

ON THE WIND

WINNINGS

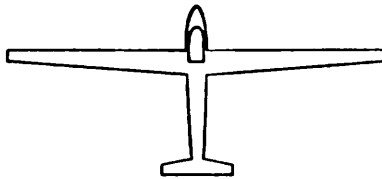
GEORGE MOFFAT

Introduction by Philip Wills \$5

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The
Soaring Press



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Dedication

*To Suzanne and Ralph, who believed when
there wasn't much to believe in.*

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PREFACE

In the future we will probably come to realize that the '60s and early '70s have been a Golden Age of soaring, in the sense that the 1930s were a Golden Age in the development of power flying. True, the pioneering work had been done as early as the '50s with ships such as the RJ-5 and skills such as MacCready's. For the vast majority, however, the ships of the early '60s were the Skylark, the Ka-6 and the 1-23 and pilot skills were based on the famous Dick Johnson dictum, "Get high and stay high."

One need only contemplate the absurdity of entering any of those three ships in a current National championships almost anywhere in the world to appreciate the development in sailplanes. One need only examine the contest scores then and now to see the remarkable improvement in flying skill. In 1963, Ed Makula of Poland won the World Championship in the Open Class with an average daily score of 871 points, while Schreder placed third with an average of 770. In Australia in 1974, the Open Class winner averaged 974 points per day; the third-place man, Grosse of West Germany, 921.

What has caused this remarkable evolution in little more than a decade? Certainly the development of modern, high-wing-loading, fiberglass ships capable of extraordinary L/Ds at speeds over 100 miles per hour is part of the story. Having bought one of the pioneers of the new breed in 1962 - Dick Schreder's record-setting HP-8-I became very much interested in sailplane evolution and flew something

like fifty types over a ten-year period to assess development trends.

The first part of this book is a condensed record of some of the more interesting ships of the last fifteen years from most of the countries actively involved in building sailplanes, and what it was like to fly them. At first I had thought to edit out all but the successes—the Libelles, Cirruses and Nimbuses. But gradually I realized that the relative failures—the HP-10, the Dart—were interesting and important attempts, experiments that helped channel the Holighauses, the Waibels and their peers into the ultimate designs of the current superships. Another reason for including reports on the also-rans is simply that many of these types are disappearing fast. It thus seems valuable to have a history of what at least one pilot, with broad experience from which to compare, thought they were like to fly.

The second stage in the evolution of soaring's Golden Age in the last decade has to do with the skills needed for successful speed and contest flying. In 1960, when I began to soar seriously, virtually nothing had been written on maximum-performance flying. Today, thanks to books by people like Huth, and the various Symposia such as Holbrook and Byars', a vast body of excellent knowledge exists both on flying and technology to feed the intellectual and functional needs of every class of soaring pilot. The second section of this book, consisting largely of talks given by me at the annual Soaring Symposium, is a sort of personal history of learning to fly fast when there were not yet books to learn from. There is a considerable span of experience there: the thinking of 1960 was that a contest wasn't likely to be won in a ship of over 5 lbs. wing loading; by 1970 we had taught ourselves, and each other, to win in ships that seldom flew at under 8 lbs.

The third section is a widely varied set of descriptions by me of several competitions in the National and World arena, leavened by accounts of record attempts and the special difficulties that attend them. I added a piece at the urging of my publisher/editor on the year 1959, which was spent in France working on FAI badges and which served to catalyze

my ambitions in soaring. Also, under similar stimulus, I reviewed the major shift in personal thinking and approach to competition flying that I experienced between 1970-71 and the Liberal and Waikerie competitions, and upon which my flying became based. The high note of those last two years, 1973 and 1974, seems a good one upon which to end the serious sections of the book. It should be appreciated, in reading the material in this book, that it has all been left in its 'original' state. Thus, for example, a contest report or flight test written in the mid '60s will reflect the thinking of that time, and will not have been revised or edited to reflect later thinking on my part.

I confess to feelings of ambivalence about the last chapter, impishly dubbed 'Infamous Last Words' by my publisher/editor, since it was not my idea at all. He suggested, after spending several months rummaging about in my prose, that my reputation for being outspoken was not wholly unjustified. He then decided that a chapter of gems (or darts), whittled from the surrounding fatty tissue of context as originally spoken or written, might beguile the reader. I admit to having spoken or written them all; you, the reader, must decide for yourself whether these sometimes scurrilous thoughts are indeed diverting. All I would wish is that you treat them in the same vein as their original delivery—my attempt to wring some of the lightness and joy from what can at times be too serious a sport.

In sum, this Golden Age of soaring—if indeed it is one—has been an exciting time. It has been a great pleasure to have been present and to have participated in the creation of an era, to have had the chance to know so many of the people who have become its legends—Philip Wills, Camille Labar, Heinz Huth, Klaus Holighaus, Dick Schreder—and to have flown such a high percentage of the ships. This book is about soaring evolution and perhaps my own in a remarkable period—a Golden Age.

George B. Moffat, Jr.
Elizabeth, New Jersey
August 1974

INTRODUCTION

Having just written a book myself—"Free as a Bird"—in praise of all those facets of our obsessive sport which are herein disapproved, it is indeed ironical that I should be now composing an introduction to this one.

Why should I? Why was I asked? I shut my eyes, visualized desert islands. Who would I select, out of, say, a dozen castaways? George and Suzanne spring readily to mind. They've got everything—ingenious, intelligent, hard-working, inventive, courageous, pertinacious, interesting to talk to, and (in the case of Suzanne) extremely easy on the eyes. Also, to apply George's own methods of ruthless self analysis, it is flattering to be invited to write an introduction to a book by the man who is twice World Champion and today the best known glider pilot in the world.

George Moffat took to gliding seriously in 1959. This book is the record of how a man of intelligence, with boundless enthusiasm and great powers of analysis, shaped, and was shaped, by the development of his chosen sport.

I personally started gliding in 1933, attracted by the sheer wonder and mystery of the idea—that flying was possible without the aid of external power other than that contained in the air itself. I had to give up serious gliding nearly forty years later, still a romanticist.

But by then a lot of the mystery had inevitably gone. The boundaries of technical knowledge had been enlarged

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immensely. The pressures of International 'Sport' had reduced—and continue to reduce—the elements of luck and surprise. A professionalism verging on the glossy was taking over.

George was not so fortunate in his timing. The same motive led him to gliding, but he started 25 years later. By then, standards of aircraft, equipment and pilotage were all approaching nearly the same level of perfection. For a man like George, always seeking new worlds to conquer, a few years later satiation threatened. Then, as you will read, he discovered a new dimension: an analysis of the human psychology of the successful pilot.

I must say that I had an inkling of what was to come. After winning the 1952 World Championships, I reported that the element of Pilotage was the mystery subject. I recorded the following table:

Year	1937	1948	1950	1952
Entries	28	28	29	39 (single-seat)
Forbes	—	17th	15th	3rd
Gehriger	—	—	8th	5th
MacCready	—	—	2nd	6th
Nilsson	—	—	1st	20th
Welch	—	14th	24th	9th
Wills	14th	10th	27th	1st

I then covered the various criteria: practice, exhaustion, morale, experience, and ended up as follows:

“But, with all this in mind, and with the advantages we had in equipment thrown in, I still do not believe that in two years the fundamental competence of any of us had altered up or down in the startling way which this table appears to indicate. It will be an unpopular thing to say, but I personally believe that in all these Championships, limited as they have been to seven, six or five days' flying, there must enter an element of—luck.

“You have got to be good, your equipment and team have got to be good, your organization must be good—and you

must have luck. Otherwise someone else will have it, and will beat you."

Then, in the 1953 summer issue of "Gliding", I wrote the following article, which to-day has an element of prophecy:

THE BRITISH GLIDERMANSHIP ASSOCIATION

Fired by an article in the Lasham Newsletter, which produced a strong public demand, the British Glidermanship Association (B.Glp.Ass. for short) has been formed.

The purpose of the new body is, of course, to train its members in the art of keeping One Up on all the non-members, and indeed on all other members as well, if they can.

As a first step, a subsidiary Company has been formed, called Glidermanship Accessories Ltd. to design, construct, or fiddle any devices suitable to forward the purposes of the Association's members. The following are examples of the wares and ideas we have to offer.

1. **EXOTIC BADGES.** A large collection of miscellaneous, incomprehensible badges, which can be worn as the A's, B's, C's, Silver, Gold, Diamond or worse badges of practically unknown countries : 5d.6d. each or, if scratched or tarnished on our patent ageing machine, to simulate much long use, 10s.6d. each.

Very effective when making one's first entry into the bar of a new gliding club. One of our experienced members writes: "I cannot praise your badges sufficiently highly. I was stood five rounds of drinks in succession on my first visit to the Much Bungeing Gliding Club on the strength of my Montenegrin Diamond Badge, which I understand from you is actually a slightly modified button from the tunic of an Armenian Boy Scout. The empty sockets from which the Diamonds were understood to have fallen from sheer old age were particularly admired."

2. **DUMMY INSTRUMENT FACES.** Complete with rear rubber suckers for rapid adhesion to Instrument Boards. With these invaluable accessories the most poverty-stricken pilot can impress all and sundry with his abilities.

After a sufficient number of admirers have taken in his well-equipped instrument board, a good ploy is to do a short flight, out of sight; and during the night change the Faces around in some marked way. When the aforesaid admirers notice the re-shuffle, say airily: "Well, of course, I ought to have spotted it before but I found in my cu-nim flight yesterday that it really is important to be able to focus all at once the two variometers, the artificial horizon, A.S.I. and the gyroscopic synchroscope whilst still leaving one's hands free for the V.H.F. transceiver and the oxygen tap."

3. PILOTMANSHIP. The basic gambit of any true Gliderman is, of course, to convey the impression of being a pilot of immense experience *without necessarily ever having left the ground.*

Our Chair of Pilotmanship is held by Booth-Trumpington, who is reputed to have become Chairman of the Flying Committee of a well-known club, having actually only once been airborne, and that in error and for a comparatively short time, when he failed to let go quickly enough of a wing-tip he was holding prior to a launch in a high wind.

One of his favourite ploys, much admired by the elite, follows on from any discussion on bird-flight. He intervenes :—

"That reminds me of the time, more years ago than I care to remember, when I took the Chieftain of Ngong—a distinguished old boy he was too, in his flowing robes—for a ride in the two-seater. We were lucky enough to find a thermal, and as I circled up he cried ecstatically, in his broken English: "Wonderful! In my country only the Mtara-birds do this!" As a matter of fact, I could have told him that the Mtara-birds had actually picked up the idea from me, when I had gone out to start gliding up in his interesting little country ten years before. But I didn't say so; I always think one must be so careful with these foreign Johnnies not to risk giving any impression of shooting a line. Don't you agree?"

4. TECHNICIANMANSHIP. A course of exceptional value. H. Kranze, one of our most brilliant graduates, although in fact he cannot even read accurately his gas-meter, has been known to convince a roomful of people, *including Frank*

Irving and Dr. R. S. Scorer, that he understood every word of even the most advanced articles written by Frank Irving and Dr. R. S. Scorer.

It is hoped that these brief notes, indicating the general scope of our great science and subject, will stimulate further research which will duly be reported by all members.

I had another, more serious shot at solving the mystery of pilotage in 1958, and my theories of what turns me on were quite different from George's. I suspect every individual has a different key to this particularly personal lock.

I had retired from World Championship flying, and accepted an invitation to fly in the Dutch nationals at Terlet. This meant leaving the British nationals after five days—on the last of which I won the task in my Skylark. On my return I wrote up what happened.

“At Terlet our first task was a 110-km triangle. The first leg was into wind, and proved a hard grind, but quite soon I realised—and it was quite a shock—that I was once again flying as I had not flown for years, on top of my form. A curious kind of dead certitude takes hold of one—and oddly enough the adjective is the right one. It is not a stimulating feeling in my case, simply a certainty that over *there* is the next thermal, that a momentary straightening up in *that* part of the circle will edge one into the core of the lift. The proceedings become rather like driving a tram; surprises just don't arise. Why should they?

“Possibly my last flight at Lasham had clicked me into this frame of mind; or more likely the very fact that I was no longer struggling to remain in the World Championships class, that I was flying purely for the fun of it again, did the trick. If you know the lift is over there, you go to it. You don't worry that, if by any chance you prove wrong, you may have flown out of range of your starting base, will have to land away, and may lose the day. If you come to the end of the active sky, and ahead of you is dead, you simply wait around until it boils up somewhere, go back and round, or realise that the day is over save for your last long glide to earth. Impatience doesn't draw you to do anything silly. What on earth is all the fuss about?

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“The result of this dull, dead certainty was rather shattering, anyway to me, who had certainly not anticipated anything of the sort recurring to a pilot in his 50s, for I ended up with a total of 7,706 marks out of a possible 8000 (nearly 2000 ahead of the next competitor, Seyffert, and over 2500 ahead of Hans Grosse, who took 3rd place in a Ka6) and won five of the eight tasks flown. I felt I ought to apologise to someone; I had entered myself as an experienced sheep and turned out a somewhat elderly but still ravening wolf. But, needless to say, my fellow-competitors took it all in good part.”

*** * ***

But it is the joke in 1953 that has turned into earnest twenty years later, and the new dimension thus introduced into competitive flying is brilliantly analysed in the closing chapter of the book.

At first sight it might be taken as a record of almost Darwinian interest: the man selects his sport, the sport moulds and disciplines its man. For the young George, read the Chapter “Starting at Chavenay”. At this point, did he put his finger into the system, and get sucked in? Is what came out the other end portrayed in the final Chapter “Contest Flying as an Idea?” To me, the most exciting thing about the book is that the answer, thank goodness, is—NO. Both chapters were written in 1974! The basic George has not changed at all. So we come to the underlying theme of the book: self-discipline; and self-discipline of this order is a form of genius.

I think his psychological methods are more introvert than appear at first sight. I think he has found out that this is the way he can gear himself up. I don't think many other pilots will necessarily be affected by his ploys: certainly I was always too engaged with my own love-affair with the air to allow my spirits to flag through the actions of others. What *did* get me down was not flying on flyable days, and not being allowed to take off until some pundit in a “thermal snifter” had explored the air and decided conditions were now good enough for everyone to keep going, lead-sleds and all.

Designated starts instead of pilot-selected starts, no re-lights so one cannot try to tip-toe off on the first elfin whiff of rising air, triangular courses round pre-set turning points, all these things and others reduce the area of free choice and decision of the pilot, transferring these prerogatives to the ground-borne organisers.

In almost every field of life, centralism and bureaucracy are reducing our individual freedoms. It may be inevitable in our sport too, and if so, why, George Moffat has learnt to live with it better than anyone else in the world.

If you want to Get to the Top, read this book. But after that, for goodness sake, like George, keep your sense of humour dry. And ride your chosen sport, don't let it ride you. Other people may or may not win, but you are the only one of you there is.

Philip Wills
London, June 1974

TOOLS

- 1 **THE MODERN SAILPLANE**
 An approach to evaluation
- 2 **FOUR AMERICAN METAL SHIPS**
 Sisu 1A, HP-8, HP-10 and HP-11
- 3 **STANDARD CLASS POTPOURRI**
 Ka-6, Olympia 463, BG-12, Foka,
 Edelweiss and Austria
- 4 **THE CALM BEFORE THE STORM**
 Skylark 4, Elfe MN, Dart, Austria SHK,
 HP-14, plus 2-32 and T-49
- 5 **WOOD TURNS TO GLASS**
 Standard Elfe, Standard Cirrus
 and ASW-15
- 6 **FIRST OF THE NEW BREED**
 Nimbus, Kestrel, BJ-4 and FK-3
- 7 **THE VIEW FROM VRSAC, 1972**
 More than met the eye
- 8 **COMPETITION FACE-OFF**
 ASW-17 vs Nimbus II

1 THE MODERN SAILPLANE

An approach to evaluation

While most subsonic powered aircraft have shown little improvement since World War II, the opposite is true in the realm of motorless flight. Sailplanes have developed markedly during the same period. In the almost two decades between 1945 and 1964, record flights in sailplanes showed performance gains of 50 percent and more, in both speed and distance, with triangle-course speeds approaching 80 mph and distance reaching 560 miles, and this technical progress has continued in the '64-'74 decade. Since sailplanes from those remarkable 19 years represent the ultimate in aerodynamic efficiency at the time, and many are still flown today, a look at those configurations and developments is interesting and provides a clearer view of the latest sailplanes of the '70s. The facts and opinions presented in these chapters were garnered from personal flight tests of over 35 modern sailplanes and from observations of many others, both in the U.S. and abroad.

