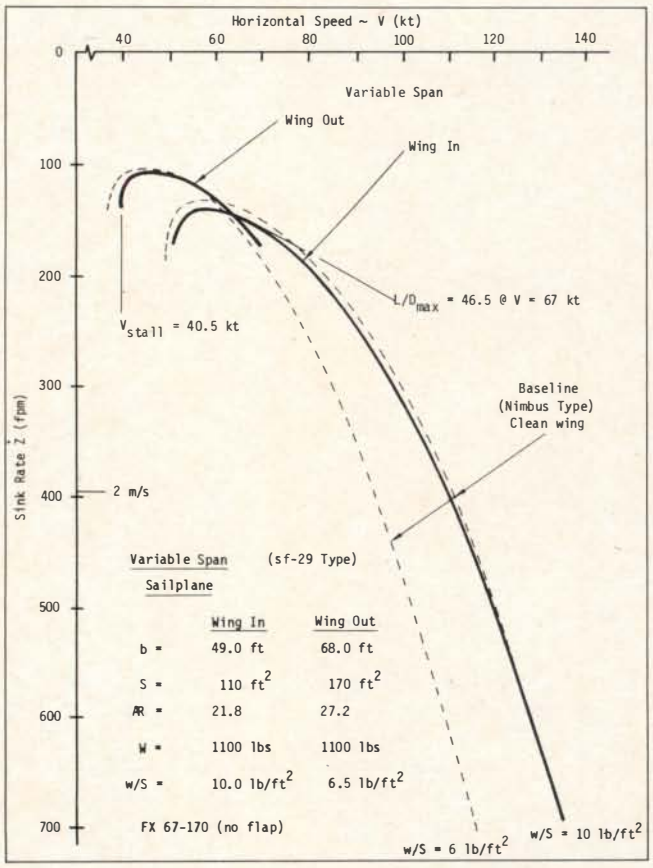


Figure 4. Predicted Performance of a Variable Span Sailplane

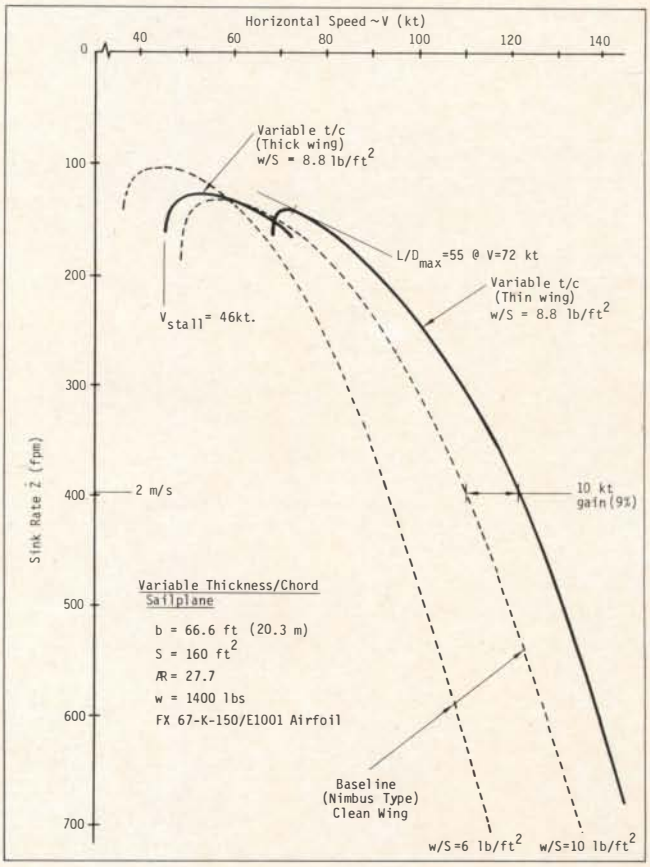


Figure 5. Predicted Performance of a Sailplane with a Variable Thickness Wing.

performance of the smooth wing machine at a wing loading of 10 lbs./ft.^{2}. While the absolute values of Johnson's test results may be controversial, I believe the polars shown in Figure 2 are representative of a current generation Open Class racer. Thus I have labeled them "*Nimbus* type" polars (assuming a machine of *Nimbus* dimensions and airfoil sections) and have used them as a baseline against which the predicted performance of the various variable geometry sailplanes can be directly compared.

The characteristics of the *Nimbus* and the subsequent variable geometry sailplanes I assumed in my calculations are shown in the appropriate figures (2 through 5). The airfoil drag characteristics assumed in each example are those of the actual similar type machines as shown in Figure 6. All examples assume smooth wings, the drag values are adjusted for the Reynolds number appropriate to a given wing loading and lift coefficient value, and fuselage drag coefficients are adjusted to the appropriate reference wing area value. Each of my assumed sailplanes "looks" like its counterpart in Figure 1, with the exception of the B-5 type machine, which I assume to be similar in shape to an ordinary *Nimbus*. With these notes in hand, it is now possible to get down to (theoretical) brass tacks on which way one might profitably go in improving the already astonishingly good performance of a *Nimbus*-type machine (after reviewing Boxes A and B as necessary).

★*Next month, in Part II, John McMasters will present the results of some detailed performance estimates of representative sailplanes employing the various types of variable geometry wings discussed in general terms here.*

BOX A

A REVIEW OF FIRST PRINCIPLES

In order to discuss the specifics of individual variable geometry sailplanes, it is worthwhile to set down a few basic principles of design to guide the discussion. Basically we presently have a machine of almost standardized shape. It is characterized by a long slender fuselage of minimum cross-sectional (frontal) area; a narrow, high-aspect-ratio wing of superb smoothness and devious contour; and an aft-mounted empennage designed as a careful balance between minimum size, adequate stability and control, and good taste. At this level, *all* sailplanes look alike and are white. This recipe (except for whiteness) was settled on once and for all over forty years ago, and no one has yet demonstrated a better one.

Beyond this point we have a myriad of differences of opinion on almost every detail of the design. On the basis of hard-won experience over the years we have pretty well settled on the values of some basic parameters, however. I doubt that George Moffat or any competent aeroelastician would advocate wings on *competition* machines with spans much in excess of around 25 meters or aspect ratios much beyond 30-32 (although *Sigma* exceeds 36 by a hair). Use of carbon fibers, for example, puts these levels within reach structurally, but lateral control and weight (which increases more rapidly than span) considerations confine us to the values specified as a practical matter (according to me — and I'm prepared to debate the matter hotly).

Accepting these values as the bounds of span and aspect ratio, we have said nothing about the "best" values of wing area, weight (ballasted or empty), and consequently wing loading (weight per unit of wing area). To determine these values, and hence define the size of our sailplane, we must resort to some fundamental formulas of airplane design in general.

(Box A continued next page)

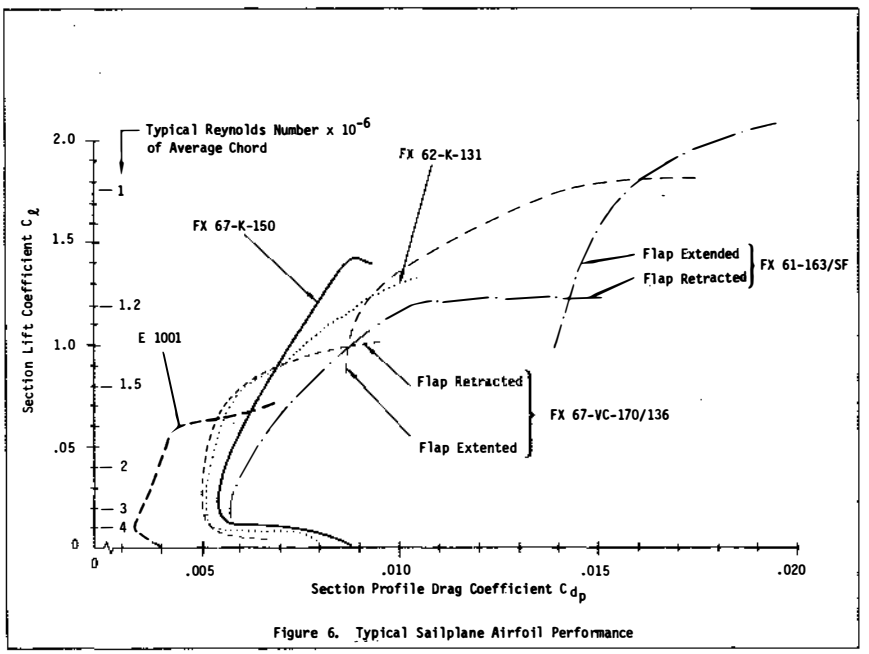


Figure 6. Typical Sailplane Airfoil Performance

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(Box A continued)

Reduced to the problem of a machine in a constant velocity glide, we may write:

$$\text{Glide Angle} = \theta = \dot{Z}/V \cong D/L$$

$$\text{Weight} = W \cong \text{Lift} = L = \tfrac{1}{2}\rho V^2 C_L S$$

$$\text{Drag} = D = \tfrac{1}{2}\rho V^2 C_D S$$

Where: $\dot{Z}$ = Sink Rate

V = Flight Speed

b = Wing Span

S = Wing Area

AR = Aspect Ratio

ρ = Air Mass Density (Mass Per Unit Volume)

C_L = Lift Coefficient

C_D = Drag Coefficient = $C_{D_v} + C_{D_i}$

C_{D_i} = Induced Drag Coefficient

C_{D_v} = Viscous Drag Coefficient

W/S = Wing Loading

These simple formulas can be rewritten and expanded in several forms (Reference 9). For the present purpose we may select the following:

$$\text{Flight Speed} = V = \sqrt{\frac{2\,W/S}{\rho\,C_L}} \quad ; \quad C_{L_{\substack{\text{red}\\\text{line}}}} \le C_L \le C_{L_{max}}$$

$$\updownarrow \qquad\qquad \updownarrow$$

$$V_{dive} \ge V \ge V_{stall}$$

$$\text{Glide Angle} = \theta \cong \frac{1}{L/D} \cong \frac{\dot{Z}}{V} = \frac{D}{W}$$

$$\text{Drag Coefficient} = C_D = C_{D_v} + \frac{k_w C_L^2}{\pi AR} \quad ; \quad AR = b^2/S$$

$$\text{Drag Force} = D = \frac{\rho}{2} C_{D_v} S V^2 + \frac{2 k_w}{\pi \rho}\left(\frac{W}{b}\right)^2 \cdot \frac{1}{V^2}$$

$$\text{Sink Rate} = \dot{Z} = \frac{\rho}{2} C_{D_v}\left(\frac{S}{W}\right) V^3 + \frac{2 k_w}{\pi \rho}\left(\frac{W}{b^2}\right) \cdot \frac{1}{V}$$

In addition, several other factors must be kept in mind:

1. Viscous drag and maximum lift coefficients vary with Reynolds number. The usual trends for sailplanes are for drag coefficient to significantly decrease and maximum lift coefficient to slightly increase as Reynolds number increases over the range of values in the sailplane problem. A simple relation for calculating the *average* Reynolds number on a wing is:

$$\text{Average Reynolds Number} = \overline{Rn} = (1.845 \times 10^5)\sqrt{\frac{W\ (\text{lbs})}{AR\,C_L}}$$

2. Wing weight increases more rapidly than wingspan (i.e., doubling the span would result in a wing far more than twice as heavy if both are constructed of the same materials), and any time one adds a gizmo or cuts into what could have been primary structure, a weight penalty is incurred.
3. Sailplanes frequently bank and turn. This foolish requirement introduces a whole range of additional design problems. For the immediate discussion, it is sufficient to note that:
   a. $\text{Turn Radius} = R = \dfrac{V^2}{g \tan\phi}$; ϕ = Bank Angle
   b. You must generate more lift by flying either faster at a given altitude, or by flying at a higher lift coefficient when turning than when flying level.
   c. Trim drag in turn increases rapidly as bank angle increases or, when flying at a given bank angle, the wingspan increases.