Increased performance during the 1945 to 1964 period was due to three basic improvements. The most important single gain has been in construction. Modern high performance sailplanes are built to standards unheard of before 1964. Wings finished to tolerances of .002 inches and fuselages smoothed to give extensive laminar flow resulted barely a decade ago in L/Ds exceeding 40 to 1. A second reason for increased performance stems from the widespread use of laminar-flow wing sections, which increased high-speed

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capabilities, especially where the high Reynolds Numbers allowed the laminar sections to come into their own. The third notable change was in wing loading. In the early days, sailplane designers strove to achieve low wing loadings, on the order of four pounds per square foot, with circling speeds around 40 mph and rather low cruising speeds. By 1964 and beyond, the latest sailplanes had wing loadings averaging five and a half to six and a half pounds per square foot, with extremes by the '70s going as high as eight or nine pounds per square foot with available water ballast. Such sailplanes circle at 50 to 60 mph, climb slower but can cruise at over 100 mph between thermals. The result is far higher average speeds at the expense of poorer weak-weather performance. Most of the sailplanes evaluated belong in the latter category, because they are of prime interest to modern pilots.

Some basic criteria for comparing sailplanes must be established. In general, therefore, they will be considered in relation to their desirability for contest work rather than conventional sport flying. In the U.S., relatively few non-contest pilots engage in extensive cross-country flying after acquiring their FAI badges. For soaring within a 20-mile radius of the home airport, any good sailplane with a 25-to-1 glide ratio that is easy to fly and maintain will do as well as the most exotic one—in fact, better. The very high performance ships are costly and require a good deal of attention if they are to retain their high L/Ds.

The modern contest sailplane has been growing heavier and faster. This trend will doubtless continue as contest committees put more emphasis on speed and distance tasks and less on the old fashioned downwind float beloved by Weihe owners. The faster, heavier modern sailplanes tend to be more difficult to thermal and require much better judgment in the use of up-currents, problems the contest pilot accepts as an inevitable part of the game but which give pause to the sport pilot.

Before dwelling on detailed descriptions of individual sailplanes, mention should be made of materials used in their construction. Wood, the traditional material, was still prominent on the scene in Europe when many of these

sailplanes were flown, and was only recently supplanted by fiberglass and the more recent fiberglass-metal configurations. Wood's excellence is a well proven factor, as demonstrated by the numerous contest victories of the Skylarks, Ka-6s and Fokas. It is relatively inexpensive, is easy to repair with ordinary tools and, since most sailplanes are kept out of the weather, rot and deterioration are not a factor. A wooden sailplane will last for 10-15 years and many much older gliders are still being licensed and flown. The major difficulty is that plywood begins to show glue lines with age. After a couple of years, every rib and bulkhead is revealed by a ridge on the skin, with a consequent reduction in performance. For example, the Breguet 901s, built in the '50s, originally had an L/D of 36 to 1. By 1964, few would reach 30 to 1.

Metal, mainly aluminum alloy, is the favored material in the United States. It has the unquestionable advantage of being long lasting and enormously strong. I have made several landings in the desert with my HP-8 which would have reduced a Ka-6 to kindling wood. The amazingly quick repairs possible with metal were ably demonstrated by Paul Bikle during competition in the '60s. His Prue Standard was repaired in time to finish the National Championships from crackups that would undoubtedly have destroyed a wooden sailplane.

The big problem with metal is the surface finish. A metal sailplane is only as good as the plaster job on its wings and tail surfaces. A Sisu or HP-11 without the filler would perform little better than a 1-23. Unfortunately the fillers that are frequently used require extensive upkeep, especially after the first year or two. Constant wing flexing causes cracks in the finish that require endless filling and sanding. I would estimate that to keep the surfaces of my HP-8 in top shape it required, over a year, one hour of work for each hour of flying! Later examples, such as the Laister Nugget, used chemical bonding between ribs and skin, to eliminate rivets and deliver a surface with smoothness approaching that of fiberglass without filling. The HP-10 was another exception to the rule, as its sandwich-construction wing skin needed very little filler and did not flex enough to crack it.

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The HP-10 was a metal sailplane that keeps its smooth surface without work.

By 1964, plastic in sailplane construction was being investigated and developed to production status by West Germany. The Phoenix was the first of all-fiberglass sailplanes and was made in 1958. Since the surfaces are fabricated in female molds they do not require filler or paint. Repairs are more of a problem, though. As early designers and builders using fiberglass had a limited backlog of experience with the material, flaws were more apt to occur, such as the one that caused the death of Bjorn Stender in 1963 in his super-high-performance BS-1*. An ATCed sailplane in fiberglass, manufactured by a reputable firm, will always be a good bet, of course. I believed in 1964 that most high-performance sailplanes would be made of glass fiber, primarily due to the consistency and stability of surface which no other material could offer. Their contest records in the succeeding decade bore out my contention. I now (1974) believe that new materials, or a mixture of metal and plastic, may become common because they may cost less to build.

In the following discussions of sailplanes I consider three main criteria—performance, handling (including rigging), and comfort. The first is, of course, the most difficult to evaluate as there seems to be no method for satisfactorily or easily measuring glide angles of 30 to 1 and higher. Paul Bikle has done some remarkable work in this field, of course. My own pragmatic method is to make comparisons by flying alongside sailplanes with well known performance curves, or ones with which I have had considerable experience. I used the HP-8 as a primary yardstick in the earlier flying, because most of my extensive flying in this sailplane yielded final glides of around 36-38 to 1. This figure agrees well with the 34 to 1 angle

*According to a report published in the French magazine AVIASPORT, the BS-1 suffered structural failure of one wing due to flutter, which evidently developed during a high-speed dive beyond the aircraft's V_{NE}. Stender bailed out but the 'automatic' device with which his parachute was equipped (probably a static line attached to a bulkhead) failed to function because the rear turtledeck disintegrated. Though he tried to extract the parachute canopy from its casing manually, he did not succeed and was killed on impact with the ground. Ed.

reported by the late Dr. August Rasket of Mississippi State College, before he made such improvements as the wing fillets and additional tips. Tests in 1964 showed that of all the ships against which the HP-8 was compared (including the Sisu 1A and the HP-11) the only one that could outdo it at best glide was a Sisu 1. My subsequent extensive experience with the Standard Cirrus persuaded me to use it as my calibration for later ships, as described in the tests themselves.

In my opinion best L/D is a very much overrated factor in sailplane design. Much more important is the L/D at 80, 90 and 100 mph. Those are the speeds at which competition sailplanes are usually flown and where the hot ships leave the 1-23s, Ka-6s, etc. Handling characteristics of a sailplane are of vital importance for serious contest work. A ship that is exhausting to fly robs the pilot of too much energy during a long flight. One very important characteristic is a rapid roll rate. Most sailplanes we are considering here take between four and five seconds from 45-degree to 45-degree bank. Few of the heavier ones have a rate of roll less than five seconds but anything much over that is hopeless.

Personally, I like almost neutral stick-free stability and though a sailplane having this characteristic cannot be flown hands-off for a long period of time, it is efficient and does not require constant retrimming with each speed change. For example, my HP-8 had no trimmer and needed none, since control pressure was neutral at all speeds. Conversely, the Sisu and the Skylark are ultra-stable and require constant and tiresome retrimming for every speed change with resulting control-surface drag.

Ease of rigging and derigging is another important consideration for contest pilots, especially if one lands early and needs a quick relight. The foreign sailplanes are generally very good in this respect while our American counterparts are rather poor. Few American sailplanes can be rigged, with taping of gaps, in less than 10 minutes by the average crew, whereas a Libelle, Cirrus or ASW-15 seems almost to fall together by comparison.

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Cockpit comfort can hardly be overemphasized for contest flying—or for sport flying, for that matter. A cockpit should be large enough for the pilot and his gear with all controls easy to reach and operate, and panels should be large enough for adequate instrumentation. Most American sailplanes are good in these respects while the European cockpits are predominantly marginal for our well fed frames—the Libelle in particular springs to mind. As far as seating position is concerned, I used to prefer upright for flights up to three hours, semi-reclining for contest work. The latter type spreads the weight over a greater area under the sustained G loads of tight thermaling and is more comfortable for long flights. Up to 1964 I had tried only one extreme supine ship, the French Edelweiss, and found it very pleasant although more difficult for map reading, eating and fingernail chewing. Between 1964 and 1974, I became much more used to the supine posture, an experience shared by the Grand Prix drivers during the same period.

Good visibility is another important factor. Lack of a clear forward view is dangerous when landing on strange fields and can cost distance, as one is obliged to break off the final glide sooner to get a good look at the field. A flat-wrap sheet on the forward canopy of the Foka, HP-10, HP-11 and Sisu gives excellent visibility. The Polish Zefir uses molded-in optical flats to give the same effect. Some of the latest ships—the ASW-17 is an example are less than generous in forward visibility and pilot discomfort over such features can be a marked factor in competition.

2

FOUR AMERICAN METAL SHIPS

Sisu 1A, HP-8, HP-10 and HP-11

I picked these four ships to appraise together because the Sisu, HP-8 and HP-11 were flown competitively against one another on several significant occasions in the early '60s, and were essentially similar in over-all concept. All were of metal construction, with flaps, V tails and a pace-setting trend towards higher wing loading as an aid to speed flying (and winning competitions). The Sisu also had dive brakes, while the Schreder-designed ships relied on an extreme flap position for braking action.

Frequent references to the HP-8 along with the analyses reflect my extensive record and competition flying experience in the type over several years hard flying. The resulting yardstick of comparison between it and the other ships, in which I flew considerably less hours, is one that I believe the reader may find interesting. Although the HP-10 was never produced in quantity, it was sufficiently interesting in design to rate retention in the comparison flying.

Sisu 1A

When the all-metal Sisu 1A was first widely observed in 1963, it was thought by many experts—including such international notables as Dick Johnson of the U.S., Adam Witek of Poland, and Camille Labar of France—to be the best contest sailplane in the world for medium to strong conditions.

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In 1963, through the kindness of Gleb Derujinsky, who owned the Sisu that Dick Johnson had flown in the Internationals, I had the chance to pilot that ship that year against my own HP-8, as well as conduct test flights against it. In straight-flight performance it is very good indeed, probably just a trifle under the HP-8. In tests we held for many miles at speeds between 70 and 90 mph, the HP-8 seemed slightly better at best L/D and noticeably better over 100 mph. The latter, of course, is a result of the 7-1/2 lb. per sq. ft. wing loading of the HP-8 compared to about 6-1/2 for the Sisu. Essentially, the HP-8, HP-10, HP-11 and Sisu are equal at speeds from 60-90 mph, if one can judge from many long glides made together during the 1963 Nationals.

What distinguishes the Sisu is its circling speed. While the HP-8 circles best, in an average thermal, at between 50 and 55 mph, (more likely 63-67 for the HP-8), the Sisu, which stalls at 45 mph with flaps up and 36 IAS flaps down, circles comfortably at 43-45 mph indicated. This amazing performance is due entirely to the 25-percent Fowler flap lowered to 20 degrees. Rate of sink increases noticeably with the flaps down, due to increased drag, but the slow circling speed allows better net climb. In tests against the HP-8, the Sisu climbed away with depressing ease. When I tried thermaling the Sisu without flap, both speed and climb were similar to the HP-8. The climb performance is surprisingly like that of the Schweizer 1-26.

In handling, the Sisu 1A is outstanding. Controls are light and well coordinated, with the possible exception of the flap handle, which is fairly stiff. The dive brakes are very effective, although not as powerful as a Ka-6's. The ship shows positive stability in all axes, perhaps a bit too much in pitch for my taste. The rather awkward trimmer on the stick must be adjusted for all changes of airspeed over 10 mph. In circling, a constant airspeed is easily maintained and the sailplane is pleasant to fly, climbing best in moderately banked, slowly flown circles. Unfortunately, the rate of roll is on the slow side—about five seconds, or 25 percent more than a Ka-6. In straight flight one encounters low yaw stability, characteristic of V-tails. This requires a reasonable amount of attention to keep the string straight on the

canopy, but the Sisu is well above average for V-tails, about like the Austria.

Rigging and derigging are relatively easy. The tail folds up and remains attached to the fuselage. The multiple-pin wing attachment has lots of hardware but goes together quickly, as do the many controls. The cockpit is large and comfortable, with a roomy instrument panel and excellent visibility. All controls are easy to reach and operate. For my taste the seating seemed too upright for long flights, but many pilots seemed to prefer that traditional position, at least until the designers changed their minds.

To summarize, the Sisu flies beautifully! Aside from its being a relatively expensive ship, the only drawback I can see lies in the fact that, as with most metal ships, the Sisu is only as good as the filling job on its wings, which makes it expensive, also, in the large number of hours required for its maintenance.

HP-10

The HP-10 is an all-metal ship, originally available in kit form at moderate price from Helisoar Aircraft of Danbury, Connecticut. It is an excellent performance sailplane, unfortunately never produced in volume.

The preformed-sandwich wing construction accounts for speedy construction, and the molded shape makes ultimate performance less subject to filling attention than with most metal ships. The rectangular wing takes a bit of getting used to at first, but the 37-to-1 L/D helps!

The HP-10, like the Sisu 1A, had a poor record when it was new on the scene in the Nationals. The highest standing achieved was 8th place by designer Dick Schreder in 1961. However, Dick was in the lead for most of the contest, losing only by failing to complete the task on the last day. HP-10s entered in subsequent Nationals have not been well enough flown to prove much. In straight flight, I found the HP-10 as good as the HP-8 at maximum L/D and very close up to 100 mph, after which the Eight's extra pound per square foot of wing loading begins to give the latter an advantage. I recorded

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a best L/D of 34 to 1 at 60 mph despite a drag-producing gap between the wing and the canopy where the tape had blown off.

The handling of the original HP-10 left a good deal to be desired, particularly in yaw stability and coordination. Consequently I was very interested to spend three or four hours making several flights on the first production model. This sailplane has a foot added to the rear fuselage section as did all the kits sold. It proved very pleasant to fly, well coordinated and light on the controls with no vices. Stability is positive but not excessive, pitch stability being so light that a trim tab is not required—an attractive feature on all Schreder ships. Yaw stability is surprisingly good, about comparable to that of the Sisu. Rate of roll is a brisk 4.6 seconds, well under the Sisu. Stall was straightforward and crisp, without wing drop, at an indicated 47 mph with zero flap, 43 mph with 12 degrees of flap and about 38 mph with full flap (67 degrees).

The ship circles happily with 12 degrees of flap at between 50 and 54 mph. Judging from my experience with the Eight, one would do better at the higher speed and a steep bank angle. The Ten is very easy to hold at constant speed in any bank up to about 55 degrees and, in fact, feels a lot like a late model 1-23. On leaving a thermal, the acceleration is brisk as in the Sisu, getting to 90 mph and up with no trouble. Since thermals were weak, I didn't get over 110 mph in order to conserve altitude. At the latter speed the HP-10 is dead quiet and feels very solid. The wing is remarkably stiff.

Rigging and derigging are not accomplished with as much facility as with the Sisu or HP-11, although far better than on the two original prototype models. In the production model, the wing was held together with 20 vertical pins, which went in easily enough. The parts are reasonably light and an average crew could probably rig the ship in 10 to 15 minutes.

Since the Ten does not have spoilers, all landing control is through the large flap. This proves effective and easy to use, thanks to an ingenious actuation which reduces loads on the crank. You can adjust the glide angle constantly during the

approach by cranking on and off, or you may just come in high, roll in full flap, and dive for the spot you want to hit. At about 30 degrees nose down I was unable to get the speed above 60 mph. I would not hesitate to put the Ten into any field a Ka-6 could get into (the same holds for the Sisu). The wheel brake is very effective.

The cockpit is large and comfortable, the visibility excellent. Unlike the Sisu one cannot adjust the rudder pedals, and smaller pilots will require cushions. This, of course, helps keep the CG where it belongs. One of the many well thought out features in the production model, indicative of the hundreds of hours of engineering that went into it, is the easy canopy removal for access to the instruments and tow hook.

To sum up, the HP-10 seems to me a tremendous amount of value for the money in a kit that could be built without special tools or knowledge and in a relatively short time. The performance and handling are of contest-winning caliber.

HP-11

The all-metal HP-11 was originally marketed in kit form through the designer, Dick Schreder of Bryan, Ohio. The kits are available in varying degrees of completeness. Building time is estimated at about 1,000 hours, the sheet metal wing taking rather longer than the HP-10's. Ultimate performance depends heavily on the amount of time and care spent on filling and sanding the wings, and then maintaining them! The initial model, unpainted and with thinner wing skins, showed very inferior performance compared to the beautifully finished ships of later years.

The performance of Dick's HP-11 is magnificent. It is fully equal to the Sisu, perhaps a bit better at high speeds. Dick generally flew rather wide circles at what I would guess was 52-54 mph with 12 degree flap. Like the other HPs, the Eleven seems to climb best at speeds well over minimum sink for level flight. The HP-8 does best against other ships at about 12 mph above stall.

Rigging and derigging seem simple but less quick than the Sisu. Insertion of the tail pins especially takes time. Assembly

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by an average crew would probably take 10 minutes or more. The wing joins in roughly the same way as the Ka-6, although the smaller diameter main pins often seem to need a good deal of hammering.

The cockpit is the usual Schreder Magnum size with the pilot in medium upright position. Everything is convenient to the hand and the visibility is unexcelled.

The HP-11, like the Ten, offers an enormous amount of performance for the money. In good hands either can equal the performance of the Sisu while saving the complication of retractable gear, dive brakes as well as flaps, etc. Each ship offers the young pilot a chance to get a real thoroughbred at a reasonable cost.

STANDARD CLASS POTPOURRI

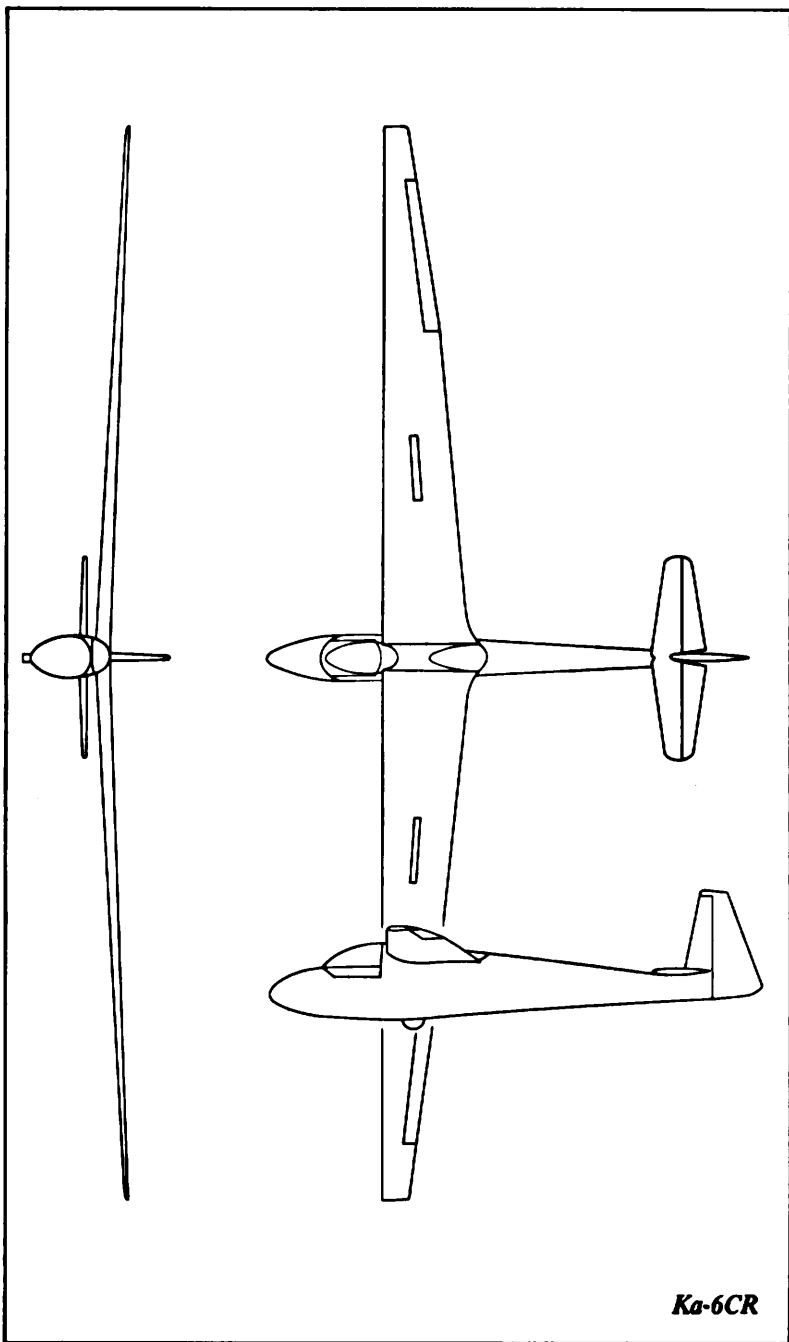
Ka-6, Olympia 463, BG-12,
Foka, Edelweiss and Austria

The early sixties were the years when the Standard Class started down what many pilots regarded as the slippery slope of out-and-out competition in design, performance and cost. How did it come to pass? Was it really, as some have hinted darkly, a manufacturers' conspiracy? What, in truth, was the 'standard' of the Standard (15-meter) Class sailplane at the start of that era?

I believe that most pilots who flew quite a number of different sailplanes during those years would have selected the Schleicher Ka-6 as the basis of comparison. I therefore picked it, and a gaggle of other ships that were being developed and flown against it and each other, as a view of the old, pre-glass birds so many now view with nostalgia. I think, in retrospect, that the Standard Austria SH (included in the flight tests) was the real 'writing on the wall', had we but read it and distinguished the meaning from some of the grafitti then going about.

Ka-6CR and E

While at the Nationals during the summer of 1964, I had a chance to fly Wally Scott's late 1963 standard model Ka-6CR and was distinctly surprised by the performance. While supposedly standard in every way, except for a bit of extra plywood behind the spar (a standard option), Wally's Six seemed to have far more penetration than any other I have flown. In lift averaging 500 fpm, I had little trouble



Ka-6CR

staying with Ben Greene's superbly flown Standard Austria, even though inter-thermal speeds were 100 mph and more. I also had all too much chance to see the depressing way in which Wally managed to hang onto my HP-8, even in strong conditions. Undoubtedly, much is sheer ability on Wally's part—he is clearly a superb pilot and one who practices almost daily—but his ship does seem to have some extra 'go' hidden away somewhere.

During the 1964 Nationals, Graham Thompson and Rudy Moser brought a pair of modified Ka-6s that were almost Ka-10s. They had the Wortman de-twisted wing and seemed to have all the glide angles moved up the speed scale about 10 mph. Best L/D, for example, was right around 60 mph. The general consensus of opinion was that neither of these ships could climb with the older models, but the difference didn't seem to trouble either pilot. Rudy kindly let me fly his, late one weak afternoon, and the ship seemed to have all the usual Ka-6 maneuverability and ease of flying. The all-flying tail takes a bit of getting used to—you do not let go of the stick casually without some very interesting and rather violent gyrations, but as long as you 'mind the store' things are docile enough. Penetration seemed clearly above the earlier Sixes, but this was just guesswork as no other 'known quantities' in the form of other sailplanes were about at that time for comparison.

The Ka-6E model, which finished first and sixth in 1966, has a number of refinements over the original Ka-6, notably the longer canopy, lowered fuselage, Wortman wing and all-flying tail. There is no question that those improvements, together with other less obvious ones that have brought the price up to the Austria-Dart level, have given the old girl some new performance. Fortunately I had considerable opportunity to fly against both Rudy Moser and Hans Werner Grosse during the 1965 Nationals at Adrian, to estimate performance. First, there is no question that penetration is better on the revised, E Model ship. I would guess that Rudy could fly some seven miles an hour faster than Wally Scott in his beautifully finished CR model for the same rate of sink. However, I felt that I had about the same margin on the E with my Austria SH.

In climb, there was little difference among the three types, although I would guess that the E was a little inferior to the other two. I don't feel that I was doing justice to the Austria, having had only two brief flights in it before going to Adrian, and doubtless did a better job of thermaling later. Given a choice between the three ships, I would say the E was slightly better than the CR but not so good as the Austria for typical American conditions. Hans Werner Grosse, the winner that year, told me that he agreed.

I cannot report on the handling of the E since I haven't had a chance to fly one, but everyone who has agrees that it has the same fine characteristics of the earlier model and is, if anything, improved. I did sit in Rudy's ship and found the cockpit distinctly cramped for my lanky six feet two. Headroom is definitely off compared to the taller CR model. Frankly, I have always found the Ka-6s cramped for flights of over three hours, particularly when compared to the lounge-chair comfort of the Austria. Missing, too, are such conveniences as the self-connecting controls, adjustable-in-flight rudder pedals and superfine finish that have made the Austria a standard for production sailplanes. Still, the E is a very potent ship and will certainly win a lot of contests.

One problem with the E, shared by the less exotic Ka-6s and the Dart, is the relatively low placard speed both for rough and smooth air. On these ships the magic numbers are 87 mph for rough air and 125 mph for smooth. The SH allows 155 for smooth air although retaining a very conservative 87 mph for rough. Since the German criterion for rough-air placard is a speed that will allow the ship to withstand a sharp-edged gust of 2000 fpm, most of us don't take the rough-air-speed placard very seriously. A study made some years ago in England indicated that most sailplanes were reasonably safe at speeds up to 20 mph less than the smooth-air placard but fairly unsafe at the placard speed in strong turbulence. Some will doubtless ask why anyone would want to fly a sailplane at 130 mph or above. The answer is that modern ships, with their extremely flat glides, make it very difficult to judge the final glide so closely that one doesn't have a little extra altitude to use up at the last moment. With contest points worth about six per minute on

the average task, most of us find ourselves concentrating on aiming the nose right at the line and carefully ignoring the telltale airspeed. At the Nationals at Adrian I never crossed the start or finish line at less than 130 mph and have been as fast as 160 when strong lift was encountered on the final glide. This is merely nervous in the exceptionally strong Austria, but would be downright panicky in a Ka-6 or Dart. Then, too, contest committees all too often still set finish lines that require high-G pull ups or turns at these speeds so as to finish in the right direction. All of this is a little less thrilling in a stronger ship.

Olympia 463

At Lasham, in England, I had the opportunity (through the kindness of owner Mrs. Anita Schmidt) to fly the Olympia 463, the well known British Standard Class sailplane. Like the Ka-6, it is of the classic wooden construction and, with the decidedly boxy appearance, tends to make one rather skeptical of performance after seeing such super Standard class ships as the Foka and Austria. However, as Herr Huth of Germany pointed out so graphically with his Ka-6 at Internationals, super looks do not necessarily win super prizes.

On leaving the winch tow at 1,100 feet, I found only strong sink and was just thinking about entering the pattern when I detected a bit of a nibble of rising air. The 463 flew slowly around her own wing tip in beautifully coordinated turns, milking this decidedly English 'Nick Goodhart' type thermal for all it was worth. After reaching 2,000 feet, I decided that we had enough altitude to start flying. It's that kind of ship; just show it a thermal and don't get in the way. Subsequent efforts indicated that best climb occurred between 45 and 48 mph, at which speeds one could bank very steeply without things getting out of hand. Just for amusement, I joined a Skylark 3F in his thermal and had no trouble staying with him. At the top he peeled off to the north at 80 mph, and I followed. After 10 miles of straight flight, with me slightly behind and below, I thought that I had gained, if anything. The Skylark is supposed to get about 23 to 1 at such speeds as compared to perhaps a point or two

less for the Ka-6. All this seemed to bear out what I had been told—that the 463 is a bit better at high and low speeds, the Ka-6 superior from 50-65 mph. The differences are quite slight, of course.

The handling is outstanding. Rate of roll at least equals the Ka-6's—four seconds—and all controls are light and well coordinated. Stall occurs at 37 mph with no alarming tendencies. The flight characteristics are very gentle; one can hardly imagine even the most inexperienced pilot getting into trouble. Dive brakes are of the usual powerful British type. Stability is good on all points, although relatively slight in pitch. This, of course, means little trim drag—a good point. Yaw stability is entirely satisfactory. All reports indicate that facility of rigging is another of the Olympia 463's strong points. This is understandable, as the all-up weight is only 360 pounds, each wing weighing only 95 pounds. An extremely attractive feature of the 463 is its robust skid and aft-placed wheel. The sailplane could survive some pretty rough field landings.

On the subject of comfort, I will have to resort to hearsay. The ship I flew had a special seat designed for its diminutive owner and was a bit cramped for me. I am assured, however, that the standard model accommodates the usual British giant. Otherwise, everything was well thought out and convenient, although the interior had the rather spartan look normal to British sailplanes. Visibility is excellent, especially to the rear, due to the shoulder wing design.

Elliots of Newbury, builders of the famous 419, produced a very attractive ship, one that originally sold in the U.S. at roughly the same price as a Ka-6. While the 463 looks rather homely, the air doesn't seem to mind the corners and one can guess tht it would be hard to beat in light to medium conditions. It weighs 60 or 70 pounds less than a Ka-6 and was originally available about a year sooner.

BG-12-B

Another interesting type at the 1964 Nationals was the BG-12-B, originally marketed in kit form by Gus Briegleb's Sailplane Corporation, El Mirage Field, Adelanto, California.

Ross, the designer's son, flew his borrowed one to a very respectable seventh place. Having owned an early A model for a year, I was most anxious to fly the lighter B. A type evaluation is rather hard, as each ship seems to differ somewhat. The one of Ross's that I flew had distinctly poor visibility to the sides and rear, although in most of these ships the view is good. The cockpit is reasonably roomy, although with that unfinished look common to home-built jobs.

Once in the air, the ship proved to handle much like my A model—fairly heavy on the rudder and ailerons but extremely light on the elevators. Stick-free stability is near neutral, obviating the need for a trim tab. The ship thermals easily at around 50 mph indicated, although the heavy ailerons require considerable pressure to attain the maximum roll rate of about 4.4 seconds. In straight flight, one is pleasantly surprised by the rapid acceleration up to about 100 mph. The best L/D of a well built ship seems right around the advertised 33 to 1, judging from flights alongside the HP-8. The BG-12-B offers excellent performance both in the high- and low-speed range for a very modest price, requiring 600-1,000 hours to build. The handling is not exceptional, but for pilots who want lots of performance for relatively little money, the BG-12-B bears real consideration.