From the designer's point of view what all these equations and cautions say can be summarized as follows:

1. To fly slowly, we need a low wing loading and a high lift coefficient. For a machine of given weight this means we need a large wing area, and to do even better we could profitably use some means of increasing camber.
2. To fly fast we want a high wing loading and small wing area. In addition, the value of the lift coefficient will be low, and thus the value of the induced drag will be low. Thus, large wingspan is of diminishing value, and low viscous drag is all important. [Note: In the drag formula, viscous drag is increasing as the square of the velocity, and the sink rate formula shows that sink rate thus increases as nearly the cube of the speed. Induced drag is never negligible, but becomes increasingly small as speed increases.]
3. To minimize the sink rate of the machine, it is first important to fly slowly. This also reduces the turn radius at a given bank angle. At the condition of minimum sink rate, it turns out that the induced drag is between 60 percent and 70 percent of the total drag, and thus the next dominant term is the span loading (W/b). Thus, we want a large wingspan (b) and a lightweight (W) machine. This is nearly the reverse of our high-speed recipe.
4. At the condition of minimum glide angle (maximum lift-drag ratio) the viscous and induced drag terms are roughly equal and both must be minimized. As a result, a small wing area, small viscous drag coefficient, and large wingspan are all desirable. To first order, the value of L/D maximum is independent of the vehicle weight. Thus by ballasting the machine, we do not alter the glide angle appreciably, but only increase in proportion the forward speed and rate of sink at which the minimum glide angle occurs. [To second order, however, watch your Reynolds number as chord gets smaller!]
5. At any flight condition, low values of viscous drag are essential in order to achieve high performance.
6. The "best" sailplane will ulitmately be the one which can perform well under a wide variety of atmospheric conditions. Thus we want a machine which can be flown with a wide range of weights (or wing loading) and with aerodynamics to allow both excellent minimum sink rate performance *and* high-speed capability.

BOX B

LAMINAR FLOW AIRFOIL PERFORMANCE

The text in Box A described the importance of viscous drag minimization in maximizing sailplane performance at all flight conditions. It has been a cardinal rule in sailplane development for decades that to achieve low values of viscous drag, long runs of laminar flow on all surfaces of the machine are essential, and the adverse effects of wing/fuselage junctions, etc. must be minimized. Once the wing sizing has been accomplished and the problem of induced drag thus dealt with, improvement in flow quality on *all* surfaces of the machine is the final area in which the aerodynamicist can exert any major influence on performance.

On a machine like a high-performance sailplane, something like 60 to 75 percent of the total *viscous* drag is that attributable to the profile drag of the wing. Thus we pay great attention to the design of airfoils which at one stroke provide near minimum viscous drag over a wide range of lift coefficients, high maximum lift coefficient capability, reasonable stall characteristics, and sufficient thickness within which to build a structure of adequate strength and stiffness. As pointed out in several references (10,11) achieving all this in a single fixed-geometry airfoil is a near impossibility.

As the airfoil design problem sorts out, it becomes clear that achieving low drag at low-lift coefficients and high lift with low drag are two quite different problems, and if one is confined to a single airfoil section, the necessary compromises in performance can be quite dramatic. Some typical modern examples of airfoils important to this present discussion are shown together with their *ideal* performance in Figures 6 and 7.

At the present state-of-the-art in laminar flow airfoil development, it is now far easier to design airfoils with improved high-lift capabilities than it is to design ones which will produce lower drag values (at low lift coefficients) than was achieved by the NACA some thirty-five years ago. And the worst of the low-drag problems is that these sections require near perfect conditions of surface quality to perform as advertised. As we try to squeeze the last bit of low-drag performance from laminar sections, they become increasingly sensitive to any surface contamination (e.g. bugs). To see this effect dramatically, one need only refer to Dick Johnson's flight test articles to see the results of bug simulation on a *good* sailplane wing. Whether Johnson's simulation is representative of real bugs or not, the contamination effect is clearly displayed, and some of the more advanced sailplane types under discussion here demand high-speed airfoils which are even more sensitive than the friendly old Wortmann sections on the *Nimbus* and AS-W 17.

As general guidelines to the feasible in airfoil design, we may offer the following:

1. Very low profile drag at low-lift coefficient values can be achieved on the computer (and occasionally in the wind tunnel) if the extent of required low-drag bucket (lift coefficient range over which low drag coefficients are achieved) is small. Here a perfectly smooth and accurate surface is required, particularly in the leading edge region, and the thinner the section, the lower the drag value.

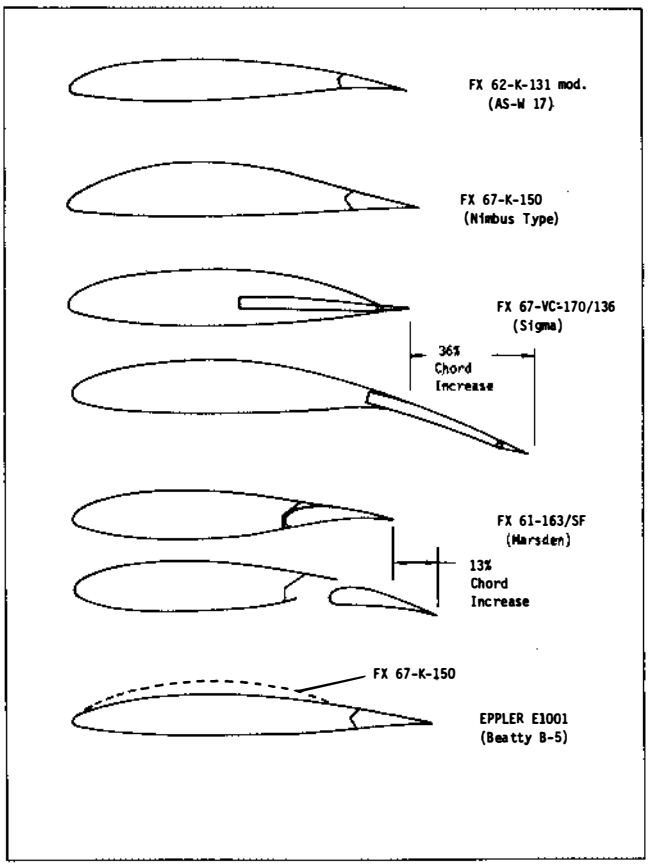

Figure 7. Modern Sailplane Airfoils

2. Increased camber, coupled with careful tailoring of the airfoil contour, can produce airfoils with dramatically high maximum lift coefficients. They will, however, be miserable at low-lift levels (high-speed conditions) because they will frequently separate (stall) on their *under* surfaces, at low angles of attack.
3. The extent of the low-drag bucket can be extended while retaining high maximum-lift capability by carefully tailoring both the upper and lower surfaces. The result is usually a section in which thickness increases in rough proportion to the width of the bucket with minimum drag increasing in proportion to increasing thickness.
4. Camber-changing, simple-hinged, "cruise" flaps give improved performance compared to sections without them — but the gains to be had are limited.
5. Slotted flaps are more powerful than simple-hinged flaps commonly used on most flapped sailplanes, but they also produce substantially higher profile-drag values.
6. The alternative (to slotted flaps) of a camber *and* area changing (Fowler) flap as used on *Sigma* and the SB-11 is attractive *aerodynamically* on a wing in Unlimited Class racer dimensions.

Night is coming. You've been forced down alone on a windy desert dry lake. Forget the Hilton. You can make the best of it in a. . . .

MOTEL 1-26

by GERI SILVEIRA

The Mojave Desert was hot and dry as usual. Thermals rising to 10,000 feet were good for local soaring, but it had been that way the day before and it was still hard to get away.

Early Saturday morning my partner, Nancy Evans, and I rolled our 1-26 out to the line at California City Municipal Airport. I was going cross-country for Silver Distance. There was a slight crosswind, no clouds, and the towplane was ready. So was I. Nancy would use my brand-new truck for crewing.

First tow, no go.

Tow two, no go.

Tow number three, off at 1800 feet AGL, caught one good thermal to 10,000 feet MSL, and for the first time Silver Distance was looking good. I headed north toward Inyokern, a 36-mile trip over some very grim territory. But after that first super thermal there was nothing all the way to Saltdale Dry Lake, about 14 miles north. By the time I was down to pattern altitude, the dry lake was right below me and there was a road right next

Stuck! The author's truck (speck, left center) came to a halt about 1 mile from her downed 1-26 and had to be left on Saltdale "Dry" Lake for several days. Its retrieve proved a saga in itself.

Jack Arkovich

to my chosen landing point. I pulled the brakes and landed.

I knew Nance was right behind me. I didn't know she had a blowout. I knew the road I saw was about 100 feet away. I didn't know the "road" was actually a strip of foot-thick mud.

When I found out about the road, I was worried. When the glider settled two inches into the lake's soft crust, I was really worried. And it was getting late.

About a half-hour later I heard from Nance. She had stopped at a salt mill nearby to ask for help. They told her to forget about trying to drive out on the treacherous lake surface. "What are you two girls doing out here anyway?" she was asked. Nance somehow managed to round up two volunteers and decided to try nevertheless.

It was almost dark.

Pretty soon I saw headlights winding their way toward me. They stopped about a mile away.

A wind was rising, but the little ship and I were immovable in our sea of mud.

A radio call came from Nance.

"We can't get to you tonight Ger. If you want to walk out, we'll wait for you."

It was a temptation. But somehow our vulnerable little ship in that vast desolate wasteland made me uneasy.

"No, I'll stay with it."

Nance tried for a couple of hours more to find a way in on her own. Our last radio contact was brief, yet definite.

"Geri, I'll have to come back in the morning. I just can't get to you."

Goodbye, Nance.

Hello, Motel 1-26.

* * *

I could see nothing for the darkness. All I could hear was the roar of the engine. . . . I held the stick tightly, hoping I could sense my direction. I was blind. I was flying blind. . . . The airplane began to dive, and I fought for control. My God, I'm doing a high-speed pass! I know I'm getting low. The vent was open, blowing the hair away from my face, but still I could not see. Where's the pull-up? Where's the pull-up? I'm not going to make it. . . . At last I felt the ship climb up steeply to the right. I imagined the fuselage of the Citabria, green against that sullen white landscape. I began to see the instruments, phosphorescent in the dense barren night . . .

I awoke, and the airspeed indicator and the variometer were illuminated. I had never noticed that before. The cockpit of the 1-26 was uncomfortable, even with the backboard taken out. Lying down, I could see a mist over the lake. It was too dark to see my watch, but I figured I had been asleep several hours.

I stood up.

The light from the moon sidelit the tail of the 1-26 so that it appeared outlined, luminescent. I could see no lights in any direction and there was only a slight reflection from the white lake bed. A breeze caught the rudder and blew it to one side with a bang. It was the only sound for miles. I turned 180 degrees and looked over the tail. It was as if I had landed on an alien planet. This was the meaning of alone. No fear, just alone. It is a time when one really develops a relationship with her ship. I arranged my "bed," closed the canopy, and wondered why I had ever gotten into soaring.

* * *

One wakes up early on a dry lake in July. I had almost no water and no food at all. I lay down under the wing and waited. At one time Nance had suggested we take the ship out on a dry lake, do some auto tows, and spend the night under a wing. Somehow, I had a whole lot of reservations about that idea. I wondered how Nance would feel about it now.

I heard a call.

"Ger!"

It was Nancy and Jamie, another 1-26'er. I will never forget the question lettered on his T-shirt, *1-26: Can you accept the challenge?*

Nance gave me a big hug and handed me an apple and a sandwich.

Jamie said, "It's gonna be a great day to do my five hours, once we get out of here."

I agreed it probably would be, afraid to ask how we would get the 1-26 out, but encouraged by his positive attitude.