Since this ship, in its various models, has had a rather poor reputation, perhaps a word on the subject is in order. To the best of my knowledge, no BG-12 has crashed from any structural failure attributable to design error. Like all the higher performance ships, it is intrinsically less forgiving of bad handling than a 1-26. Unfortunately, due to its low price, a number of home builders and others seem to have acquired a sailplane they are only marginally equipped to fly. I have spun and stalled BG-12s both with and without flap, and see no characteristics that should trouble a well-trained pilot. We should not blame the sailplane for the gulf that exists between our ultra-safe and easy-to-fly 2-33 and 1-26 trainers and the realities of high-performance sailplanes.

Foka 4

The Polish Foka 4, a Standard Class ship, is excellent both in handling and performance. The general appearance is



Suzanne Moffat in George's SH-1

extraordinarily appealing; there is evidence of careful workmanship and meticulous attention to detail. The surfaces are wave-free and beautifully finished.

The performance of the Foka especially interested me, as the published curve looks very conservative—little better than that of the Ka-6. With this in mind, I took several opportunities to fly alongside Adam Witek of Poland during the practice days before the 1963 Nationals. In straight flight, the Foka seemed to have a maximum L/D just slightly below that of my HP-8; I would guess that it fully attains the published 34 to 1. At speeds up to 80 mph it stayed quite close to the Eight's performance, falling away gradually at higher speeds. In circling flight, Adam usually flew fast, at very steep angles of bank, and climbed effectively. A very well flown Ka-6 might outclimb the Foka.

Needless to say, at that time I was anxious to make a flight in the sailplane and had the opportunity to do so through the generosity of the Polish team on the day following the contest. Takeoff proved rather bumpy, as the wheel is placed rather far aft and much of the weight rests on the forward skid. Once airborne, I was surprised by the excellent visibility on tow. Releasing at 2,000 feet in a weak thermal, I

promptly discovered that the Foka handled better than any of the 35 sailplanes I had, at that point, flown. Rate of roll is phenomenal, slightly under four seconds, but the most pleasant feature is the sense of precision one gets in handling. After only five minutes I had the feeling of being able to do anything with the ship. Particularly impressive is the 'grooved' sensation one gets of the ship wanting to stay perfectly centered in thermals. Even at banks of over 60 degrees, endless smooth circles could be flown—and this with no practice in the ship. Controls were light and smooth, although the ailerons are rather firm due to the short stick travel dictated by the prone seating.

Enjoying the maneuverability of the ship, I amused myself by diving down and climbing up through a couple of other sailplanes that were thermaling nearby. In straight flight I became particularly aware of the remarkable stability in yaw, unusual in sailplanes. After an induced skid, the Foka seems to snap back into the groove the instant the feet are removed from the pedals. Stalls showed no unusual characteristics. Nosing over from the 50 mph that seemed to give best climb, I flew over to join Ben Greene in his Standard Austria. We flew together for about five miles, which really is too little to tell much, but I felt that we were about equal up to 65 mph and that he had very slight edge from there up to 90, which was as fast as we went. According to published figures, the Austria should have had a sink of 1.15 m/sec. at the latter speed, giving an L/D of 31, while the Foka ought to have had 1.65 m/sec., giving 22. The actual difference must have been very slight, as we only changed relative altitude by 15 feet or so in several miles. The Polish figure seems very conservative.

The Foka's cockpit is of the semi-reclining type; the actual headroom available is 28 inches compared to 29 inches for the Skylark 4. It is snug, with no excess room, but nevertheless extremely comfortable and well thought out. Such items as water-bottle mounts behind the seat prevent unnecessary clutter in the workroom. Controls are all within reach, but the confirmed altimeter tapper will find the gauges rather far away. They are also necessarily few in number, since panel space is limited. Adam Witek's ship had two excellent PZL variometers (total energy), airspeed, altimeter,

and turn/bank. The latter was rather hard to see through the stick, a usual problem with reclining positions. I found the visibility excellent, due to the flat-wrap forward canopy. Probably time for rigging with a good crew would be under five minutes, or noticeably faster than a Ka-6.

In short, the Foka 4 is a delightful sailplane which you could have delivered in New York at a relatively moderate cost. Unfortunately there is a catch. Since the U.S. has no reciprocal ATC arrangement with Poland, the sailplane cannot be licensed here according to the FAA except in the EXPERIMENTAL category.

One inhibiting factor, which involves the Foka as well as most other foreign-built ships, is the matter of strength already mentioned. Many American ships (Schreder's, for example) are stressed for high ultimate loads and rough-air-placard speeds. The Sisu, HPs and Skylark have rough-air placards of 120 mph. Most German and Polish ships are placarded at 87-93 mph for rough-air. Those speeds represent the highest velocity at which a 2,000 fpm gust will cause the wing to stall rather than fail, and are roughly analogous to maneuvering speeds as defined in the U.S. Needless to say, those placards may be exceeded but the gust velocity tolerance decreases fairly rapidly, reaching 1,500 fpm at 112 mph, and 1,150 fpm at 140 mph (these figures are taken from the design envelope of the Standard Austria).

All of this becomes important to the contest pilot in a clean sailplane, since he wishes to cross the starting line at maximum speed, and, also, to be able to dive off any excess altitude before crossing the finish. I have frequently exceeded 135 mph on the last few miles of a speed task if unexpected lift put me above the calculated glide path. It would make me nervous to do the same in many foreign ships. That kind of nervousness did not seem to bother Adam Witek in 1963, whose Foka flashed across both start and finish lines very fast . . .

Edelweiss

I first saw the French Edelweiss in France and sat in it. This beautiful Standard Class ship, designed by M. Cayla,

famous for his Breguet 901, claimed extremely high performance. The seating is completely reclined, under a long, molded canopy to which the instrument panel is attached. I found it quite comfortable although one doesn't have much room for map reading. Part of the cramp comes because the controls go aft under the seat, wasting about four inches of vertical room. The actual fuselage height nearly matches the Foka and Zephir. Forward visibility appears non-existent, due to the high instrument panel and the long, wavy canopy. One looks out the side, apparently solaced by the beauty of the canopy's long, low line.

Thanks to the kindness of U.S. distributor Ken Livingstone of Washington, D.C., I finally had the opportunity in 1965 to fly the French C-30S Edelweiss, runner-up in the Standard Class World Championships in 1963 and winner in 1965.

The Edelweiss is an extraordinarily good looking 15-meter ship. Its long, low fuselage puts the pilot in full reclining position and demands considerable dihedral to get good wing clearance. Construction is plywood sandwich for the most part, with excellent finish. The general level of workmanship does not quite match the Austria's (see below) but is well ahead of the Ka-6. Rigging is fundamentally simple, although rather slow because of the tight fittings on this brand new ship. With an experienced crew, rigging times should nearly match the Ka-6. Perhaps I should say an experienced and *strong* crew, since the 565-pound empty weight (one pays in weight for these smooth surfaces) makes holding up the tips a bit of a chore.

The cockpit feels a little cramped for my height on first entry. The visibility seems poor when the long, rather wavy moulded canopy closes over you, as I noted when I first merely sat in the ship. Both of these impressions change in the air, however, where the visibility seems excellent, especially to the rear, and the cockpit becomes very comfortable. Controls are all in easy reach. Like most of the reclining jobs, the panel suffers in size and would be hard put to take more than five instruments.

In the air the ship feels light and solid. Ailerons are the best I've seen on such a heavy ship, with a rate of roll clearly

under four seconds. Yaw stability is outstanding. In fact the whole ship feels a lot like the excellent Foka tested earlier. Stick forces are light and easily trimmed with an ultra-effective trimmer convenient to the left hand; in fact, I found myself flying with the trimmer much of the time. Stalls are normal, usually accompanied by a slight drop of one wing. Spin recovery is prompt. In a thermal, the ship has a wonderful 'grooved' feeling, commented on by all the experienced pilots who flew it. It wants to stay coordinated and in the thermal, even in steep turns. On leaving the thermal, the ship picks up speed with the same slippery, powerful feeling one notes in the Sisú. Dive brakes bring you down in Ka-6 style—right now!

After a couple of hours flying to feel the Edelweiss out, Ed Byars kindly let me fly his Austria SH while he flew the Edelweiss, so that we could check comparative performance. Climb rates seemed about the same, although the French ship is definitely easier to handle and quicker in roll. On the glide, we made several runs of about five miles at 60 (best L/D speed) and 100 mph. To my surprise, the Austria proved somewhat superior at both speeds on all runs, to the extent of approximately two to three points on the L/D scale. There seems little doubt that the 35/1 advertised by the French contains some Gallic optimism. The results on the high-speed end confirmed a German study made of several current sailplanes.

One attractive feature of the C-30S is its ability to carry up to 170 pounds of ballast (lead) for strong conditions. I was told that the French usually used about 50 pounds, even for moderate weather. This would, of course, improve the penetration. Another appealing feature is the strength. The Edelweiss has a rough-air placard speed of 140 mph and certainly feels nice and solid at that speed. The ship is an enticing bet for the West or Southwest for record attempts and general fast flying. In general, I think that Edelweiss is an excellent compromise between the performance of the Austria and the handling of the Dart. Of course, one pays for such excellence.

Standard Austria

Like the Foka, the Austria 'S' shows the very best in wooden construction, with extensive care taken to protect the plywood from wave-inducing moisture. All the Austrias I have seen have exhibited outstanding workmanship and finish. One can easily see why, when it was newly displayed, the OSTIV judges picked it as the best Standard class ship at the 1960 Internationals.

The performance figures on the Austria show that a fairly high minimum sink (.7 m/sec. as compared to .62 for the Ka-6, .66 for the Foka) has been accepted to gain a very flat glide at higher speeds. Best L/D of 34 occurs at 65 mph with about 30 at 80 mph and 23 at 100 mph. While these figures seem to me a little optimistic, the Austria obviously comes near to them. Up to 80 mph it stays close to the HP-8, dropping away gradually as speed is increased up to 100 mph. In thermaling it is less impressive. It flies very fast and seems unable to climb significantly better than the HP-8. The 1964 model had a thicker wing, in an attempt to improve the low-speed characteristics.

In handling, I found the Austria somewhat disappointing. Perhaps my disappointment was exaggerated by the fact that I had just completed testing the superb Foka 4. The controls seemed rather imprecise, with a noticeably slow roll rate (just under five seconds) for a Standard Class ship. It seems to want to be thermaled rather fast, around 53 mph, but the speed proved difficult to control in banks of much over 35 degrees. Stability in yaw was average for a V-tail—the string has a tendency to wander during map reading and other cockpit chores. None of those matters would disturb a good pilot after a few hours of practice, of course.

In straight flight the excellence of the ship showed itself at once; we easily passed all the other sailplanes that happened to be around. The dive brakes, like those on the Foka, are large and effective, a point I appreciated as I spent most of my approach explaining to Elmira tower why I forgot to look at the sailplane's registration number before taking off. "That

cream colored glider" was finally cleared to land and did so, only to discover that the wheel brake barely worked. Landing brings up the greatest single problem, due to the ridiculously flat fuselage bottom, with only three or four inches of ground clearance. Any rough field would undoubtedly cause expensive problems.

Ease in rigging of the Austria depends on the ship. Most go together very quickly; the automatic control hook-up is a wonderful feature. Certain ships seem to have trouble in aligning the aft wing pin; most do not. In general, rigging is outstandingly easy.

Cockpit comfort depends entirely on the parachute worn. With a conventional chute I couldn't get into an Austria at all, but Ben Greene, who is as tall as I, used a chest type pack that lives in a special niche behind the pilot's shoulders. Using that chute, I found the cockpit extremely comfortable; the seating is semi-reclined, similar to the Skylark 4. Since one sits almost on the bottom of the ship, crash protection would be poor compared to other sailplanes we have described. The nose, back to the wing, is of fiberglass and is exceedingly strong. Visibility is similar to that of a Ka-6: good, but not picture-window-like. Controls and instruments are well placed; the panel offers plenty of room for gauges.

While the handling is definitely below the Foka's, so is the price. Furthermore, the Austria has a standard ATC in the U.S. The 1964 model featured an improved wing and retractable gear. The Standard Austria is an excellent strong-weather sailplane.

Austria SH

In Marfa, at the 1965 soaring camp, with two Austria SII's, several Sisu and a Dart (among others), the Austria's winning ways continued. Much to everyone's surprise, there in Sisu country, the Austrias continued to put up the best times around the many 500-km triangles that Ben Greene, Dean Svec and I flew. In general, flying the same triangle and keeping in touch by radio, Ben and I averaged around 56 mph, with the Sisu coming in at just over 50 mph. On one day, when I flew a slightly different course, the Austria

averaged 64.8 mph—just short of the then World Record set in South Africa. Numerous comparison flights with Dean's and Red Wright's Sisu showed that the Austria was slightly better at climbing in good lift and slightly worse in glide at speeds up to 100 mph. Flying in close formation, we found that ten to fifteen miles of flying were necessary before vertical separations exceeded five feet. These figures do not agree with the published polars, which showed the Sisu very much superior. Our feeling was that the Sisu seemed very sensitive to turbulence both in climb and level flight, dropping noticeably as each gust was encountered. Weights of pilot and equipment were similar within fifteen pounds for these runs, which were repeated frequently at various speeds. In short, from a performance point of view, the Austria SH set a new standard for fifteen-meter ships.

In reading these conclusions, one should keep in mind that the Austria SH is a completely different ship from the previous fixed-wheel S model. The latter shows distinctly poor climb, although identical high-speed qualities. The change has been achieved with the use of an Eppler 266 airfoil on the SH instead of the old 64-415. Judging from prolonged flying during the Nationals against Wally Scott and Rudy Mozer, two of the best Ka-6 pushers around, the Austria SH can climb evenly with the best of the Ka-6s in any weather, although I would guess that the latter's slightly greater maneuverability might pay off if one waited around to milk the last few inches from the top of a thermal. In level flight, at equal sink rates, the Austria seems to have about 12-15-mph advantage over the Ka-6CR and perhaps half that over the E model. These observations were made when the Austria was indicating about 80 mph.

The Austria's clearcut superiority in performance is matched by its construction. I have seen no factory-made ship that approaches the standard of construction or finish of the Schempp-Hirth Austria. Gauge tests of the wing showed a maximum waviness over the standard two inches of .010 with an average of .006. (For comparison, most of the Sisu go around .005-6, a Skylark IV around .050 and a Dart about the same. The fabled RJ-5 was down to .002 in its best configuration). One of the most impressive things about the

Austria is its ability to hold its excellent contours year after year, even in the extreme temperatures of West Texas.

Handling qualities of the Austria are good, but not up to the level of the Ka-6 or the Dart. The rate of roll is an acceptable 4.2 seconds (3.9 for the Dart and about the same for the Ka-6) but it is achieved with considerable control pressure. Many pilots will object to the feedback from the ailerons, which can make for a tired wrist in rough air. Longitudinal stability is good, directional stability fair. As in most V-tail ships, keeping the string centered needs a bit of practice. Surprisingly, the ship is very easy to thermal, the speed having a tendency to stabilize right around the optimum 48 to 52 mph. This characteristic makes for painless cloud flying, more so than in the Ka-6. Stalls and spins are straightforward and non-dramatic, although, like most high-performance ships, the Austria spins with the nose well down and takes its time recovering. The dive brakes are large but not especially effective, due to being so far back on the wing. Rate of descent is like a 1-26. Skidding can almost double this rate, however. All in all, the Austria SH is a most pleasant ship to fly. My wife Suzanne had no difficulty transitioning from a 1-23 and flew a successful Diamond goal out-and-return on one of her first flights.

The cockpit of the Austria SH is extremely comfortable, with a semi-reclining position and adjustable-in-flight rudder pedals. There is ample room for radio, plenty of instruments, and barograph. I am six foot two and find the height adequate, although I find the comfort of the ship can be much improved by removing the seat. Rigging requires one main pin and two drag pins, all permanently attached to the structure. All controls are self connecting. I wish I could say that the ship always falls together with a satisfying thunk. Some Austrias do. Wing alignment is rather critical and can be slow unless the crew is experienced. Still, the total rigging time rarely exceeds that of a Ka-6 since, while the wings take longer, there are no controls to connect and safety nor root fairing to attach.

THE CALM BEFORE THE STORM

Skylark 4, Elfe MN, Dart, Austria
SHK, HP-14, plus 2-32 and T-49

Hindsight, always a convenient 20/20, shows us how we have progressed. There are times in virtually every field of endeavor when relatively little seems to be happening—I have noted the same effect in sailboats, racing cars and even the craft of literature. In many ways the Open (unlimited) Class sailplanes of the mid '60s seem in retrospect to represent such a period of stasis, although at the time the ships seemed very impressive indeed. But this apparent slowing of progress is often an illusion, the calm before the storm.

If only we had known that there were three designers in Germany working behind the arras to turn the Open Class upside down within less than five years. They had already warned us with the extraordinary D-36 when it had appeared at South Cerney in the early '60s. But since the ship had come from a school and not from a producing factory, it had seemed at the time, perhaps, an anomaly. Noise, rather than signal—albeit very interesting noise. How wrong we were. The three were preparing to announce production—sailplane equivalents of the turbine car that was to shake up staid Indianapolis. But in the meantime, wood and metal prevailed.

Skylark 4

When, around 1963, the British offered the wooden Skylark 4 as their answer for the need for penetration, I became anxious to fly one. Finding none available for that purpose during my stay in England, I had to wait until I

returned home. In the Fall of 1963 I flew a Skylark 4 belonging to Giles Gianelloni, at Wurtsboro, New York.

In general appearance I found the three Skylarks I looked at rather disappointing. The paint was far from smooth, and even the most inexperienced eye could see many a wave on both wing and tail. The design detail was poor, with such things as canopy fittings, wing pins and aileron cranks hanging out in the breeze. Of course the breeze didn't object enough to keep Dick Johnson from winning the Nationals in a Skylark 4 in 1963 and 1964!

Performance interested me most, especially after the many conflicting reports I had heard in England, where several observers seemed to think that the ship was little better than the Skylark 3. I had noticed at the Nationals that the HP-8 was so much faster that no real comparisons could be made, so I made arrangements to fly alongside Holli Nelson in his Ka-6. The result was that in three passes up and down a ten-mile ridge in smooth lift, at my best L/D, I was unable to gain a foot of altitude on the Ka-6 (one point of L/D equals about a 5 foot gain per mile). At higher speeds there seemed little difference, up to 80 mph, which was as fast as we went. In circling, the Skylark gained slowly on the Ka-6 but could not gain on either of two Ka-8s that happened to be around. Subsequent flights by different pilots gave much the same results. It seems doubtful that the production Skylark much exceeds an L/D of 32:1.

In handling, the Skylark comes into its own. The controls are light and pleasant for so big a ship and the roll rate truly remarkable at 4.5 seconds. King-sized dive brakes make short landings a breeze, while the combination wheel and skid takes the pain out of rough field landings. The stall occurs gently, around 38 mph. Stability is very positive except in roll. The ship requires retrimming for any changes in airspeed, and the incredibly powerful trimmer must be handled with great care. This is rather a nuisance and completely inexplicable from a design point of view. The Skylark seems to circle best at around 46-47 mph at moderate bank.

On pushing the stick forward at the top of the thermal, however, not very much happens. The ship gathers speed very

slowly and loses it easily. The sink curve is such that one could hardly imagine going much over 85 mph under any conditions. I would guess that the fast ships could beat a Skylark around a triangle any time the lift averaged over 200 fpm. On the one decent speed day during the 1963 Nationals, Dick Schreder and I beat the Skylarks by over 15 mph.

Rigging and derigging goes amazingly easily for a ship weighing over 600 pounds. The 200-pound center section needs four people, but a Johnson-style handling tripod makes the job fairly painless. Like most large ships, the Skylark can run up quite a tape bill if you seal all joints.

Cockpit comfort couldn't be better. With the adjustable rudder pedals all the way forward, even I couldn't reach them, with my 6 feet 2 inches! The position is semi-reclining to about the same degree as in the Austria, and is ideal for long flights. All controls are easy to reach and visibility is superb. One of the many pleasing touches in the sailplane is the hinged instrument panel, which folds down and back to permit work on the gauges. An adjustable headrest is one accouterment missing, however.

While the Skylark offers a lot of sailplane for a moderate price, one cannot help being disappointed with its performance. While undoubtedly an excellent sailplane for weak thermals, it seems only very slightly superior to a Ka-6 over all and has the disadvantage of being both larger and heavier.

Elfe MN

I encountered another interesting ship in 1963 in Switzerland, through long-time Swiss champion Rene Comte. This was the Effe MN, successor to the fabulous Elfe M with its 44 to 1 L/D. The ship, a 17-1/2 meter sailplane with a very long fuselage and V-tail, is supposed to be capable of 45 to 1. The construction, plywood sandwich and fiberglass, like many of the best new foreign sailplanes, gives an empty weight of about 500 pounds and a wing loading of about 5.2 pounds. The prototype, first flown in 1963, looked clean with the retractable gear, plain flap and tail parachute. Whether all this produces 45 to 1 remained to be seen, but a single flight of about an hour made it clear that the Elfe MN

has a remarkably flat glide. In circling, the ship feels a lot like the old Weihe, flying fairly slowly (about 48 mph seemed to give the best climb) and seeming to prefer moderate angles of bank. In straight flight, I didn't go over the temporary test placard speed of 90 mph, but that speed was reached easily in a flat glide. Handling was only so-so at best. The controls were stiff and slow, probably due to too many cables. Rate of roll was extremely slow (5.5 seconds) perhaps because of the extremely limited aileron movement of 15-20 degrees. Conversely, the stability in yaw was by far the best of any V-tail ship I had flown. The tail has a very high aspect ratio and, while small, lives on the end of an extremely long (26.5-foot) fuselage. The tow hook retracts with the gear, leaving a very clean nose. Effecting a smooth landing takes practice, as one employs 30 degree flaps combined with a tail parachute. The flaps mainly provide lift—the glide ratio is still near 20 with full flap. The tail chute is about three feet across and gave far less deceleration than I had expected. This method of approach control looks very attractive from weight and aerodynamic viewpoints, but I would hate to land in some of our New England fields with it. The long wing has rather poor ground clearance.

The cockpit was comfortable, although the stick was rather a long reach for me. The instrument panel provides room for a good collection of instruments. Visibility matches that of a Ka-6. Rigging is of the classical Ka-6 type and seemed to require a good deal of jiggling about to make the pins fit.

Of course, the Elfe MN I have been describing was a newly conceived model; many of the problems cited above are common to prototypes and, no doubt, have since been remedied. The ship certainly seems in the performance tradition of the line of superb Elfe sailplanes built by A. Neukom of Neuhausen.

Slingsby Dart

When the Slingsby Dart first appeared in 1963, it looked like a remarkably good compromise between the need for climb and the desirability of penetration. We read that endless hours had been spent on the design and expected a

far better standard of construction and detail design than that seen on the earlier Skylarks. We were all pleased to learn that Philip Wills was bringing along one of the newest 15/17-meter models to have a bash at some records at Marfa. Frankly, I was rather disappointed when the ship arrived, as the construction was in no way better than the Skylark 4. The same old canopy hinges stuck a good English inch into the breeze; the wingtip attachment bolts and safety pins were still outdoors, and every rib and bulkhead showed plainly on that brand new ship, giving the familiar starved-horse look of the Skylarks. Stabled there opposite the sleek Austrias and Sisus, the Dart looked more at home with the 1-26s.

Still, 'beauty is as beauty does,' and the Dart is a beauty as long as you stand far enough away to miss the amateur paint job and protruding ribs. The long swept tail and low fuselage give a graceful, fast appearance. Needless to say, I soon persuaded Philip that we should trade sailplanes for an afternoon so that I could try the Dart. The day was as poor as one could possibly pick for evaluations. Ceilings varied from 1500 to 2500 feet, thermals were small and tricky, and the wind—about 25 knots at takeoff—was soon up to 35 and 40. The large, moderately reclining cockpit proved very comfortable. Towing out showed no vices of any sort. After releasing downwing in a thermal which vanished abruptly, I soon found myself lower and lower until I finally hooked a feeble little bubble at 500 feet above the field.

In any other strange ship I would have called the whole thing off and landed. In the Dart the required 45-degree bank felt completely natural, in fact I felt as at home as if I had flown the Dart for weeks. In short, the handling is sensational. Not only are the ailerons as light and quick as any ship I have ever flown, but the whole ship is so magnificently coordinated that it almost defies being flown badly. I have no hesitation in saying that the Dart was the best handling ship I have flown. If it has any vices, I was unable to find them in three hours of testing, including spins and stalls.

Unfortunately the performance hardly seems to match the handling. Flying against Philip Wills in my Austria and Ben in

his, I seemed unable to outclimb them, and neither was Philip able to outclimb us when he flew the Dart. Between thermals the Dart hung on fairly well up to 75 mph but then the Austrias began to move ahead at almost embarrassing speed. At speeds of 90 to 95 mph—typical inter-thermal speeds for Texas flying—the Dart was so much worse than the Austria that comparisons became impossible. These conclusions as to the inadequacy of the Dart for high-speed flying were supported by speeds over courses during the contest. The Austrias usually could beat the Dart by 8 to 10 mph in average speed. On one day my Austria finished a 500-km triangle in less time than the Dart took for the 300. In short, the Dart is no speed demon, although it is probably a bit better than the Ka-6CR. Speed dashes aren't everything in gliding, however, and if I wanted a ship with beautiful handling, comfort and easy rigging with contest potential as only a secondary consideration, I would have to look a long way to beat the Dart.

While at Marfa, Philip Wills only once flew the ship with the additional wingtips that convert it to a 17-meter sailplane, so we were not able to judge performance in this category. The extra tips are very easy to attach or remove, but their addition drops the rate of roll by about half a second. My guess would be that most people would fly the convertible in the 15-meter configuration.

In considering the Dart, one should appreciate the irrational element to sailplane flying; ships that look almost exactly alike on paper fly very differently indeed. For example, several years ago, the Schweizers published curves on the I-23 and Ka-6 which showed the former at least the equal of the latter on all points. Yet, in the Nationals, four Ka-6s finished in the first 10, seven in the first 20, out of 19 entered. Only one I-23 out of nine finished better than 35th. These figures are not intended as a slight to The Old Tin Bird, but merely to show that the Ka-6 has been one of the phenomena of the gliding world. This deceptively ordinary, relatively inexpensive, far from modern looking design continues to win and win. One wonders if the Six won't become the DC-3 of soaring in the Standard Class, with the Dart (at least in England) its Open equivalent.

Austria SHK

In the spring of 1965 Martin Schempp came out with a long-wing model of the Austria, the SHK. It proceeded to place third in the Internationals, right after the team-flown Foka and the super-ship, the D-36. The SHK is essentially a 17-meter Austria, although it has a longer tail and various other slight changes. When I flew the first one in the country, courtesy of U.S. distributor Bill Foley of Glastonbury, Conn., it was impressive. Rate of roll is exceptionally good for a 17-meter ship—just over four seconds—and controls in general have a light and pleasant feel. Other aspects are much like the SH. Performance tests against my SH were a little inconclusive since my ship had been extensively sealed and the K was as-is, straight out of the box. At minimum sink the SH seemed to lose about five feet per minute to the SHK, rather less than the specifications would lead one to expect. The high-speed runs were too short to be conclusive, but seemed to bear out the curve which show the SHK about 3-5 mph slower for the same sink at speeds over 80 mph.

The only real drawback to the SHK seems to be the considerably lower placard speed (87 mph), which would make me think twice about really fast flying in rough air. On the other hand, I believe that the K will beat the SH whenever the lift averages under 400 fpm, and that's most days except in the Southwest. Cost of the long-wing model was only a couple of hundred dollars more than the SH when originally announced.

HP-14

When it became apparent in the 1966 competition in Reno that Dick Schreder's HP-14 was a superior ship, I became anxious to test it against a known quantity, like the Sisu.

Since I started writing about the various modern sailplanes, I have become increasingly aware that only comparison flying really proves much about a sailplane's ability. The classic evaluation by minimum sink and best L/D is too misleading, even if the figures given are measured rather than the result of optimistic calculation. For example, a well-known fiberglass Standard Class ship had decidedly less sink than the

Sisu at minimum sink speed during a recent test flight in still air, but proved quite unable to outclimb the Sisu in weak thermals, even after pilots were switched and with every attempt made to fly the same path in the thermal. Obviously the fiberglass ship was suffering a separation that didn't occur in level flight in smooth air. Since the Sisu isn't exactly noted for weak thermal ability, the fiberglass ship would obviously be a poor choice for competition soaring, although very pleasant to fly.

This brings us to another point. The competitive pilot is interested in a matter of degree which may mean little or nothing to the round-the-airport type of pilot who wants to pick up an occasional badge on a good day. For example, the Foka and the Edelweiss both have good penetration, but both are distinctly inferior when tested against the Austria SH. Only comparative testing will show the relatively slight differences which mean a great deal if one is flying to win.

The day on which I flew the HP-14 was almost ideal for testing purposes with fairly steady thermals averaging 100 to 200 fpm. Strong days are poor for testing, as differences in climb don't show up as clearly. When getting into the '14 one finds the cockpit roomy. Controls are all in easy reach; the instrument panel is adequately large, and the visibility, as always in Schreder ships, is superb.

On tow one uses about 20 degrees of flap to get the nose down and prevent a tendency, characteristic of slippery ships, to go steaming past the tow plane. With flaps the visibility is excellent. Without them, the nose-high position makes the tow plane a little hard to see, as in the 1-26 and 1-23. The ship handles easily on tow.