"Nancy Crews [our California City tow pilot] is going to fly her Cub in and see if she can land out here," said Nance. "Let's walk off 1500 feet and make sure there aren't any soft spots."

And so we paced — one, two, three . . . and waited.

The sound of Nancy Crews' engine came low over the horizon. The Cub circled once, twice, and the third time made a low pass over the chosen area. The fourth time she landed, smoothly, perfectly, and with an "Ooh . . . eeh . . . all right!" over the radio.

We undid the towrope and prepared for the takeoff. I got into the 1-26's cockpit. Jamie held the tail so the skid wouldn't dig into the mud. Nancy Crews climbed into the Cub, and, with a couple of notches of flaps and fingers crossed, we started our takeoff.

The 1-26 dug in. *Come on,* I thought. We gathered some speed and the 1-26 lifted off the lake, but the Cub was still struggling to get airborne. *Oh, come on!* I pleaded. Finally, a little light appeared between the towplane and its shadow. I shouted, "Wow-ee!"

We were low for a long time, but at least we were off the ground. It was barely 10:00 a.m. Well, I thought, Nance and Jamie will follow us back to the gliderport in an hour or so. We'll load up the 1-26. Nance will go cross-country, and Jamie will do his five hours. It hadn't turned out too badly.

When we got back to California City, I released and landed. Nancy Crews had already tied down the Cub and met me at the 1-26.

"You two are really something else! Everybody else just goes up and flies around. Not you two. What an adventure! Wasn't that *fun*?"

Now I have a positive attitude, but after a night in a 1-26 cockpit, it was hard to think of the adventure as fun. I bought myself an iced tea and waited for Nance and Jamie.

When they weren't back at noon, I was worried. At 1:00 p.m. I was really worried. At 1:30 p.m. there was no longer any need to worry about where they were.

They were stuck.

We got a relay from them through an airborne glider pilot, who contacted California City Unicom. It took some time to relay the message, since it was highly unusual to have the crew stuck. That explanation took some time to sort out.

Well, I had no car. But where there's a shortage of cars, barographs, canopy cleaner, or anything else in soaring, there's never a shortage of friends. Four volunteers and myself packed up and left for Saltdale in John Newman's motor home. John and his mother had befriended Nance and me the day before and offered their aid in my rescue effort.

The motor home broke down the first time about 10 miles from the lake. About half an hour later we got it started and forged ahead. It broke down the second time on the sandy road south of the dry lake. We finally got to the edge of the lake and started looking for my truck.

"Where is it?" asked Mike, one of the volunteers.

"I don't see a truck out there," said Lou, another helper.

"It's there," I said. "You see that little red dot way over there to the right?" I asked.

"*That's* your truck?" asked John, incredulously.

It was at least 120 degrees in the sun. We took water, covered our heads with boxes, and started walking. Fortunately, our boxes had slits in them so we could see where we were going — not that there was anything to run into, mind you — but Lord was it hot. Too hot for this.

We kept our eyes down on the baked earth. The dry cracked crust beneath our feet was deceptive — what appeared to be solid ground was actually a thin layer of dried mud between us and the oozy slime below. My body temperature was rising, and I could feel rivulets of sweat forming between my shoulder blades.

The truck began to look bigger; when I could finally read TOYOTA clearly, I began to have hope. Nance and Jamie were sitting by the side of the truck. They had driven it out onto the dry lake in the cool of the early morning, but the desert heats up quickly and now, hours later, the temperature was unbearable. There were sheets over the top of the truck covering the windows to keep it cool and there was mud everywhere.

"Nance, Nance," I called.

"Thank God you're here," she said. They had run out of water and were rapidly dehydrating. "You'll never get the truck out today."

"Oh yes we will," I said with confidence.

George Uveges

Another time, a different sky: Conditions were better at Skylark North in Tehachapi Pass as this picture from Geri's album shows.

And then we started digging. There was slimy mud all the way to China I was sure. But the truck had never moved at all. It had just sunk.

And so were we.

We all walked the two miles out. When we got to the motor home, two of us were sick with heat prostration. It was that hot. We wrapped wet towels around our necks to help normalize our body temperatures and headed for California City.

The motor home only broke

down once on the way back. I remember looking out the window at the highway just as a trailered glider with 222 on its tail passed by. It was a beautiful tail, 222. We called him on the radio.

"222, this is 4 Alpha ground. We've broken down."

Fortunately, 222 was monitoring his ground station. George Lessard, of the Academic Soaring Club, gave us a ride back to the California City Airport, while John Newman stayed to repair the motor home and later follow us back to the airport.

Finally, we were all back safely together.

We left California City and drove to Palmdale where Jack Arkovich lives. His house often serves as a rendezvous point for Nance and me when we head up north. He offered me a ride home to my place in Wrightwood, while Nance picked up her car and headed home. Just as we got to Wrightwood, I realized that Nancy had my car keys and my house keys!

It was the end of a perfect day.

I finally got the keys straightened out, but I think that night was more miserable than the one I spent in the glider. My 3-month-old truck was sitting in the middle of a dry lake, and we were all just lucky to have gotten out of there safely.

Next morning I was depressed when I arrived at the advertising agency where I work. I walked into the office, picked up the phone and called the sheriff. He referred me to Bud's Garage in Mojave.

"Hello, is this Bud?"

"Yeah."

"I have a truck stuck on Saltdale Dry Lake, and I hear you've got a four-wheel-drive that can get it out."

Silence.

"You kidding? The last one we took out of there came out in pieces, lady. And I'm the only four-wheel-drive around. Good luck."

I hung up. Our typesetter looked at me with large round eyes, "Your truck is where?"

Distraught, disgusted, and tired, I explained the story. Jack, one of our art directors, began listening to my tale. When I finished, he arose abruptly.

"Elephants," he said. "You need elephants."

He left the room and reappeared moments later with the telephone number of the Barnum and Bailey Circus, which had just come to town.

He was serious.

I was desperate. I called Barnum and Bailey's PR man.

"Boy, do I have a deal for you!"

"Oh, really," he said.

"It'll be great publicity! I have a truck stuck in a dry lake, and your elephants can get it out! What a publicity stunt! I'll get TV, newspapers, radio — all the coverage I can — all you do is provide the elephants."

"Great idea!" he said, "I really like that. Where's the lake?"

"Saltdale. Up north a bit."

"Oh. Well, the elephants have two shows a day. . . . If it were closer we'd do it. . . . But let me run it by my boss, and I'll call you back."

I knew I had lost that one. But Jack, creative as ever and sensing my failure, had the number of an elephant rental company. I called. The line was busy.

Meanwhile, Jack Arkovich called me.

"We can get it out."

"WE CAN? How?" I asked.

"Well, I landed out there in the Cub, and I think we can dig it out. Bring boards, chains, shovels, and jacks. I'll fly in tomorrow morning. Get a crew together and meet me at 7:30 a.m."

"Okay," I said.

My crew consisted of me and Dave, a 23-year-old truck driver just here from England. He had never seen a dry lake. It's a good thing; no one in his senses would have volunteered for that one.

We were up at 3:00 a.m. Tuesday morning. Saltdale was about a two-hour drive from Wrightwood. We loaded my marginally reliable Capri with 15 gallons of water, chains, boards, and jacks, and arrived at the dry lake at 6:30 a.m. We started walking.

"Where's the truck?" asked Dave.

"You see that little red dot way over there to the right?"

"Oh no!"

About a mile out I remembered I had left the key to the truck in the car.

"You didn't," said Dave.

Mike Poblig

A smile of anticipation. Geri was stalking the altitude leg when this picture was taken. (Note the oxygen mask and knitted cap.)

We decided to go the rest of the way and wait for Jack before worrying about the key. TOYOTA was getting bigger, and when we finally reached the truck, Dave suggested I wait for Jack and see if we could taxi the Cub back to the car. We scanned the sky, looking for the Cub, Jack's little yellow bumblebee. Ah, the sound of an engine, low and slow. It was Jack, a couple of feet off the ground. He pulled up, made a pass, bounced off the lake to test the surface, and landed. Perfect. Now I had to tell him about the key.

Jack is a wonderful guy. He's also a Diamond pilot, so he understands about gliders. He'd understand about the key.

"Jack," I said with much trepidation, "I left the key to the truck in the car."

I won't repeat Jack's comment. I just started walking.

While I was walking, Dave and Jack started digging. Two more miles later (that made six so far), I was back with the key. Jack and Dave had three wheels dug out, jacked up, and on boards.

"Are you still mad?" I asked Jack.

"Nah," he said. "We're almost done. Dave's going to start her up, and he'll drive it out. You hop in back, the Cub's too loaded; it's too hot and muddy for both of us to fly out."

"Okay," I said.

Dave started the truck.

"It's a one-shot thing," said Jack. "Once you get going, don't stop or you'll sink again."

Jack and I pushed from the back. The truck began to sink as it moved forward. At last the chains caught, and Dave drove away without me.

I stood frozen until I was sure the truck would make it out.

"We did it!" I yelled and hugged Jack.

Jack smiled. We loaded up the Cub, and then I prayed it would make it off. The ground run seemed to last forever, but up he went, wings wagging at Dave who was now waiting at the edge of the lake. I stood in the growing heat watching the Cub disappear — then I walked out another two miles. That made eight.

Mike Pohlig

Trying a different site:
The author with her partner, Nancy Evans (left), at Bishop, California. The Sierra Nevada are in the background.

Dave took the Capri, and I drove the truck to the salt mill to get the trailer where Nance had left it the previous day. Jack flew to California City where he and Dave and I had planned to rendezvous for breakfast — it was only 9:00 a.m.

As it turned out, the adventures continued.

I got to the salt mill. There was no one there but a very mean dog who would not let me out of the truck. I was determined. After 20 minutes of coaxing, I had made friends enough to hook up and get out. While this was going on, Jack landed at California City and found they had closed the restaurant for the day to clean and paint. He flew home.

When I finally got to California City, I found Dave bailing water out of the Capri.

"You got any Goldfish?" he said.

"Goldfish?"

"Yeah. You can have an aquarium — the 15 gallons of water spilled in your car, and there are still a couple of inches in here."

I was really getting tired.

I called Jack, dropped off his jacks and blocks in Palmdale, and asked him if he ever wanted to see me again. Although he said yes, I wasn't sure I believed him. So I gave him my thank-you's and went home. Dave and my goldfish bowl stopped at a bar for a few beers.

With the rest of the afternoon off and a little help from my friends, I started cleaning the truck. That slimy mud was everywhere!

I slept much better that night, even with a 4:00 a.m. photo session scheduled at work for the next morning. Everything was out of the lake — me, my crew, Jack, Dave, the glider, the truck, the Cub, and the trailer. All for a 14-mile cross-country.

The next weekend, Nance and I were back at Cal City, trying again — she for Diamond Distance, me for Silver Distance. Neither of us made it that weekend.

Almost two months later I finally completed Silver Distance (Crystalaire to Apple Valley, California). It was so easy. I caught a thermal to 10,000 feet in the mountains, zinged over to Gray Butte, and climbed to 15,000 feet. I never turned once for over 26 miles after that! It was so easy.

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SOARING TO WIN

GEORGE MOFFAT

CONTEST REPORT ON TWO SAILPLANES

This article looks at two new ships and how they perform in a contest environment. The report is based on my experience in flying each ship in a National Championship last summer. Those who want L/D curves down to the last millimeter should consult the flight tests so effectively carried out by Dick Johnson and Hans Zacher. My observations are subjective and are based on 60-70 hours of flying against some of the country's top pilots in the real world of bugs and dust.