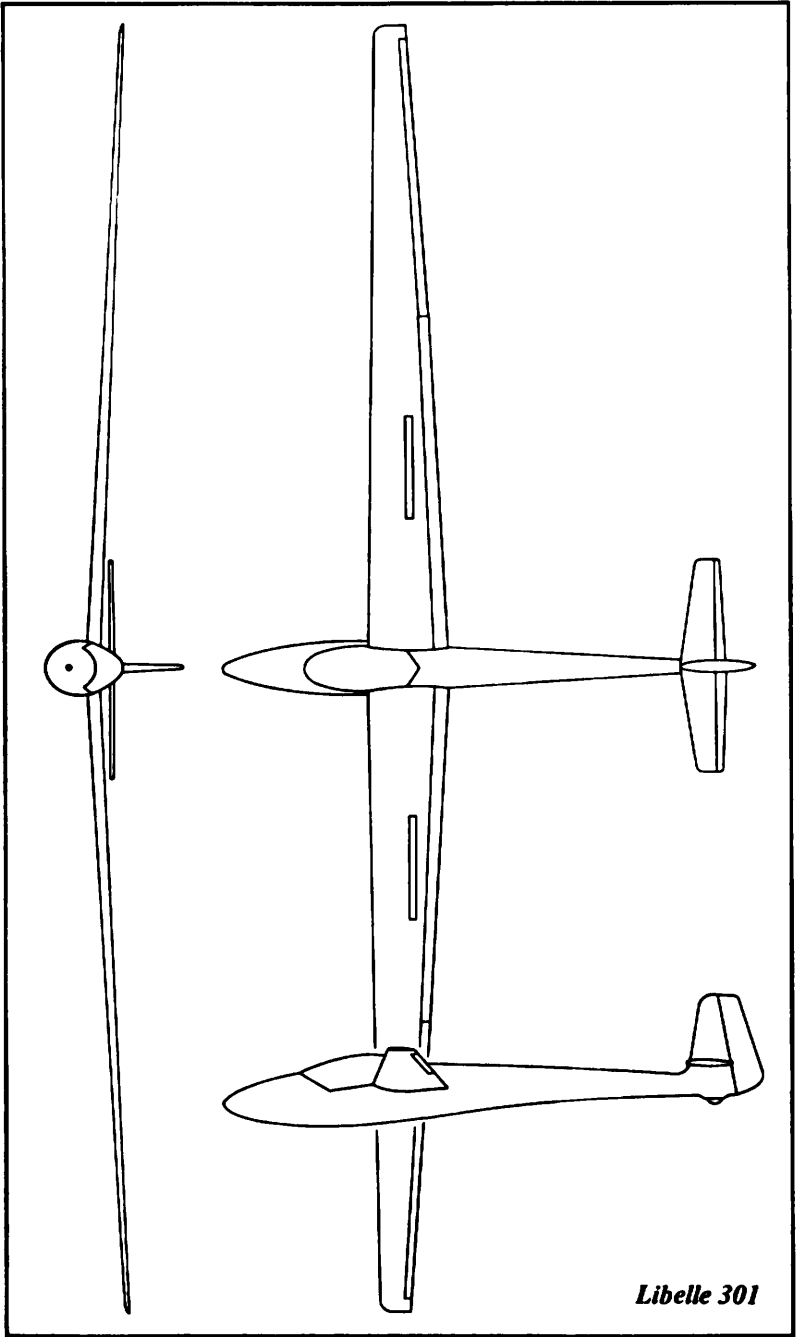
On releasing, Dick Schreder's excellent tow release promptly retracted itself, and all was quiet. I found a thermal at around 1500 feet and began a slow climb. The '14 is one of those ships, like the Foka and Dart, that make you feel immediately at home. The ship seems to want to stay centered at about 35 degrees of bank, but behaves very well at much more extreme angles. On Dick's suggestion I used no flap and about 55 mph. Later experiments showed that 12 degrees of flap permitted circling at 48 mph but gave absolutely no change in rate of climb compared to another

ship. I would be inclined to use the flaps, as they make the speed even easier to control than it already is. Rate of roll seemed to be just under 4.5 seconds—good for a 54-ft. span. Control forces are reasonably light and well co-ordinated, say like a 1-23, but no misses the superb co-ordination characteristics of the Dart or Edelweiss.

On rolling out of the thermal one experiences the instant acceleration characteristic of Schreder ships. By the time I was finished fooling with the prototype's make-shift flap lever (the production job has hydraulic flaps), I was well past 80 mph with the nose only slightly down. Stick forces are very near zero with my weight, at any speed. For some reason the feel is very like that of some of the all-flying-tail ships, such as the Ka-6CR/PE, Ka-6E and Phoebus. As in these ships, one doesn't want to let go of the stick at higher speeds; a gust can cause heavy plus or minus G loads as the ship pitches up or down. With a hand steadying the stick, one has no problem. As in other fast, quiet ships like the Libelle, the airspeed indicator becomes quite important as one has little sense of changing altitude or stick force with speed. While searching for my handkerchief, I let the airspeed go up to 100 mph without realizing it. This sort of sensitivity is very desirable in a contest ship but requires attention from those used to flying ships like the 1-23 and Ka-6, which have very positive trim forces. Stall occurred at a bit under 40 mph with no flaps and at about 32 mph with full flap. In all cases it was gentle and controllable. I didn't attempt spins, although I am informed that recovery is easy and positive.

Following the tests mentioned, I joined up with my guinea pig—Gleb Derujinsky flying Dean Svec's excellent Sisu. This combination was ideal, since I had flown against Gleb in his Sisu for years at Wurtsboro and knew the strong and weak points of both ship and pilot. We started the test in a thermal of about 100 fpm, with me slightly behind the Sisu and following in his track. Thermaling speeds seemed near the same, the Sisu being perhaps a little slower. In the weak thermal I had no trouble climbing away from the Sisu time after time. Use of the '14's flaps made no observable difference.

My feeling was that the '14 left the Sisu about as fast as the Austria SH but not quite as fast as the SHK (I had seen



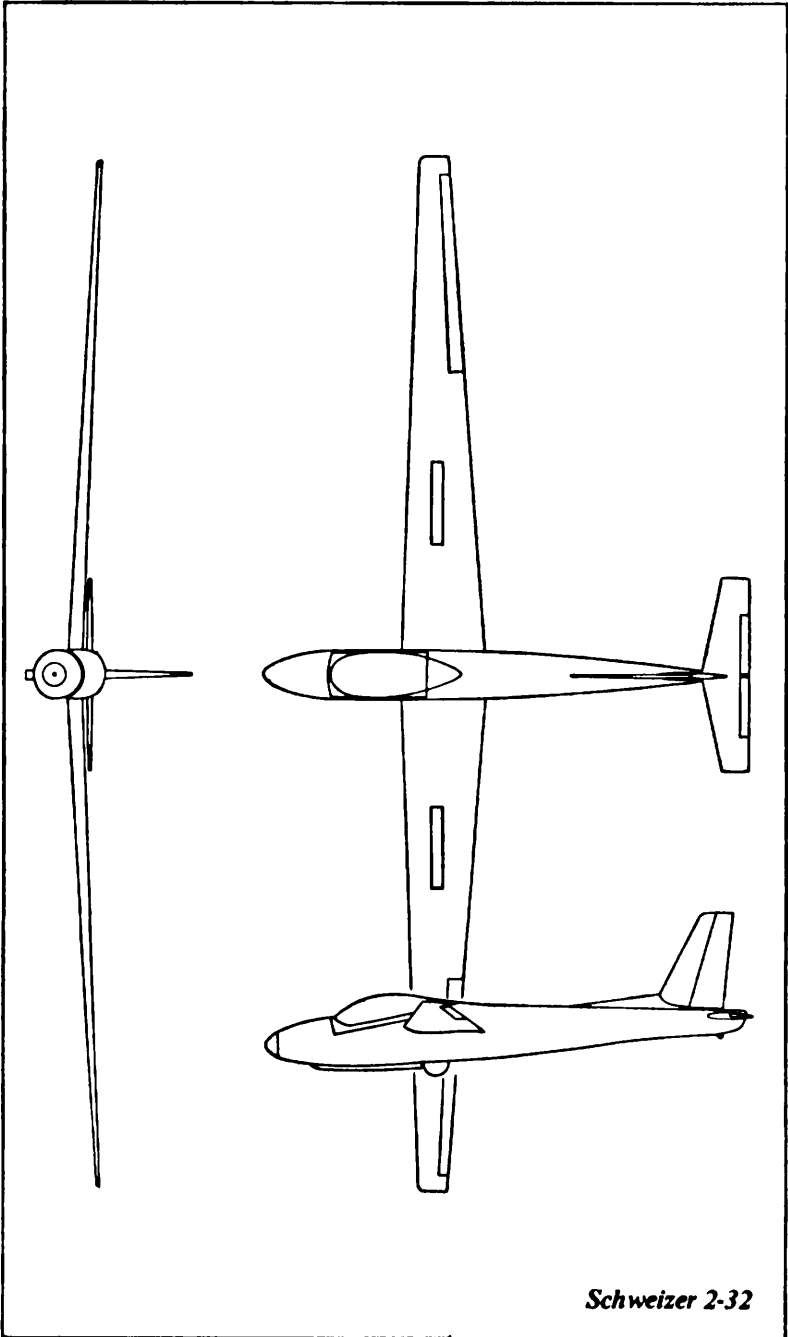
Libelle 301

the SHK outclimb the '14 slightly at Reno). In level flight neither Gleb nor I could see any difference between the ships up to 80 mph although at higher speeds the Sisu's 7-1/2-lbs. wing loading began to help, and it drew away slowly. At 100 mph the Sisu was clearly better, probably by about 3-5 points on the L/D scale. Flying at proper speeds for the 100 fpm lift, however, gave the '14 a very clear advantage. There was no doubt that the Sisu would be badly beaten in such conditions. In lift up to 400 fpm, the '14 seemed as good as any ship and one would have to have over 600 fpm before the Sisu had any real advantage. (These are figures for *achieved* rate of climb taken from the barograph. To achieve 600 fpm it is generally necessary to have indicated lift on the order of 900 fpm.)

One of the strongest points of the '14 comes in landing. Full flap gives a stalling speed of 32 mph and a comfortable approach speed of 40 to 45 mph. Even if one does stall in a gust, the descent angle is so steep that the ship is flying again almost immediately with little loss of altitude. In order to test the approach, I started a straight-in approach at 4000 feet and about a mile and a half out. Using full flaps and 45 mph I was unable to make the end of the runway and had to select a lesser flap angle to reach the field! The angle of descent seemed in the neighborhood of 40 degrees with virtually no wind.

In an experiment I dropped the nose to 60 degrees and stayed under 65 mph. The short landing that is possible in the HP-14—especially over obstacles—has to be seen to be believed. There is very little roll-out. Incidentally, in my first landing with the ship I hit within five feet of my selected spot—a tribute to the ease of landing with flaps. I find it hard to believe that any pilot who has tried the big Schreder-type flaps would ever willingly go back to dive brakes, especially the aft-placed, ineffective kind seen on many sailplanes. I do not know a ship that could be landed shorter or easier over a 50-ft. obstruction than the '14.

Rigging of the '14 is simple and quick. The wings are held together by two horizontal pins and automatically pick up the fuselage pins. Ailerons and flaps are hooked up manually,



Schweizer 2-32

after which the center section cover is fitted. The tail folds inward, Sisu-style, but unlike the Sisu requires no wrench to rig. Instead one merely moves a simple self-locking, sliding bolt. It is an excellent system.

One thing that readers should keep in mind is that the HP-14 I flew in 1966 was the prototype that Dick flew in Reno that year. Those who saw the ship there will recall that the finish of both wing and fuselage was rather poor due to the rush to complete the ship. I would expect that considerable improvements in performance could be gained by conducting the kind of detailed clean-up and resurfacing that Dean Svec did on his Sisu. In short, the ship as I tested it did very well indeed despite its rough condition.

2-32

I have saved until last in this miscellany two extremely interesting two-place ships. The first, the all-metal Schweizer 2-32, is really three place as long as the passengers are fairly friendly. Unfortunately, I flew the ship in 1962 before the new tail was installed. In that configuration, the ship was pleasant to fly, with remarkably light controls and especially effective ailerons. The horizontal tail on the original design was noticeably small but has been completely satisfactory since being enlarged. Best thermaling speed seemed about 53-55 mph although it is now probably reduced due to better elevator control. In level flight, the glide seemed flat up to about 90 mph, which was as fast as we went. Comparison flights with the Sisu and RJ-5 showed performance to be right between the two. Dive brakes are large and effective in case you want to land. Visibility and comfort are practically indecent. The ship's weight, which is in excess of 800 lbs., is a hindrance in rigging it. The wings ride in the trailer on shock mounted pins through the spar instead of those paint chewing saddles we have struggled with for so long.

T-49

Another two-place ship of note is the Slingsby T-49 Capstan side-by-side trainer, which I had the chance to fly at Lasham with CFI Derek Piggott. The cockpit reminds one of

the old Pratt-Read, except that the view is better. On releasing from car tow at about 900 feet we climbed up through a Skylark II in a handy thermal. Controls were light and pleasant for a large ship, not unlike a Ka-6. At around 1,600 feet Derek decided we had plenty of altitude for a couple of spins. I wasn't so sure but, as it turned out, he was right. The T-49 spins painlessly and recovers Cub style. On nosing over a bit the speed leapt promptly to 90 mph, showing the excellent penetration of the T-49—a feature it does not share with the Ka-6. I thought that anyone wanting a wooden trainer out of which the instructor could see as well as the student, and one which could be used for cross country flying, would have to look a long way to do better. The dive brakes are super-effective, almost too efficient for beginning students.

* * *

The aforementioned ships are all capable of glide angles of 30 to 1, many nearing 40. Their superior performances result from great attention to details in design and construction which, in turn, cause high prices—no 30/1 sailplanes cost less than \$4,000 new (in 1968).

The trend of the 1960's, as illustrated by the ships I've been describing, was toward smaller spans, better construction, and higher wing loadings than in earlier sailplanes. It is fascinating to observe the developments in sailplane design as the interest in soaring increases.

5 WOOD TURNS TO GLASS

Standard Elfe, Standard Cirrus and ASW-15

Today the glass bird is ubiquitous. No serious competition pilot would consider anything else, and the incidence of wood and fabric is daily less marked not only on the competition grid but among the sport pilots—or at least the better heeled ones. If one could freeze in time the instant when glass really arrived and could identify the ships that changed our world, the era would be '66-'69 and the ships would indubitably be the Libelle, Cirrus and ASW-15. I am sorry to say that pilots like me of 6'2" do not fit with ease into the diminutive Libelle, and thus it is missing from these flight tests. There is another surprise, too: in performance, some ships of the old sticks-and-glue era refuse to let go easily. Voila, the Elfe—a wooden bird nestling comfortably and deservedly amid the glass.

Standard Elfe

The Elfe is a bit of a paradox among the more plentiful mold-pressed sailplanes, but a paradox that goes like mad, as a 1-4-6 placing of the three entries in the 1968 World Championships shows. Just to prove that it wasn't merely dull consistency that did the trick, an Elfe won a quarter of the contest days.

Why is the Elfe a paradox? First of all, it is no glass wonder (despite its discussion in context with two of the breed) but quite an old-fashioned type collection of sticks and glue, Dart-style. Secondly, the Elfe doesn't come from

some Goliath of a factory like Switzerland's FFA (Diamant makers). The Elfe is produced by a David, alias Albert Neukom, plus a couple of helpers, in half a farmhouse cellar near Schaffhausen. No two Elfes are exactly alike.

The Elfe is a ship of many frustrations, but one thing it does superlatively: it performs. Most particularly, it climbs. In 100 hours of Elfe flying, the only ship that really seemed to outclimb my Elfe was the old Weihe. For the sake of comparison, I would say the Elfe climbs about even with the SHK. Another thing that the Elfe does well is penetrate. Ka-6s, Foka, Edelweisses, Darts and the like drop rapidly behind as the speed gets above 70 knots. Penetration, like climb, is on an SHK level.

How does the Elfe stack up alongside the other good Standard Class ships, specifically the glass birds? After hours of comparison flying against Standard Libelles, the ASW-15 prototype and various Phoebuses—ships that dominated the first ten places in Poland in 1968—I would say that there is virtually no difference between the ships. The top Standard Class ships reached a sort of plateau of development under the rules in force in the '60s, before retractable gear, water and flaps arrived. I found that individual Elfes and Libelles varied more than did the types themselves. The Phoebus-15 offers more of a problem. Some Phoebuses go extremely well in any conditions; some are easy to outclimb. One would attribute all this to pilot capability if it weren't for the fact that one of the non-climbing ships was flown by Rudi Lindner, one of the world's best. All sorts of esoteric theories were batted around in Poland as to why some Phoebuses went so well (for example, Hans Nietilspach's, fully equal to the Elfe in all departments) and some went so badly. Some said CG placement was the big trick, others felt that a 5-mm aileron droop worked the magic. Some felt light wing-loading was necessary. All agreed that the Phoebus airfoil was separation sensitive.