The carbon Mini-Nimbus C: I own one-third of this ship, which was delivered in January 1979, and have about 66 hours in it. It was one of the first three *Mini C's* delivered to this country and appeared to be in nice general shape with several minor improvements over the prototype, which I had flown in the 1977 Coupe d'Europe. Compared to the AS-W 20 and the LS-3 (the only real competition in the 15-Meter Class, if one is to believe the results of the last two Nationals), the *Mini-Nimbus* appeared as nicely finished but not as well-sealed as the AS-W 20. The large hole in the fuselage for the flap actuation torque tube was to prove especially time-consuming to seal and obviously costs a lot of performance if left open (see *Soaring*, Nov. '78 for Dick Johnson's tests on the LS-3 with and without flap seals). However, if the sealing was bad, the weight was good. My ship came in at 483 lbs. with instruments. The prototype *Mini-Nimbus* was 555 lbs.; the AS-W 20 I flew in 1978 was 480 lbs., and LS-3's generally go in the 580-600 lb. range. The new LS-3A is about 545 lbs.

In the air I found the *Mini-Nimbus C* very nice to fly with especially light ailerons. The ultra-rigid carbon wing seemed to give both exceptionally fast and precise aileron response, even with 450 lbs. of water ballast (1100 lbs. is legal gross). I found the remarkably little displacement of the ailerons gave very rapid roll rates. On all-around handling I would give the LS-3 the nod as the best I have flown, with the AS-W 20 just behind and the *Mini* just behind that. All are outstanding.

So how about performance? The Adrian Nationals provided a good test as a result of weak to moderate thermals, often widely spaced, and several cloudless days. For comparison purposes, fairly weak dry days are best as the climbs last longer and there is less dolphining around on the glides. Initially, I expected the *Mini's* performance to be very similar to the LS-3's until the thermals dropped below 150 fpm. The prototype *Mini* had been excellent against the LS-3's in the weak stuff so I expected a real edge with my 483-lb. carbon model. Against the AS-W 20 I was worried about that bulge of performance that Dick Johnson's careful testing had shown in the 65-80 mph range. True, I had never discovered such a bulge when I was flying the '20, nor had I seen it in other ships.

As weak day led on to weak day, I discovered that neither my hopes or fears were being met. In the weak stuff — right on down to 20 fpm — the *Mini C* seemed unable to gain an inch in climb on the numerous LS-3's, although we could all easily gain on AJ's very well-flown *Mosquito*, and the *Speed Astir*, assorted PIK's, etc. In cruise, often at speeds in the 60-80 mph range where the AS-W was supposed to shine, there was no significant difference. Leading edge bugs were light to moderate throughout the contest.

The best single test came on the fourth day when Karl Striedieck in his AS-W 20 and I flew together for the best part of 100 miles in lift ranging from 500 fpm to zero, neither able to gain an inch on the other. Karl, flying at 8-lb. wing loading to my 7½ lbs., would gain 10 feet or so on the long runs in quiet air; I would gain it back in the thermals. The differences were just what the wing loadings would show. Certainly there was no indication of a magic bulge in the '20's curve, nor indication of the 3 points lower L/D rating of the *Mini* that Dick's tests of an earlier (unsealed?) *Mini* had shown. Neither of us could make any money on our faithful following of three LS-3's.

Needless to say, I was not happy with the lack of superior climb in weak weather. I had noticed that the carbon fabric on the wings had a rather coarse weave not readily apparent to the eye but discernible to the backs of the fingernails. On the rest day my father-in-law partner and I put in about ten hours wet-sanding the wing, both top and bottom. At the first touch of the 400 paper, the pattern of the cloth stood out clearly so we seemed to be on the right track. (When wet-sanding use a squeegie to wipe away the water and "glop." The instant-dry surface lets you see how things are going.) The next flying day was ultra-weak and allowed many long slow climbs. The *Mini* seemed very definitely improved, both in my eyes and those of others. Unfortunately there wasn't much contest left to work with.

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The summary? The *Mini C* seems fully equal to the AS-W 20 and the LS-3. Post-sanding results indicate that it is now probably better in climb than in weak weather. In very strong weather I would expect the high allowable gross would let the *Mini* keep up to the other two. I'll be flying it in two Nationals this season, so time should tell.

Jantar 2B: I was especially glad of the chance to fly Dick Brandt's new *Jantar 2B* at the Minden Nationals, as it was a development of the '2A I had flown and liked at Caddo Mills in 1977. After the '77 contest I had supplied its Polish builders with a long list of suggestions (some quite major), virtually every one of which was incorporated in the B. Especially notable was the high as opposed to the earlier no-ground-clearance midwing, the enormous wheel (but still no brake to speak of), and the 150 lbs. of added water ballast for high speed. This 20.5-meter ship comes in at about 790 lbs. empty and has a legal gross of 1427 lbs. as compared with 1268 for the *Nimbus*.

The ship turned out to be beautifully constructed — especially the elegant forged fittings — and with a finish fully up to the German ships. Dick Brandt, who did much of the sealing on Johnson's *Jantar* for the World's in 1978, had done a careful job on the few odds and ends not handled at the factory. Rudder seals are especially important on the *Jantars*. The specially-designed Brandt one-man-rigging trailer made assembly a breeze for an Open ship. Dick's is the only such rig I have ever used that both really worked and didn't take years to assemble all the rigging gadgets.

In the air the '2B proved easy to fly — for an Open ship. The rudder, always the weakness on these long-winged monsters, is just barely adequate, not quite as good as either the *Nimbus* or AS-W 17. The ailerons were good and seemed lighter to me than the '2A. Since Bob Klemmedson was flying Dick Brandt's '2A — surely no one else owns two Open *Jantars* — we had a good opportunity to try it out. At best L/D speeds there seemed little to choose between the ships with maybe an edge to the 'B. In climb the lighter (at full ballast) 'A did a bit better, but in run it was an easy victory for the 'B. What I would have given for those extra pounds at Caddo Mills!

In the contest proper I soon discovered that the *Jantar* was outstanding. In weaker weather it had the same dramatic climb margin I remembered with the 'A. At best L/D I could edge slowly away from Ross Briegleb's 604. At higher speeds I seemed equal to, or better than, Dick Johnson's exceptionally high-performance *Nimbus*. Only Dick Butler's super 604 and AJ's near copy seemed to have a distinct advantage. Dick, on a 40-mile final glide at 100 IAS, could gain about 500 feet every ten miles while the climbs seemed about even. AJ's ship would about split the difference between Dick's and the *Jantar* in glide but climbed exceptionally well. Climbs were difficult to judge since wing loadings varied widely with the amount of ballast aboard. Dick could go with up to 1800 pounds, but seldom carried more than 1500.

Someone is going to ask why the *Jantar 2B* didn't do better if it is so good. Well, we did win the second day, but mostly it seems to me that the nut that held the stick was not properly adjusted. We also found that the ship goes best with a surprisingly far aft *cg*. The allowable is 26-48% MAC. Climb seemed to fall off unless the *cg* was in the 42-46% range, although more testing would be needed to really tell. For contrast the *Nimbus* seemed happiest in the 29-39% range, the former for best climb.

Anyway, I was really impressed with the *Jantar 2B* and hope to give the same ship a better ride this summer.

ACCENT ON CLUBS

MICHELLE SILVER

A smooth operator: Keeping operations at the field running smoothly can be a task too big even for Atlas, and no-shows for field duty complicate things even further. **Carl Ekdahl**, vice-president of the Albuquerque Soaring Club, reports in *Wind & Wings*, newsletter of the Associated Glider Clubs of Southern California (Carl is still a member of AGCSC, even though he now resides in New Mexico), on how ASC has been able to by-pass the problem of no-shows and run a smooth operation:

"1. Our (unpaid) towpilots and (unpaid) instructors and (overworked?) board members are exempted from duty. All other club members pull duty: ASC is a 100 percent active club, and our total membership is reasonably stable at eighty with ten to twelve tow pilots, three to four instructors, and six board members. This yields about sixty members for the duty roster.

"2. We schedule an Operations Officer of the Day and an Assistant Ops for each day of flying. The Assistant Ops is usually someone who has not pulled duty before, a younger club member, etc. Scheduling two people per day gives us some protection against the inevitable no-shows, late-arrivals, etc., that occur. If both are unable to show, members at the field split up the work because the rule in ASC is — no Ops, no flying!

"3. General duties of the Ops include: a) Logging in on our daily flight sheets the takeoff, landing, tow altitude, and billing information of all flights, including private owners. These sheets are turned in to our computer service and are the basis for all club billing. (Since the flight times logged are accurate and appear on our monthly billing, many of the members update their logbooks from this information.) b) The Ops is responsible for rolling out (or supervising the roll-out) of the training ship, getting the towropes, and generally having the operation ready to roll when the instructor arrives. c) Ops is responsible for field safety, changing direction of operations due to adverse conditions, and traffic advisories. (Most of our ships are radio-equipped, and we encourage and teach a loose takeoff and pattern radio procedure — Ops usually has either a portable set or one of the crew car radios available.)

"4. We also schedule a maintenance person. Maintenance in this context means general cleanup: mopping the clubhouse, sweeping the hangar, emptying the trash, and other odds and ends that need to be done to keep things shipshape at the soaring site.

"5. Like other clubs, we have established a $20 no-show penalty. I think you will be amazed at the number of people who will gladly and willingly pay this fee rather than drive out to the field to work. With our small roster we pull duty about once every 3 or 4 months. We had people in the club who were willing to pay this additional $60-80 per year, so we got hard-nosed about it and virtually eliminated the problem by instituting the following measures: a) Any no-show is *immediately* rescheduled by the operations manager, rather than waiting for the normal rotation; b) Three successive no-shows and the member is voted out of the club by the board using the 'dereliction of duty' clause in the bylaws.

Most bylaws have some such general clause in them, so this didn't require a bylaws change, just an agreement among the board members.

"The system really works in ASC. It makes flying much more enjoyable. There is always an authoritative Ops person to settle the petty squabbles about launch priorities, tow fees, etc. It gives all of the club members an *active* role in running the show, and breeds leadership qualities in the younger and newer members.

"Try it — you'll like it!"

Club homebuilding activity: With the success of the recent SSA Homebuilders Workshop, homebuilders are beginning to emerge more and more from shops and garages. While compiling the *1980 Directory of U.S. Soaring Sites and Organizations*, SSA's Administrative Assistant **John Lee** was surprised to find that nearly 80 percent of all responding clubs indicated some sort of homebuilding activity. Now the question is: How many clubs are building a plane as a club project? In order to judge the true extent of this type of homebuilding interest in clubs, *Soaring* would like to invite all clubs that have a homebuilding project in the works or recently completed (within the last year) to write to this column and tell us about it, particularly if the project is a CUBy towplane. In December of 1978 *Soaring* reported the Federal Aviation Administration agreed with the Society to allow homebuilt aircraft to serve as towplanes on a non-commercial basis. We would like to know if any club has taken advantage of this option. The CUBy is especially suited to this, John says, as one could be built for approximately $8000 while a new Piper Cub, which is nearly identical, would cost a club upward of $30,000.

Delhi Gliding Club: India — land of sacred cows, ivory-tusked elephants, rich tapestries, and sandlewood incense. Its exotic lure drew early entrepreneurs east in search of gold and spices to export into western culture. But the richness of land and culture cannot always be readily exported, however, and **Ron Rose** and **Joan O'Brien** of Atlanta, Georgia, write of India's other riches, such as the Safdarjang Airport, home base of the Delhi Gliding Club:

"As you approach the Safdarjang Airport in the center of New Delhi, your first reaction is one of doubt. The 30-ft. high roadway lining the end of the runway is intimidating, and the central-city location would chill the heart of any novice cross-country pilot. Close by, the onion-shaped domed tomb of Safdarjang, Prime Minister to the Mughal Emperor Muhammed Shah in the early 1700's, lends an unusual texture to this soaring site, adding to its unreal first impression.

"Overhead huge gaggles of assorted soaring birds circle lazily in the intense Indian heat. Thermaling buzzards, hawks, and a Ka-7 finally convince you that the Delhi Gliding Club could operate out of this field. While gazing at over thirty birds in the sky above, one wonders just who is following whom, but soon the Ka-7 breaks for the next thermal and (like Moffat's 'leeches') all but a handful of birds string out on course behind the '7. The appearance is one of a great white kite with a long black tail.

"There is a large hangar with several gliders in it at the airport. The Delhi Gliding Club's fleet includes two *Rohinis* (a side-by-side two-place and a single-place), both open-cockpit designs of Indian manufacture exhibiting a rich British (specifically Slingsby) heritage. The club also owns a Slingsby T-21b, a Polish ITG, a Ka-7, and the queen of the fleet, an AS-K 13. In addition, two or three more sailplanes are undergoing repair by the club.

"The feeling of awe and disbelief returns briefly when one learns about the costs of instruction. An Indian student can become a member for 55 rupis, or about $6.90, while adults pay $13.17, and foreigners $25.72. Joy rides cost 63¢. (Who says soaring's expensive?) When your membership becomes effective after two months, your instruction rides increase to $3.39.

"All of this adds up to one of the more unusual soaring efforts we've ever encountered. But lest we paint too positive and exotic a picture, we should mention that there are some hidden restrictions for soaring development at this site. For example, if the monsoon season doesn't materialize, the dust haze can make it impossible to take off. If the monsoons fulfill their expected role, the pilot will have no trouble launching, but landing anywhere other than on the asphalt runway poses an unusual problem — it's hard to get a crew to retrieve you when they have to walk through lush green grass known to be a favorite habitat of the deadly Indian cobra!"

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BUSINESS MEMBER

MAINTENANCE AND PROJECTS

LES SEBALD

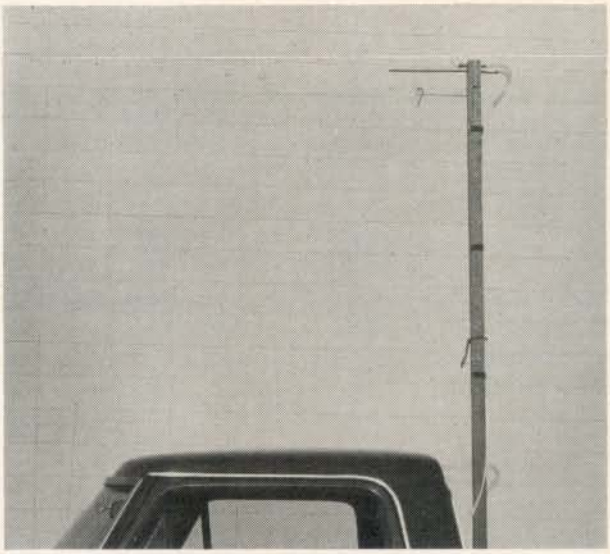
Bill Wells, in the November 1977 issue of SOARING, *treated us to an excellent article entitled "Calibrating Total Energy Tubes." His basic approach was to change the chamfered edge at the end of the Braunschweig or Nicks tube to adjust for undercompensation (too sharp an edge) to a well-chamfered edge (overcompensation). As he says, the chamfer usually ends up being between .004" and .007", which is not much. Testing was done by comparing the total energy probe vacuum with an equal but opposite pressure from a pitot tube, both held in smooth air just outside of his car as he drove at moderate speeds. Bill used an airspeed indicator and several pneumatic switches for the tester. He thought of using tilted manometers, rather than the ASI, but did not use them because he thought they would be too acceleration-sensitive.*

Now Eric Greenwell and Rudy Allemann have apparently tried the water manometer scheme with considerable success and the following is their account. — L.S.

MEASURING TOTAL ENERGY PROBES EASILY

An article in *Soaring* by Bill Wells described a technique for measuring the performance of total energy (T.E.) probes. Rudy Allemann and I used this method last year with good results; however, I was left with the feeling that there might be an easier way. In particular, a method that didn't involve two airspeed indicators and their cross-calibration.

As most know, the essence of a T.E. probe is a suction equal to the pitot (dynamic) pressure at all flight speeds, not the actual pressure or its equivalent in mph on an airspeed indicator. Only a means of comparing, not measuring, the two pressures is required. So, why not substitute water-filled manometers for the airspeed indicators, as manometers, unlike airspeed indicators, are cheap, sensitive, and identical?



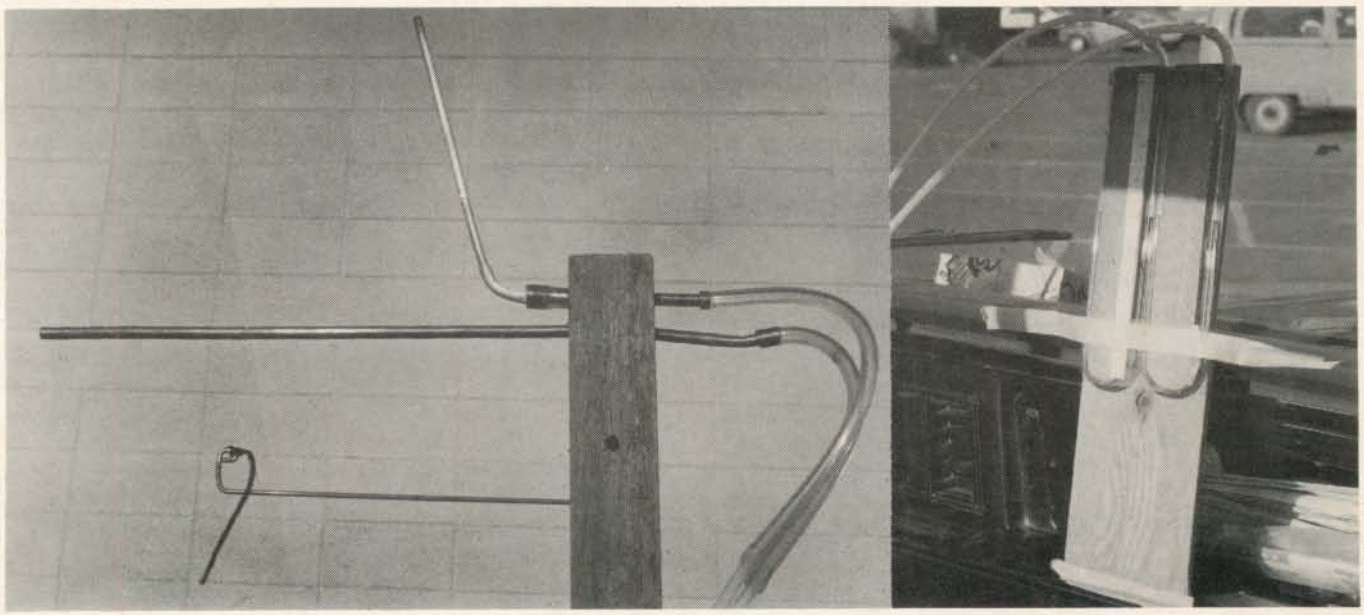
Eric Greenwell

These thoughts led to the construction of two manometers mounted side-by-side with the pitot pressure connected to one unit and the T.E. suction connected to the other unit. The pitot and T.E. probes were hung out the car window on a board just as in Wells' method. The test was run by driving down the road at flight speeds and noting the relative positions of the fluid columns of the inner tubes. T.E. reading higher? Overcompensation. Pitot reading higher? Undercompensation. Stop to adjust the T.E. probe and keep at it until the columns stay together. Perfection! Cheap, easy, and no help required.

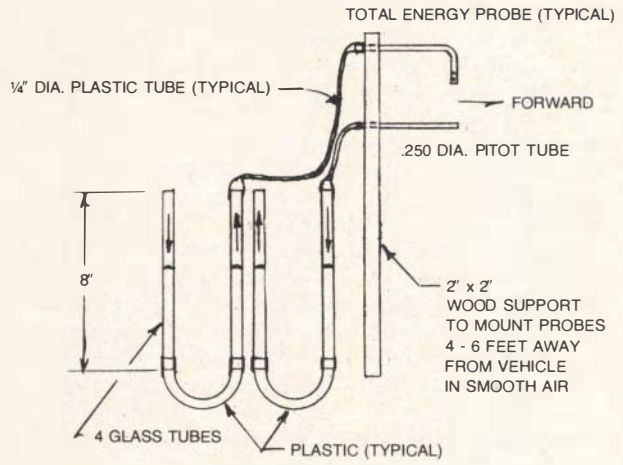
Three venturis, two Nicks tubes, and a Braunschweig probe tested last year with Wells' method were retested using the water manometers. The same results were obtained. There is a surprising variation in the performance of T.E. probes, making their test and adjustment well worth the effort.

Other notes: Glass manometers are recommended as the plastic tubings I tried had too much friction. Food coloring in the water makes it easier to see. Tests at speeds over 70 mph are unnecessary; if the probe is correct at lower speeds it will be correct at higher speeds.

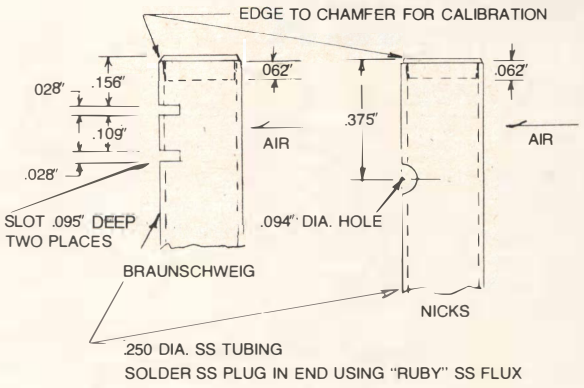
* * *



Eric Greenwell



Water Manometer



Typical Dimensions for Total Energy Probes

Thanks to Eric and Rudy for sharing their work in this column.

Just for reference, I have taken the liberty of including several sketches with dimensions of the tip end of Braunschweig and Nicks tubes that I know have been successful. To make the Braunschweig tube, chuck up in a lathe and cut the end squarely. I have used thin-wall stainless brakeline tubing from an auto store. Next, make an end plug as shown from either solid stainless steel or brass stock and press fit. If necessary, soft radio-type solder can be used with stainless steel "Ruby" fluid flux. Cut the slots by feeding the tubing into a chucked-up saw blade. A ¾"-dia./.025"-thick saw blade and mandrel can be bought from Brookstone Co., 127 Vose Farm Rd., Peterborough, New Hampshire 03458, as part number A 1500 Saw and A 1501 Mandrel for just over $3.00. Clean out the slots with fine emery cloth. Although I have had a bit less luck with the Nicks probe, it is certainly easier to build because of the hole. In both cases, the chamfering tool that Bill Wells offered is well worth using for the calibration adjustment. Anybody got any other ideas?

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SAFETY CORNER

ROBERT GAINES

"Let the buyer beware," so the saying goes. This month Gren Seibels writes about fellow pilots who jump in a new ship and make a big splash at the local field. Maybe they were told the new bird is "just like a Ka-6." It should have been a warning — it's probably a hot bird that may bite you in the rear. — ROBERT GAINES, SSA Safety Chairman.

FAMOUS LAST WORDS:

"IF I CAN BUY IT, I CAN FLY IT!"

I can't think of many combinations with greater potential for lethal mischief than mixing the low-time pilot with a high-performance aircraft. I've been observing this truism with genuine dismay since the early days of our involvement in World War II when the Army Air Corps, in its hunger for crews to man the airframes spewing off the assembly lines, began putting 100-hour pilots in command of B-25's, P-47's, and the like. Inevitably, too many of those shiny new airframes had quick fatal encounters with the terrain thousands of miles this side of any combat theater. The doomed young pilots simply had not flown enough to develop the instant reflexes necessary to control all that hot machinery.