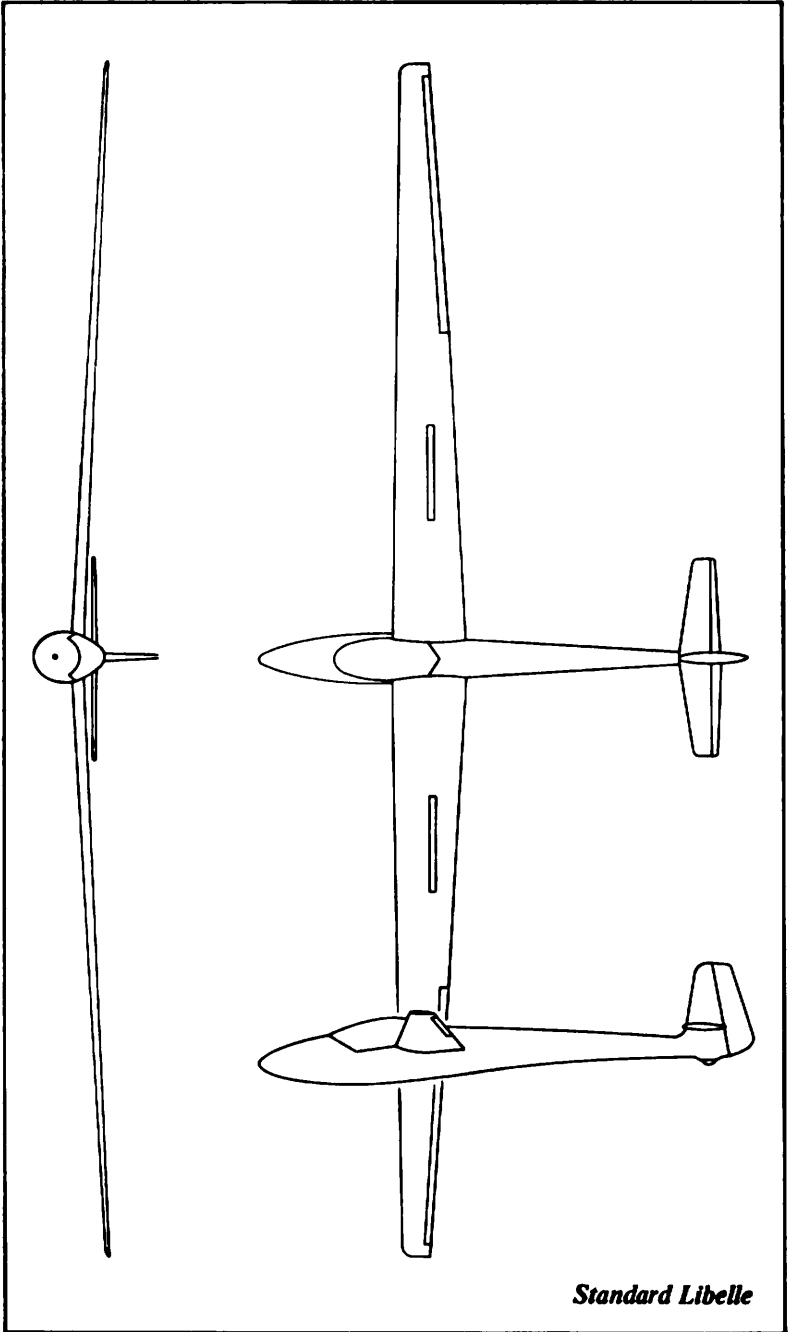
What is it like to fly the Elfe? The first thing one notes is a cockpit built for long, thin types. I, 6 ft. 2 in. and about 175 pounds, found the cockpit perfect, snug but not tight, and unusually comfortable. There is another three inches of

rudder-pedal travel available for even longer types. How unlike the Phoebus, which I can't get into at all without one of those special German shoulder-perching parachutes. While length is good in the Elfe, width is not. Anyone much wider than I am couldn't get in at all, shoulder room being especially tight. Once in, one finds visibility so-so, about like a Ka-6. The sloping canopy tends to reflect the instruments badly. Ventilation is of the Ka-6 type—a bit primitive. The instrument panel is excellent, capable of holding five large and two small instruments plus a radio, all of which can be seen easily. Controls are all within easy reach.

In flight, one notices immediately the light and pleasant control forces. English pilots brought up on Skylarks will find the nearly neutral stick forces strange, but such an arrangement is efficient and obviates endless trimming. In fact the Elfe doesn't even have a trimmer—a nuisance, since one has to hold slight back stick on climbs and forward stick for high speeds. The cure on my ship was a 'cat's cradle' of bits of shock cord, with various bits looped over the stick for different speeds. Effective, but hardly the sort of improvisation one should have to make on a costly sailplane.

Ailerons are first-rate, giving a 45°-45° roll in about four seconds. Violent control application does not seem to cause any separation, so one can wrap into a curve as quick as one pleases, Ka-6 style, without any height losses. An interesting feature of the Elfe is its stall-proof wing. This characteristic results from the fact that the all-flying tail stalls about three knots before the wing does. The trick is to drop the speed until the stick falls back in your lap (a bit disconcerting at first). Nothing untoward occurs; the nose drops a degree or two, and the ship keeps right on flying. This feature is especially pleasant in low, feeble thermals and cloud flying. Best climb speeds vary rather widely with angle of bank from 38-48 knots. My experience is that the ship climbs best at steep bank angles, say 40°-50°, and at higher speeds. In Poland one could frequently circle up through the middle of the ubiquitous gaggles, using this technique.

Between thermals the ship gains speed quickly. Best L/D occurs at 50 knots, but one does best, relative to other ships,



Standard Libelle

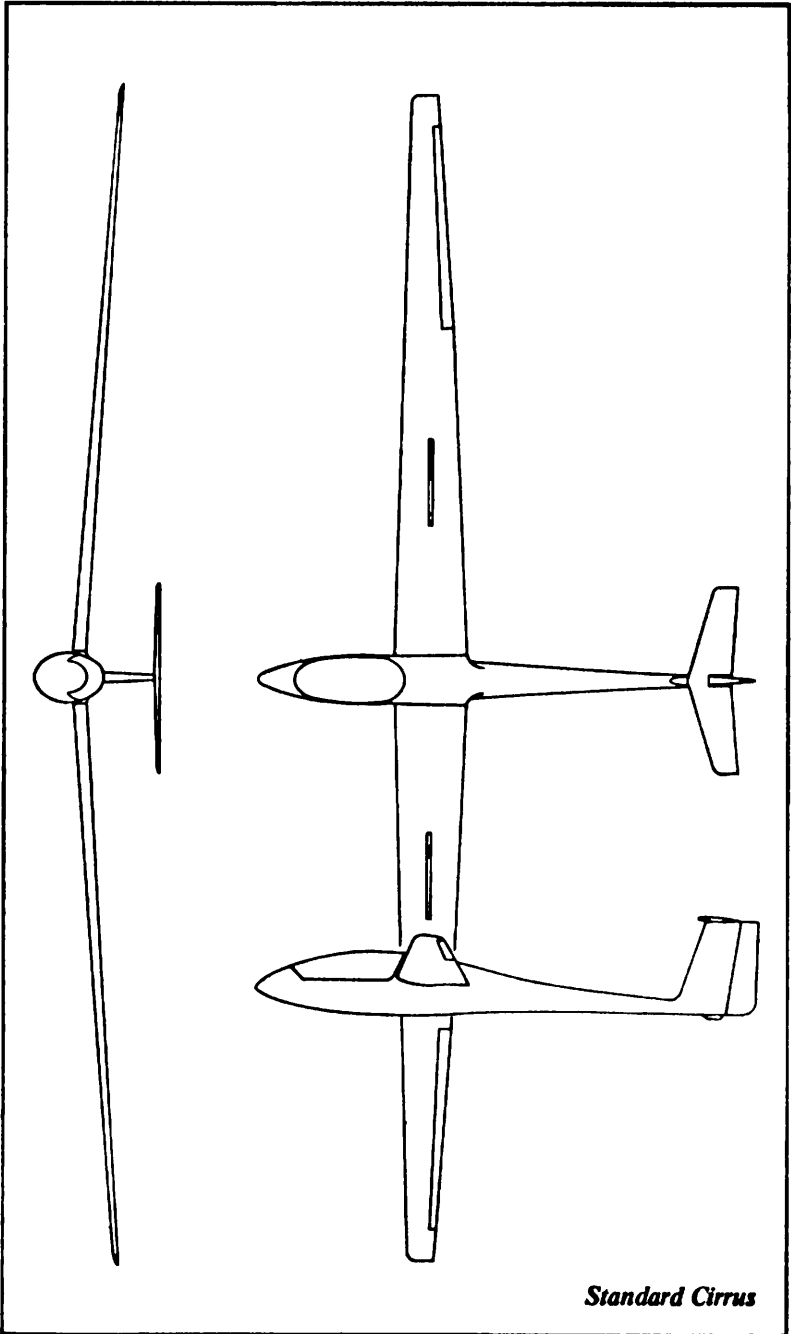
at 70 knots and over. Near best L/D there is only a slight margin over Ka-6s, Darts, *et al*; it is at the higher speeds where the Elfe really shines. From 90 knots up, one holds the stick with both hands to guard against the pitch-ups and bunts inherent in all-flying tails. I experienced no flutter at speeds up to 120 knots in rough air.

The dive brakes on the Elfe look enormous but are, in fact, disappointing. While they speed-limit nicely, they are so far back on the wing that they produce no lift reduction—only drag. The effect is like that of a tail parachute; one can come in fast and steep (and float, and float, and float) or one can come in slow and flat, but not both. Angle of approach is similar to the SHK and makes one wish for good old Slingsby super-effective, honest-to-God dive brakes. The wheel brake is stick mounted and really works. The wheel is well forward so that the instant 'nose rubbing' characteristics of Libelles are avoided.

For rigging, the Elfe is a pain. True, one can do it promptly (3-1/2 minutes for OSTIV) if all the many bits are neatly laid out in position, but the best time either A. J. Smith or I managed in Poland from the time of opening the trailer door was 10-11 minutes. The problem is the three-piece wing. The centre section weighs 180 lbs., ridiculously heavy for a Standard Class ship, and screws on with four bolts, three control connections and a hatch. Outer panels are light (50 lbs.) and are attached by a bolt, an aileron connector plus two hatches. The tail takes two people to install although the system is simple. When one compares all this with the Standard Libelle (two people, 90 seconds), one wonders . . .

Construction of the Elfe is mixed. The fuselage has a glass nose back to the wing, then straight plywood construction. The wing has a dural spar, ply and a balsa-plywood sandwich skin. The tail is also balsa-ply. Its construction makes for good surfaces and easy repairs. However, designer Albert Neukom told me in 1968 that future Elfes would be all-metal, Schreder style, with a two-piece wing.

To sum up, the Elfe is a ship of superlative performance with several annoying minor features. The all-metal version,



Standard Cirrus

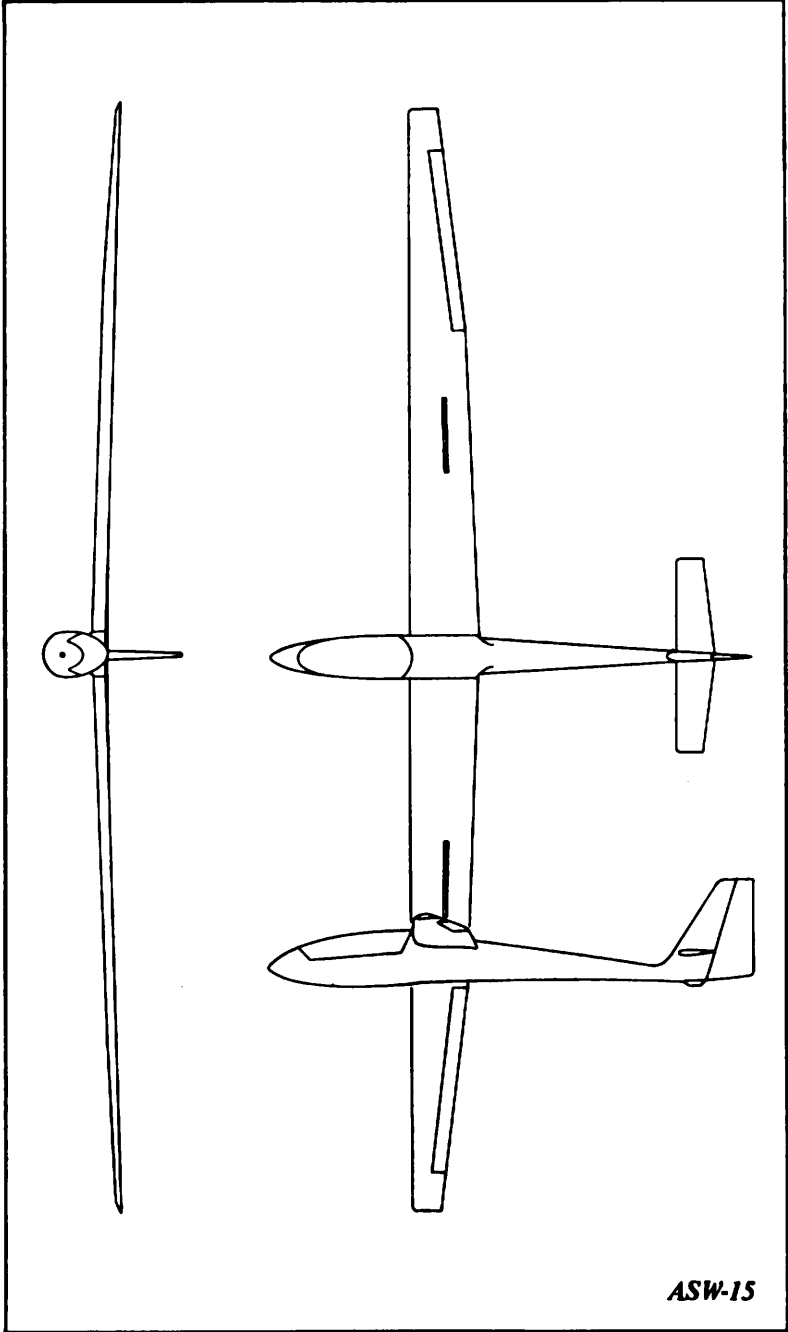
considerably lighter than the 480-500 lbs. of the sticks-and-glue variety I've been describing, should be, no doubt, even more effective.

Standard Cirrus

The World's Soaring Championship at Marfa, in 1969, provided me with the opportunity to study the ships that were the best new ones in the world, many of which will be competing successfully for years to come.

In the Standard Class only one of the ships, the Libelle, was flown by a thoroughly experienced pilot; thus final scores should be ignored. To me, the most interesting of the three types that were new in 1969 (Standard Libelle, ASW-15, and Standard Cirrus) was the Standard Cirrus. That sailplane had by far the roomiest cockpit (so appreciated by Red Wright that he bought the ship on the spot) of any Standard Class ship that year. The canopy is side-hinged, and opening it gives complete access to the instruments from all sides. Seating is semi-reclined, as with the big Cirrus, with excellent visibility forward and to the sides. Visibility to the rear is somewhat restricted for taller pilots, as in the case of the Phoebus, although not quite to the same degree. Controls are well arranged except that both stick and tow release are a bit too far forward for tall pilots. This problem has been corrected on later ships. Rigging is of the normal Cirrus-Libelle type and extremely quick and easy.

I thought the Standard Cirrus to be the nicest ship to fly then, and my logbook showed 56 types at that time. It seemed to seek out the center of thermals by itself. The ailerons are particularly light and pleasant, having a precision that gives the pilot an immediate sense of mastery. The yaw stability makes string centering almost automatic. Climb performance seemed excellent in tests against the big Cirrus, the greater maneuverability of the small ship at least making up for the lower rate of sink of the 18-meter version. Unfortunately, at Marfa that year, I was unable to arrange tests against the other Standard ships, but reports from Germany of tests made at Hahnweide by such top German pilots as Hillenbrand and Schauble (and relayed to me by



Klaus Holighaus, designer of the Standard Cirrus, along with comments from the German Nationals) indicated that the climb at least equaled the Standard Libelle and ASW-15.