All these years we've been hearing about the "born pilot," but have you ever actually met one? I have known hundreds of men and women who fly, and every last one of them earned their wings with the usual course of lessons, ground schooling, and check rides, slowly developing a feel for this strange new three-dimensional freedom as their hours aloft accumulated. The best of them regarded their newly-won tickets not merely as a license to fly, but more importantly, as a license to start *really* learning how to fly. To this day, they're still learning, the best of them.

But general aviation's accident statistics are a continuing disgrace — and we who comprise that small fraction of general aviation called soaring have at least as much to be ashamed about as our power brethren who crunch all those Cherokees and light twins. The pundits have harrumphed and explicated, blaming the quality of instruction, or the inadequacy of regulations, or even the design of the machinery itself. But I would submit that the real culprit in all too many tragedies was the impatience of the pilot-in-command to move up to a level of performance beyond his acquired capabilities. It's the famous "Peter Principle" airborne.*

It was my good fortune to be accepted for flight training by the U.S. Navy in the early 1940's. Since most Navy fliers were bound for eventual carrier duty, our training was based, from the first flight on, upon the rigid requirements of carrier operations: absolute precision was just barely good enough. By the time I saw my first actual carrier deck through the canopy of a Grumman TBF, I had logged several hundred hours of Navy time. Predictably, my qualification landings aboard the old *Wolverine* were entirely routine (albeit my pulse rate was anything but). Happily for all of us, the Navy had a powerful aversion to killing its pilots unnecessarily, and this welcome philosophy underlay every facet of a training syllabus that was second to none in its day. At every stage of instruction there were relentless check rides by the nit-pickingest corps of sticklers I ever met. If you earned a "down," you had to fly two consecutive "ups" to satisfy the Navy you were ready for the next stage. (If the Navy still wasn't satisfied, you were automatically on your way to boot camp — a powerful stimulus to precision flying.)

Transition from an open-cockpit Stearman biplane to an 8-ton torpedo bomber was gradual and logical: SNV's (BT-13's), SNJ's (AT-6's), and at the end, a fortnight of flying clapped-out, battle-scarred SBD's before graduation. Then came three more months devoted to operational training, featuring endless field carrier landing practice aboard the huge TBF's before we were allowed anywhere near a real carrier. The payoff was an astonishing safety record while we youngsters were engaged in some of the most difficult, demanding flight regimens ever devised.

So what has all this nostalgia got to do with soaring safety? Just this: in flying, there is no greater virtue than patience. As it applies to soaring, and specifically to sailplanes, the idea is to force yourself to take the time — and make the effort — to learn absolutely all you can about flying the aircraft you are currently using before graduating yourself to a higher level of performance. A few hours in a 1-26 do not qualify *anyone* (even the "born pilot") to cope with the challenge of properly handling, say, the LS-1 or the Standard *Cirrus*, let alone the new generation of racing-class glass in the 15-Meter configuration. In these ultra-high-performance designs, too many things can happen too fast for any low-time pilot to contend with them all.

Good judgment combined with sound reflexes: hallmarks of the experienced pilot. If there's a shortcut to experience, no one has yet discovered it. Of course, the smart people see to it that their experiences are all meaningful; in every flight they perceive valuable lessons. And at every opportunity they challenge themselves — to climb better, to coordinate at all times, to master all the techniques that make flying safe and satisfying. Not for these the lazy, sloppy meandering from one established thermal to another. While climbing, for instance, they are closely studying every segment of the sky ahead, plotting the best course (least sink) to reach the next likely thermal source.

This approach may sound a trifle grim and earnest for the average weekend hobbyist. But it is possible to work hard at your flying, perhaps even be compulsive about it, and actually increase your enjoyment rather than diminish it. A graceful *chandelle* into the heart and core of the thermal you discovered all by yourself . . . a nicely-calculated final glide that leaves you precisely at pattern altitude on downwind . . . now honestly, aren't these things more fun than a constant struggle to correct the aftermath of inattention or sloppy execution?

Of course no two pilots are apt to reach the same level of judgment and general expertise after equal amounts of experience — a disparity of human reaction which poses a problem that has frustrated and baffled aviation bureaucrats for half a century: how to establish meaningful criteria for the various grades of licenses? I have had one or two students who could easily have passed the practical flight test for a private power license at the 20-hour mark, and could have waltzed through a commercial check ride at 50 hours — so long as nothing unexpected occurred.

But that, of course, is the big IF that makes the low-time pilot an iffy proposition in the air. Almost always it's the unexpected that lays us low. Not long ago, with close to

* The Peter Principle, from shaky memory: *In the normal course of affairs, everyone is eventually promoted to his highest level of incompetence.*

2000 hours of soaring time in my log, I experienced my first unintentional spin while in the midst of a low save; before I finished working that thermal it happened all over again! (The AS-W 20 balks at 60-degree banks at 38 knots; I was simply trying too hard.) Thanks to thorough spin training in my student days, recognition was instantaneous and recovery was normal, with no more than 100 feet lost in each episode.

Despite all the moaning and groaning about inflation and taxes and federal regulation (and I yield to no man in my hatred for all three), we Americans have achieved a degree of affluence during this century that is yet unmatched even by the oiliest country in OPEC. Yet I wonder if this happy situation may not be the undoing of some of us general aviation types. It is so deadly easy to persuade ourselves that if we can afford a specific aircraft, there's no reason for us not to fly it.

Being a compulsive reader of aviation accident reports, I am always struck by the disproportionate number of professionals — doctors, lawyers — as well as self-made business successes who end up smashed to pieces in the wreckage of high-performance, private aircraft (frequently along with their trusting families and friends). The most dangerous *non sequitur* in all of flying goes like this: *If I can buy it, I can fly it.*

Bear with me for a true story, and then I'll hush up. One afternoon, long ago, I was capering in my Ka-6 for a charity air show. Afterward, an attractive young professional type stood by my ship, admiring it with that unmistakable glow of infatuation. Five minutes after he introduced himself, I knew he was hooked. I sent him to Bermuda High Soaring School at Chester, South Carolina, where he was easily the most avid of all their scratch students, if not much above average in ability. But he persevered, passed his written and practical, and accepted my advice to go the Ka-6 route for a hundred hours or more.

But with fewer than 50 hours logged, he confessed he was growing impatient for higher performance; soon thereafter, he took delivery of one of Art Zimmerman's *Concept 70's*. Of all the glass designs of the early 1970's, this one was the most forgiving and gentle in the hands of the novice; I wished my friend Godspeed and bade him log a couple of hundred hours before making another move. But alas, he discovered that his Standard Class '70 could not hack it with the squadron of H-301 *Libelles* then quartered at Bermuda High. Again, signs of impatience. Next thing I knew, he turned up with an LS-1. Courtesy demanded congratulations, but in my case at least, they were pretty damn insincere. Sure enough, on his very first landing, it got away from him, skittered across the grass, and crunched into a ditch alongside the taxi strip. Subsequent flights were orchestrated like concertos for busted landing gears and splitting fiberglass. Understandably, they grew less and less frequent; finally, they stopped altogether. The LS-1 was quietly sold, and of our professional friend we saw no more. He was lucky; he got scared. Others I have known, not so lucky, got hurt.

* * *

Bob Wittke, now a retired TWA captain, once reminisced about a fellow airline skipper who was interviewed upon retiring after 35 years in the cockpit. When asked to review the most important lessons he had learned in his long career in the air, the grizzled veteran thought for a moment and replied:

"First, avoid the terrain.

"Second, be patient rather than curious.

"And finally, never carry a package by the string!"

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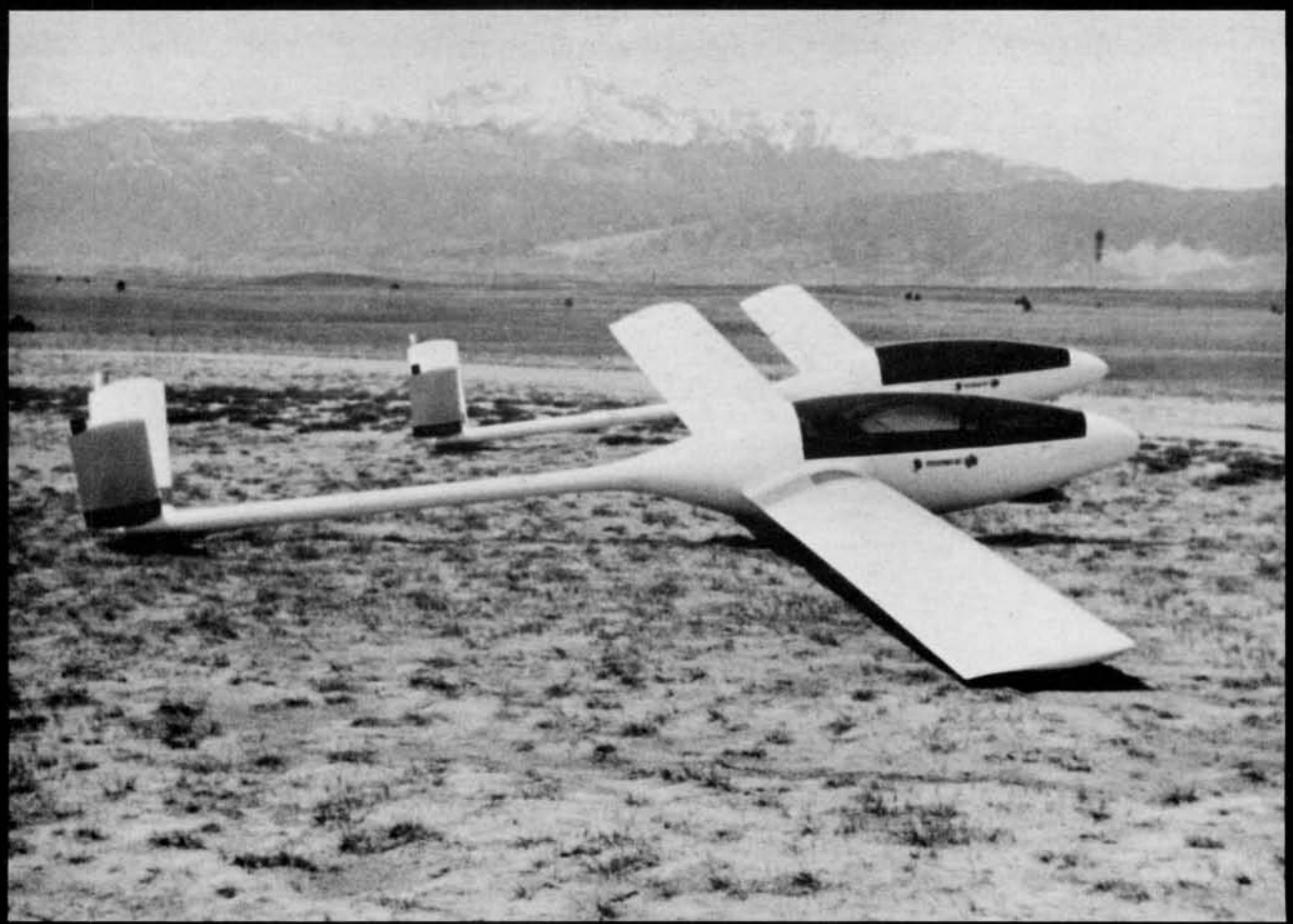

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3829. Robert W. Morgan
3830. Daniel C. Walker
3831. James Walsh

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5000-meter gain (16,404-ft.)

W.E. Colliver; 1-34; Black Forest, CO
Jin Enya; 1-26; Black Forest, CO
(Certified to Japan)
Karl Grund; 1-26; Black Forest, CO
(Certified to West Germany)
Charles G. Kalko; Astir; Black Forest, CO
John V. Kew; Astir CS; Moriarty, NM
Hardy M. Ledet; 1-26; North Conway, NH
John O. Mills; 1-34; Black Forest, CO
Tonk Mills; 1-34; Black Forest, CO
Robert W. Morgan; 2-32; California City, CA
James R. Simons; 1-34; Black Forest, CO
Stephen R. Zimmerman; 2-32; Boulder, CO

DISTANCE DIAMONDS

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Hans-Joachin Beule; 325 miles from Estrella, AZ; PIK-20; 6:35 hrs.; June 2.

GOAL DIAMONDS GOLD DISTANCE

300 km O&R or Triangle (186.4 miles)

James Walsh; Std. Libelle; Narromine, Australia.

GOLD BADGE LEGS

Altitude: 3000-meter gain (9842-ft.)

Glenn Barrett; 1-26; Elsinore, CA
W.E. Colliver (See Dia. Alt.)
F. Richard Ellenberger; 1-34; Black Forest, CO
James J. Harkins, Jr.; 1-26; USAF Academy, CO
David F. Lambert; 1-26; Black Forest, CO
James K. Merritt; PIK-20; Hemet, CA
John O. Mills (See Dia. Alt.)
Tonk Mills (See Dia. Alt.)
Stanley K. Russell; Blanik; Ryan Field, AZ
James Walsh; Libelle; Narromine, Australia.
Jack Wilson; Lark; Black Forest, CO
(Certified to Great Britain)

SILVER BADGE LEGS

Altitude: 1000-meter gain (3281-ft.)

William E. Giles; Blanik; El Mirage, CA
Peter D. Chatterton; 2-33; Estrella, AZ
David F. Lambert; 1-26; Black Forest, CO
Gil Warrenton; 1-26; Hemet, CA

Distance: 50 kilometers (31.1 miles)

Eugene H. McNay, Sr.; 1-26; Zionsville,IN
William J. Stinson; Pilatus B-4; Warren, VT

Duration: 5 hours

Roscoe L. Cole; 1-26; Elsinore, CA
James J. Harkins; 1-26; USAF Academy, CO
Peter W. Johnson; Ka-6 CR; Sebring, FL
Robert W. Morgan; 2-32, California City, CA
Edward A. Rohan; Salto; Elsinore, CA

Altitude/Distance

James Walsh; Libelle; Narromine, Australia.
Mynderse R. Woodruff; Pilatus B-4; Warren, VT

Altitude/Duration

Allan C. Northcutt; 2-33; Ridge Soaring, PA

Altitude/Duration/Distance

Daniel C. Walker; Ka-8; Frederick, MD

C BADGES

30-min. flight

10,330. Okey N. Barker
10,331. Bret A. Beck
10,332. Devin P. Bower
10,333. Peter D. Chatterton
10,334. Ray J. Cornay III
10,335. Darrell L. Davey
10,336. Thomas H. Davis
10,337. Allen W. Harry
10,338. Patricia A. Hill
10,339. Thomas R. Holm
10,340. Russell A.S. Janzan
10,341. Eugene Kaine
10,342. Robert E. Krause
10,343. David F. Lambert
10,344. Malcolm D. Lambert
10,345. Ronald A. Long
10,346. Robin L. Maiden
10,347. Samuel F. Miller
10,348. James F. Pletcher, Jr.
10,349. William Rosenthal
10,350. Gail M. Sabetti
10,351. Warren J. Schjonning
10,352. Vincent Sibel
10,353. Michael Slingluff
10,354. Bruce C. Spinney
10,355. Barna A. Szabo
10,356. John J. Ungate II
10,357. William H. Walton, Jr.
10,358. Clarence E. Wray, Jr.

B BADGES

5-min. flight

Bret A. Beck
Peter D. Chatterton
Darrell L. Davey
Gregory A. Falken
Allen W. Harry
Russell A.S. Janzan
Robert E. Krause
David F. Lambert
Malcolm D. Lambert
Timothy I. McCracken
Archie T. Pior
James F. Pletcher
Robert N. Reber
William Rosenthal
Gail M. Sabetti
Warren J. Schjonning
Vincent Sibel
Barna A. Szabo

RECORDS APPROVED

World; Single-place; Motorglider; Alt./Alt. Gain; 34,148 ft./29,276 ft. (10,408m/8923m); Günter Cichon; Nimbus M; May 27; West Germany.

World; Single-place; Motorglider; Goal; 519.04 mi. (835.8m); Günter Cichon; Nimbus M; May 23; West Germany.

California; 15-Meter; Alt./Alt. Gain; 29,796 ft./23,754 ft.; B.J. Holden; 1-34; Nov. 25; Inyokern.

Massachusetts; Single-place; Feminine; Alt./Alt. Gain; 12.850 ft./8200 ft., Karen K. Webb; 2-33; Dec. 29; North Adams.

CALENDAR OF EVENTS

Contests listed in bold-face type are sanctioned by SSA

Apr. 4-6, Region 5, 1-26 Championships, Rudy's Gliderport, near Gainesville, Florida. Contact Frank E. Conner, P.O. Box 424 Wauchula, Fla. 33873. (813) 735-3231 or (813) 773-9850.

Apr. 4-6, Mitchell Wing Ultralight Fly-in, Porterville Airport, Porterville, California. Contact Mitchell Aircraft Corporation, 1900 S. Newcomb, Porterville, Calif. 93257. (209) 781-0778

Apr. 5-6, Chilhowee Easter Contest, Benton, Tennessee. Contact William M. Wells, 104 Greenbriar Lane, Oakridge, Tennessee 37830. (615) 483-4119.

April 19, Colorado Soaring Workshop, talks on task flying, weather, etc. Contact Norma Faulkner, 4437 E. Iliff, Denver, Colorado 80222. (303) 756-5933 home. (303) 773-1184 work.

Apr. 19-20, Central California Soaring Club Fun Contest, Sequoia Field. Contact Leo Hawel, 295 W. Holland Ave., #102, Clovis, California 93612. (209) 291-8726.

Apr. 21-25, North Region 5 Soaring Championships, Chester Municipal Airport, Chester. South Carolina (bid subject to approval). Contact Gren Seibels, 2400 Heyward Street, Columbia, South Carolina 29205. (803) 799-1838.

May 12-16, Region 2 Contest, Blairstown Airport. Blairstown, New Jersey (bid subject to approval). Contact Ray Young, 192 West High Street, Somerville, New Jersey 08867. (201) 722-3737.

May 19-24, Region 9 Contest (bid subject to approval), Estrella Sailport, near Maricopa. Arizona. Contact Richard H. Elliott, P.O. Box 33097, Phoenix, Arizona 85067. (602) 264-2261.

May 23-26, May 31-June 1, Region 1 Contest, Sterling Airport, Massachusetts (bid subject to approval). Contact Nicole Szurovy, 550 Commonwealth Ave., Newton, Mass. 02159. (617) 244-4594.

May 24-26, Seventh Annual Vintage Sailplane Regatta, Harris Hill, Elmira, New York. Contact Vintage Sailplane Association, Scott Airpark, Lovettsville, Virginia 22080.

May 24-26, The 32nd Annual Wright Memorial Glider Meet, Caesar Creek Gliderport. Waynesville, Ohio. Three classes: 1-26. Sports Class, and high-performance. Write Caesar Creek Soaring Club, P.O. Box 581, Wright Brothers Branch. Dayton, Ohio 45409.

May 24-26, Apalachee Soaring Society Contest, Quincy Airport, Quincy, Florida. Contact Apalachee Soaring Society, Box 12472, Tallahassee, Florida 32308.

Brian Anderson

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May 24-28, Region 4 and Mid-Atlantic Competition at the Mid-Atlantic Soaring Center in Fairfield, Pennsylvania (bid subject to approval). Contact Charles DeWald, 1504 Auburn Ave., Rockville, Maryland 20850.

May 25-31, Region 7 Contest, Joliet Airport, Joliet, Illinois. Contact Lance Flynn, 849 Brookside Lane, Deerfield, Illinois 60015. (312) 945-7153.

May 30-June 1, 25th Anniversary Meet and Dinner Dance of the Long Island Soaring Association. Contact Mary Jane Glenn, 6 Broadhurst St., Port Jefferson Station, N.Y. 11776. (516) 928-1647.

June 1-7, National Soaring Week. Contact John Lee at SSA for assistance in planning local activities. SSA, Box 66071, Los Angeles, Calif. 90066.

June 7-8, 4th Annual Sportsman & Amateur Soaring Meet. Contact Aero Soaring Club, Dart Airport, P.O. Box 107, Mayville, New York 14757. (716) 753-2112.

June 9-13, Region 10 Contest, Marfa, Texas. Contact Fritz Kahl, Box 1047, Marfa, Texas 79843.

June 17-26, 5th U.S. National 15-Meter Class Soaring Championships, Wilmington, Ohio. Contact Tom Stoops, 3741 Silver Oak St., Dayton, Ohio 45424. (513) 236-1463.

June 23-27, Region 8 Contest, Ephrata, Washington. Sponsored by the Seattle Glider Council. Contact John Sager, 240 SW 183rd St., Seattle, Washington 98166. (206) 246-5225.

June 28-29, 4th Annual Great 1-26 Sailplane Race, Fun Country Soaring, Wellington, Ohio. Contact Ray Malloy, 15309 London Ave., Cleveland, OH 44135.

June 28-30, July 1-4, Region 12 Contest, Bishop, California. Sponsored by the Bishop Soaring Club. Contact Adriaan Schat, 120 Mandich, Bishop, California 93514. (714) 873-6311.

June 29, 50th Anniversary of Soaring Banquet, Elmira College, Elmira, New York. Contact National Soaring Museum, Harris Hill, RD #3 Elmira, N.Y. 14903. (607) 734-3128.

July 1-10, 11th U.S. National Standard Class Soaring Championships, Harris Hill, Elmira, New York. Contact Shirley Sliwa, %NSM, Harris Hill, RD #1, Elmira, New York 14903.

July 2, Commemorative Flight — An Official U.S. Glider Mail Flight, Harris Hill, Elmira, New York. Contact National Soaring Museum, Harris Hill, RD #3 Elmira, N.Y. 14903. (607) 734-3128.

July 4-6, 12th Annual Soaring Fun Meet, Parlin Field, Newport, New Hampshire. Hosted by Kearsarge Soaring Assn. (10th Anniversary Year). Contact Harold F. Smith, Crocketts Corner, New London, N.H. (603) 526-4219.

July 4-6, Sportsman Contest, Hinckley, Illinois. Contact Al Freedey, 754 N. Gladstone, Aurora, Illinois 60506.

July 5-13, 3rd Annual SSA Vacation Derby from San Antonio, Texas, to Hobbs, New Mexico, by way of Odessa, Marfa, and Big Spring. Soar historical skies. Contact John Lee, SSA, Box 66071, Los Angeles, Calif. 90066. (213) 390-4447. (See March. 1980 *Soaring*).

July 15-24, 47th U.S. Open Class Soaring Championships, Hobbs, New Mexico. Contact Jack Gomez, 310 W. Taylor St., P.O. Box 831, Hobbs, New Mexico 88240. (505) 393-3252.

July 17-24, 1-26 National Championships, Ionia, Michigan (bid subject to approval). Contact Jerry Benz, 260 E. Main, Saranac, Michigan 48881. (616) 642-9019.

July 19-27, National Aviation Space Education Convention, Florida Institute of Technology, Melbourne, Florida, and the NASA Kennedy Space Center. Write: American Society for Aerospace Education, 1750 Pennsylvania Ave. N.W., Washington D.C. 20006.

July 27-Aug. 3, Eighth International Vintage Glider Rally, Sutton Bank, Yorkshire, England. Contact Vintage Gliding Club of Great Britain, 60 Well Road, Oxford, Kent, England.

Aug. 11-15, Tenth Annual South Region 5 Contest, Cordele Airport, Cordele, Georgia (bid subject to approval). Contact Bob Grey, 200 Grey Creek Drive, Athens, Georgia 30606. Phone, business (404) 549-6988 or home (404) 548-1805.

Aug. 24-29, Region 6 Contest, Ionia, Michigan (bid subject to approval). Contact Jerry Benz, 260 E. Main, Saranac, Michigan 48881. (616) 642-9019.

Aug. 27, Sept. 1, SSA's 2nd Annual Women's Soaring Seminar, Ridge Soaring, Inc., Julian, Pennsylvania. Contact SSA, P.O. Box 66071, Los Angeles, Calif 90066. (213) 390-4447.

Aug. 29-Sept. 1, 2nd Annual SSA Homebuilders Workshop, National Soaring Museum, Harris Hill, Elmira, New York. Contact John Lee, SSA, Box 66071, Los Angeles, Calif. 90066. (See March 1980 *Soaring*)

Sept. 6-7, Joint Aviation Committee Air Show, Chemung County Airport, Elmira, New York. Contact National Soaring Museum, Harris Hill, RD #3, Elmira. N.Y. 14903. (607) 734-3128.

Sept. 13-14, Central Ohio Soaring Association Annual Fall Roundup. Marion, Ohio. Contact Karlee Lemley, 5288 Butternut Ct. W.. Columbus, Ohio 43229. (614) 888-1987.

Oct. 4, Commemorative Flight of Wolf Hirth — Elmira to Binghamton. Contact National Soaring Museum, Harris Hill, RD #3, Elmira, N.Y. 14903. (607) 734-3128.

Oct. 11-12, Fall Foliage Festival sponsored by the Harris Hill Soaring Corporation, Harris Hill, Elmira, New York. Contact National Soaring Museum, RD #3, Elmira, N.Y. 14903. (607) 734-3128.

Nov. 28-30, Snow Bird Soaring Contest, Harris Hill, Elmira, New York. Contact National Soaring Museum, RD #3, Elmira, N.Y. 14903. (607) 734-3128.

May 24-June 7, 1981, 17th World Gliding Championships, Paderborn-Haxterberg, West Germany. Contact SSA, P.O. Box 66071, Los Angeles, Calif. 90066. (213) 390-4447.

May/June 1981, SSA World Soaring Championship Tour including visits to sailplane factories. Contact John Lee, SSA, Box 66071, Los Angeles, Calif. 90066. (See March 1980 *Soaring.)*

Calendar of Events

Sponsors of all soaring events are requested to submit details so they may be included in the SOARING calendar. Deadline for calendar items is the 20th of the month, two months previous to the cover date (March 20th for the May issue, for instance). Prospective participants and visitors should write to activity contacts for information on entry applications, rain dates, and practice days. Send calendar items to: Lianna Lamont

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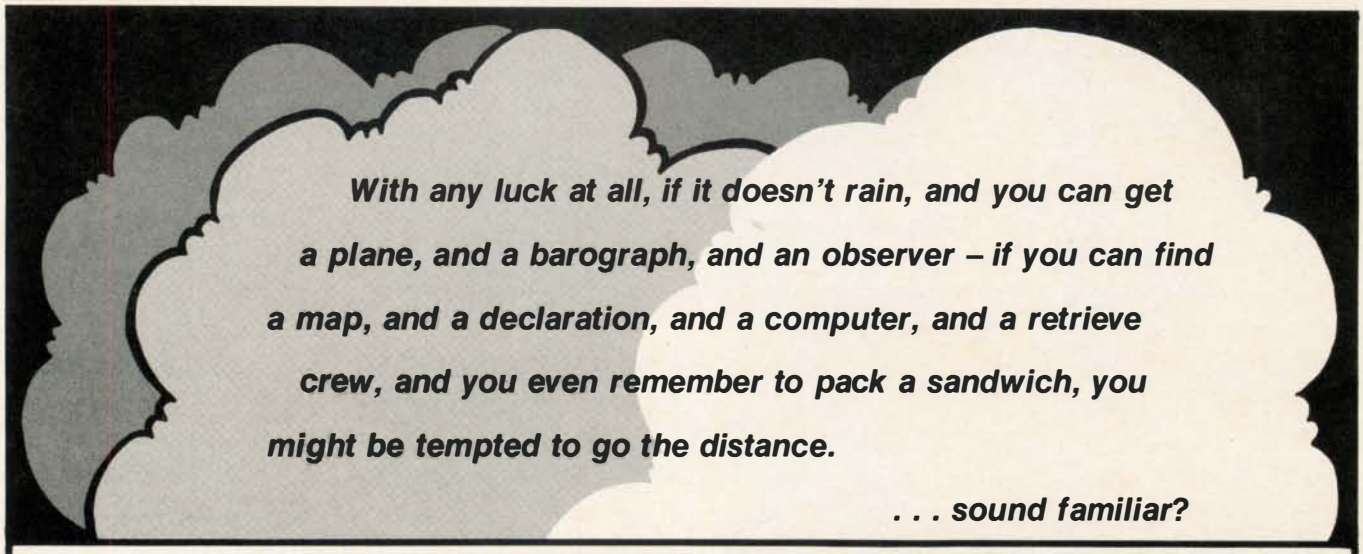

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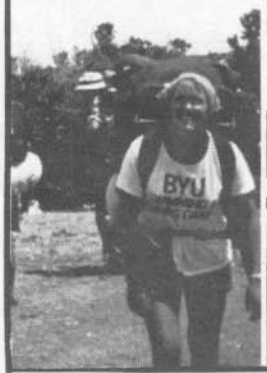

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Waterbury, CT	26 Apr	Chicago, IL	19 Jul	Los Angeles, CA	4 Oct
Brookhaven, NY	27 Apr	Miami, FL	26 Jul	San Francisco, CA	5 Oct
Montpelier, OH	3 May	Brookhaven, NY	16 Aug	Montpelier, OH	1 Nov
Houston, TX	10 May	Atlanta, GA	23 Aug	Houston, TX	8 Nov
Flemington, NJ	17 May	Flemington, NJ	13 Sep	Roc/Elmira, NY	15 Nov
Phoenix, AZ	24 May	Waterbury, CT	20 Sep	Brookhaven, NY	6 Dec

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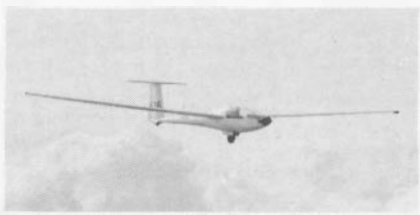

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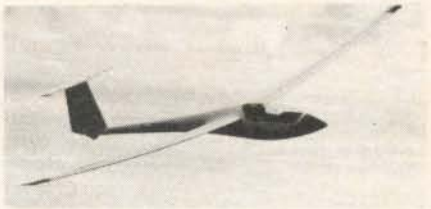

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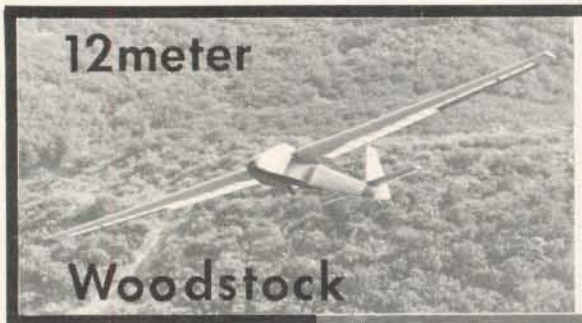

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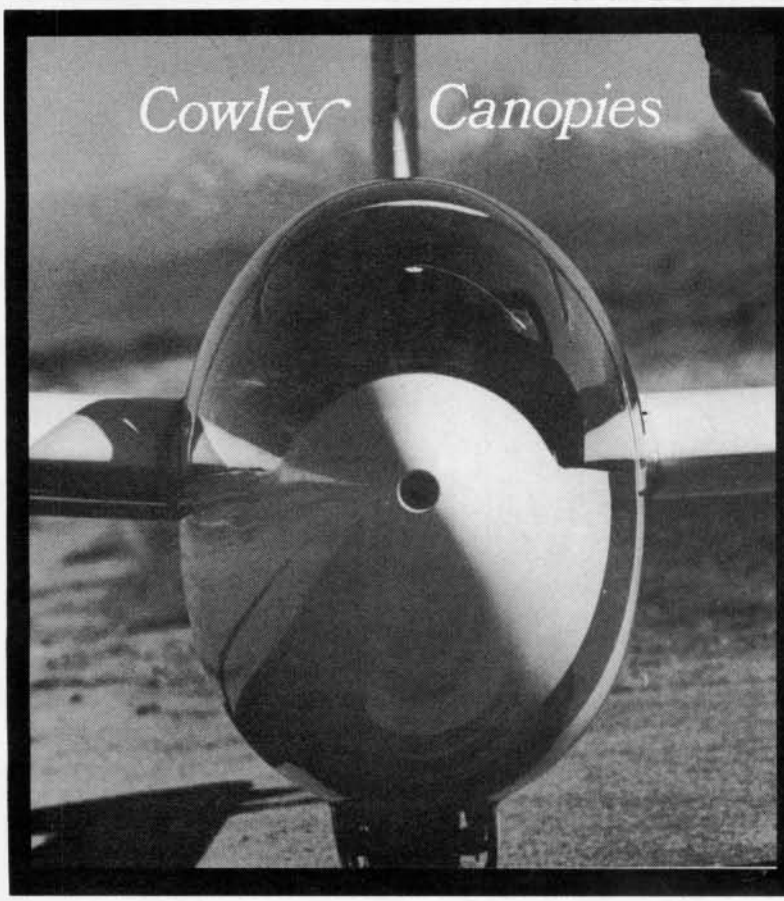

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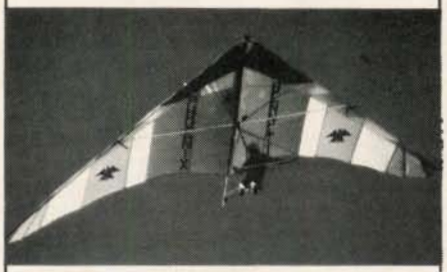

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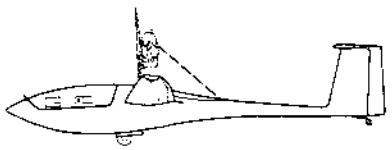

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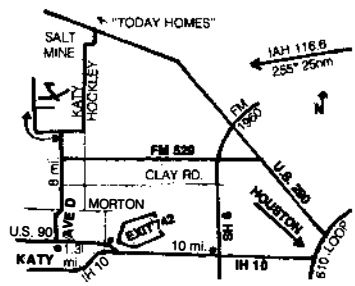

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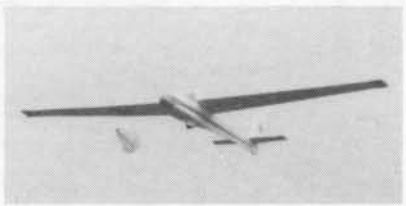

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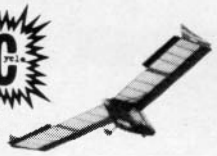

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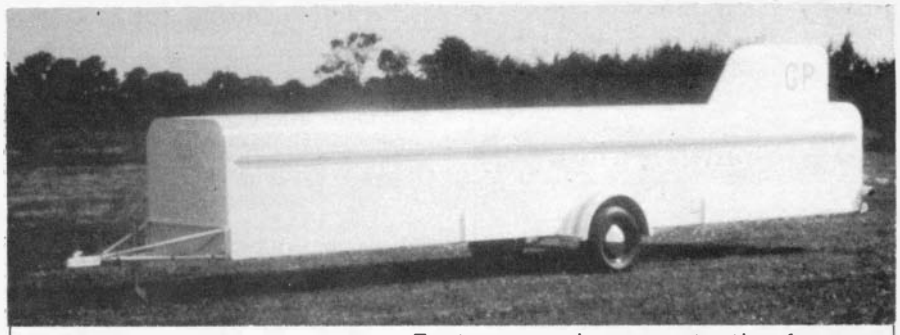

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