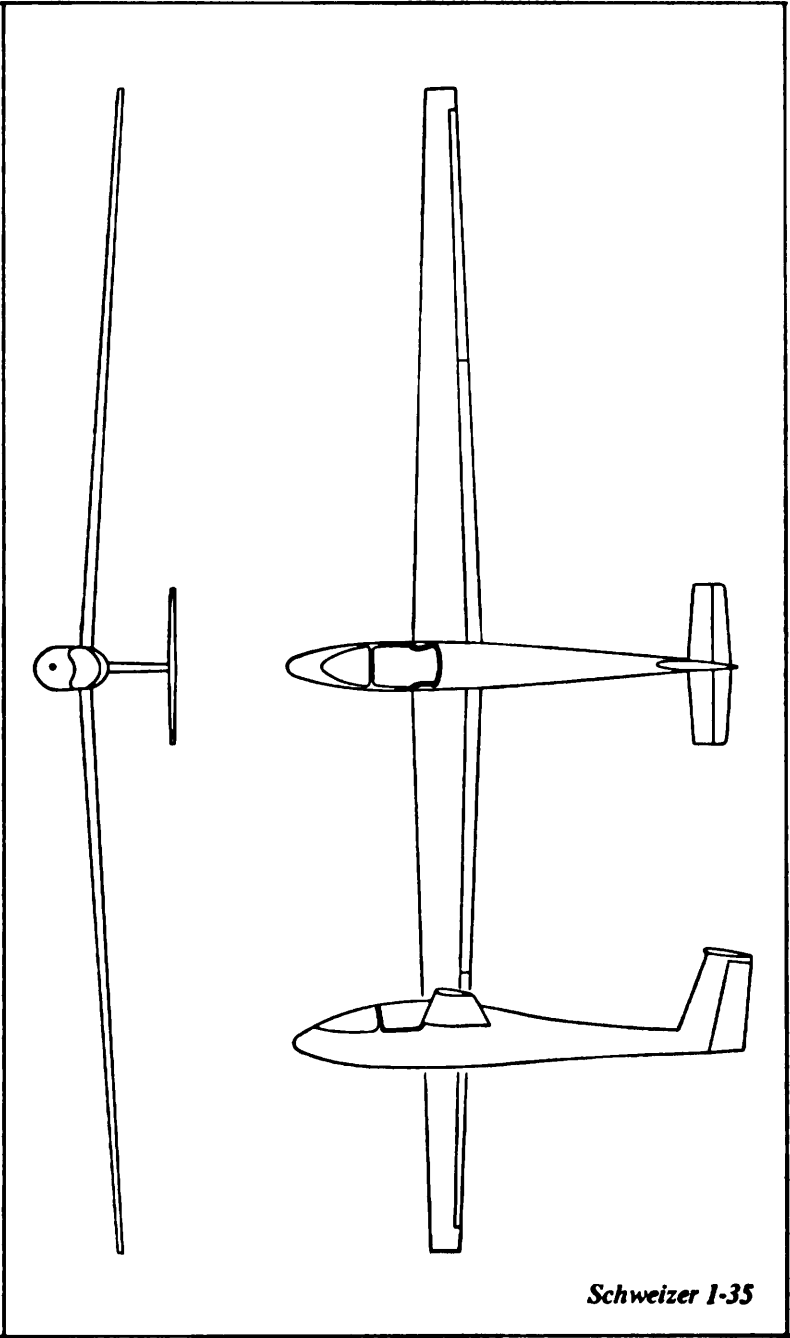
In straight flight, the Standard Cirrus gains speed rapidly. Tests against a Cirrus B showed a loss of about 10-15 feet a minute at speeds between 60 and 95 mph. Subsequent tests against a Diamant 18 showed about the same loss rate, but when the Diamant moved up to 120 mph in an attempt to lose the little upstart, the Standard Cirrus slowly rose away and left the Diamant and its very startled pilot. Those experiences bore out the previously mentioned test reports in Germany, which showed the Standard Cirrus superior to the Standard Libelle at high speed, gains of 20 meters in about a 3-km run being consistently noted. The report, however, did not say whether the Libelle had a retractable landing gear (the first production units had fixed gears, but a retractable wheel later became standard). And it should be mentioned that those were early tests, subject to later findings. There was little doubt then that the new Klaus Holighaus design would be both popular and effective. Its excellent dive brakes make landings short and easy.

ASW-15

While driving home from Marfa after the 1969 competition, I stopped at Adrian, Mich., and had a chance to fly the Schleicher ASW-15, the Standard Class ship designed by Gerhardt Waibel of D-36 and ASW-12 fame.

The cockpit is roomy, well laid out, and quite similar to the Cirrus Standard, although a bit snugger in all directions. Visibility is good except to the rear—about like the Phoebus (that is, only a problem if you are tall). The cockpit layout is good, unlike the ASW-12, and the noise level is low.

In the air, the coordination proved good—superior to the Standard Libelle (which, in turn, is better than the Open Libelle)—but not quite up with the Standard Cirrus. Rate of roll was a crisp 4.0 seconds, but not the 3.0 seconds quoted in one advertisement. The actual weight of the ship is about 80 lbs. over the 398 lbs. mentioned in early reports, so one should not expect to fly at 5.1-lbs. wing loading unless a



Schweizer 1-35

jockey by trade. Directional stability is adequate, but pitch stability is too positive for a contest ship. This was especially annoying, because the trimmer was out of adjustment on that particular ship and speeds over 75 mph were achieved by leaning heavily on the stick, Ka-6 style. Also on that early model the controls were annoyingly stiff, due to poor quality control-rod guides. I am assured that later models do not have this problem.

Stall characteristics are excellent. The ship will spin only if forced, an excellent feature for the 1-26 type making the big leap to a performance ship. Dive brakes, too, are entirely adequate.

I made a few test runs against Dick Schreder, who was flying my Cirrus B. The new Standard Schleicher seemed almost equal in both climb and speed, dropping away only very slowly on long straight runs. My guess would be that the penetration is a bit superior to the Standard Libelle.

In conclusion, it should be noted that all three of the Standard Class fiberglass ships that were new in 1969 (Cirrus, Libelle and ASW-15) are fine machines, with performance differences probably varying by under 2% and handling differences by perhaps 10%, with the Elfe very close.

6 FIRST OF THE NEW BREED

Nimbus, Kestrel, BJ-4 and FK-3

Nimbus

1963 saw the first flights of both the D-36 and Bjorn Stender's BS-1. The hordes of Libelles, Cirruses, and Phoebuses were to bring the performance of the super ships to the average pilot by the late '60s, but in no way improved fundamentally upon them. Then, in January of 1969, came Klaus Holighaus' innovative Nimbus prototype, two years abuilding.

The Nimbus relies on wingspan to gain performance, lots of wingspan—72.5 feet in fact. Wingspan, of course, gives a lot of things at once. With plenty of span, the designer can go to very high aspect ratios without having the very narrow wings that bring low Reynolds numbers and the resultant higher drag. In the case of the Nimbus the aspect ratio is a breath-taking 31!

What sort of performance does that kind of span bring? The calculated glide ratio is 51 at 56 mph, 30 at 100 mph, and 20 at 120 mph.

Everyone has always known that sheer size would give far higher performance. The Germans were building very large ships even before the war. The problem has always been handling, maneuverability, and landing characteristics. How does the Nimbus fare? The rate of roll is a bit under 5.5 seconds at 52 mph, a rate equal to that of many of today's 18-meter ships. Flying at the normal wing loading of six

pounds, the ship circles well at from 44 mph up, depending on bank (the smaller Cirrus does best from about 48 up, at the same loading). Stall on the Nimbus comes at 39 mph clean and 34 mph with 90° flap for landing. Pilots of Dick Schreder's various HPs will be amused that Klaus was ecstatic over the ease of landing with flaps, as compared to dive brakes.

The structure of the Nimbus is completely normal fiberglass. Like the Cirrus, the fuselage is straight fiberglass (the nose and tail were made from the Cirrus molds and then spliced to a slightly longer tailboom). The wing is the usual fiberglass-foam-fiberglass sandwich, except that in the 15-foot center section balsa is substituted for foam to confer added strength. The spars are the normal fiberglass unidirectional rovings and are stressed for 20 Gs. The very high stress factor was dictated by the need to resist bending, rather than by any questions as to the strength of the glass.

Klaus Holinghaus, like Dick Schreder, is a triple threat. Not only is he the designer of the Cirrus, and part of that remarkable team of German students that designed and built the D-36 in 1962-63, but he also built the Nimbus virtually single-handedly in an attic room at the Schempp-Hirth factory, where he is chief of engineering. In addition, he is one of Germany's top young pilots. When I stayed in Kirchheim getting the Elfe ready for the Internationals in 1968, I often dropped in on Klaus in the evening or on rainy weekends to offer a little labor and to learn a great deal. Like Dick Schreder, Klaus has no special secret for turning out super sailplanes while holding down a demanding full-time job. The answer is work. Many a night turned into morning before Klaus and a few friends went home—and the German workday starts at seven o'clock.

The fuselage went relatively quickly, because many Cirrus parts could be used, but each of the three wing panels required the building of an absolutely true female mold of plywood. The general procedure was to build a mold for the upper surface, lay up the glass, foam, and glass in this, and then add the prefabricated spar. On this structure enough temporary balsa ribs were added to give the contour of the

lower surface, which was molded on the ribs. Finally the ribs were removed except for the strong fiberglass end ribs, and the upper and lower shells permanently joined at the leading and trailing edge. Flaps and control surfaces were cut away later for a perfect fit. The resulting Nimbus weighs 825 pounds, with the heaviest wing panel going just over 200 pounds.

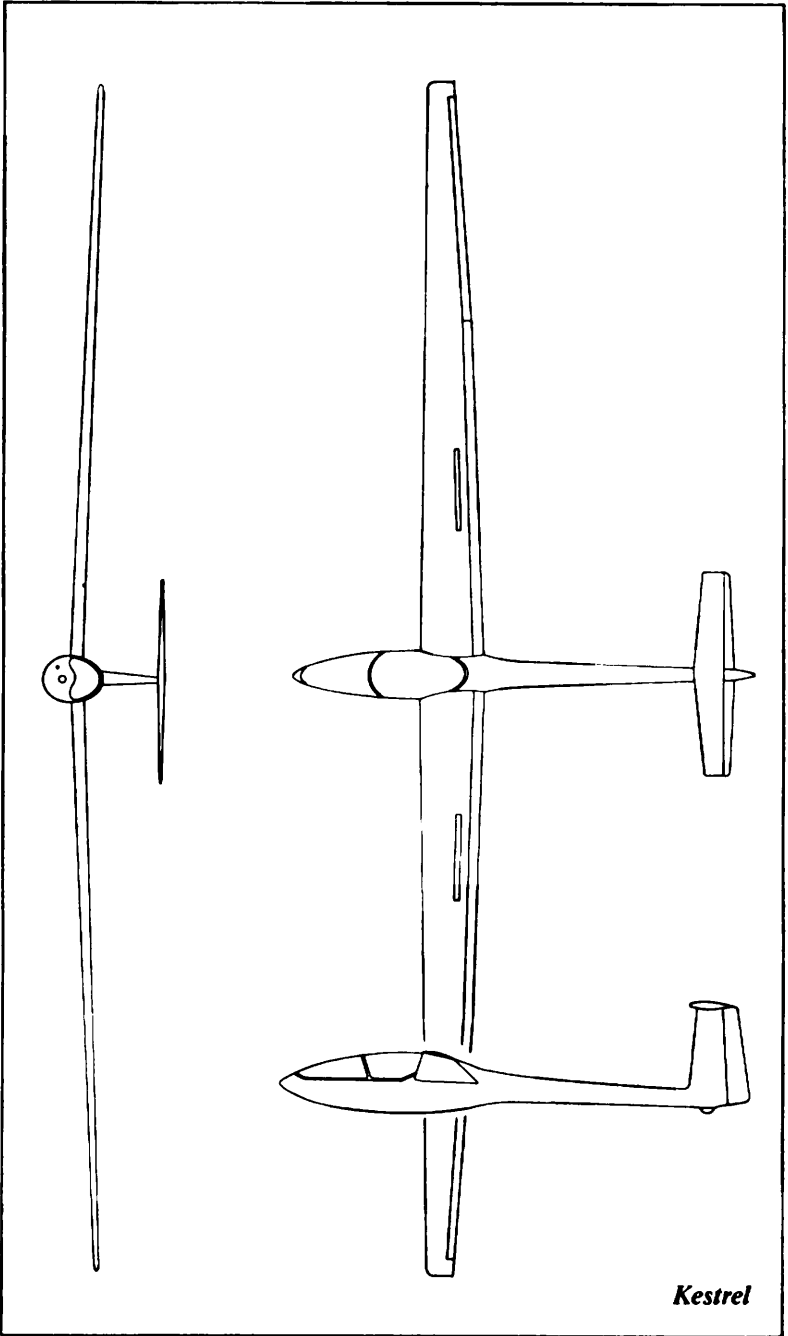
Those who are thinking how great it is to be single and have all that time should know that Klaus has been married for several years and has two sons, the eldest of whom is mad about flying and spends a great deal of time in the shop supervising his father's efforts. Frau Holinghaus teaches ballet and flies with one of the local clubs on weekends—when not serving as Klaus' crew.

I did not realize it at the time, but the prototype ship I had a hand in building was the same one I was to fly in the Worlds' at Marfa in 1970. A detailed description of that contest, and of the Nimbus' flight characteristics, will be found in a later chapter.

Kestrel

A ship that stirred enormous interest since Herr Hanle (head of Glasflugel) showed the design in 1968 at Marfa is the Kestrel. A complete flight report by Ed Byars appeared in SOARING for November '68, but, of course, at that time no flight comparisons had been made. By 1969, four Kestrel's had flown at Marfa, which made it possible to evaluate its general performance meaningfully.

The 16-19-24-28 overall placings of the four Kestrels would not indicate that the ship did very well, but one should remember that only a bad break for 1968 National Champion Ben Greene on the first day prevented a much higher placing. Ben had individual day scorings of a second, two fourths, and a fifth. Certainly all the Kestrel pilots were troubled by the very late delivery of their ships—most had only a few hours on them when the contest began. As a result of the delivery rush, ballast tanks didn't arrive until half way through the contest, tail fairings were never delivered, and instruments failed to work properly.



Kestrel

My impression of the Kestrel, after a considerable amount of comparison flying with Ben and Hans Linke as well as three hours of flying Ben's ship, was that it would be the best sailplane in the world if Herr Hanle had been able to come anywhere near the advertised weight of 463 lbs. The actual stripped weight of Ben Greene's Krestrel was not 463 but 578 lbs.—28 lbs. less than my Cirrus which (with its factory-approved wing-tip extensions) has five feet more span. The result is a high wing loading of 6.5 lbs. or more, and a disappointing climb rate. Even with 190 lbs. of ballast, the Cirrus could outclimb the Kestrel and, of course, at the end of the day after dumping ballast, there is little comparison. Conversely, of course, the Kestrel with its excellent Wortmann wing (the same section as used on the prototype Nimbus) is markedly better than the Cirrus in glide. I felt that the two ships were equal in lift of 500 fpm and up, but would far prefer the Cirrus in the inevitable weaker lift.

The Kestrel is a very good ship in many ways. The detail design is outstanding, with such items as push-button trim, 30-degree flap for landing, and excellent visibility. Unfortunately, the rate of roll is poor (5.5 seconds), the coordination only so-so, and the rate of climb less than average.

It should be noted that the Glasflügel firm had serious reservations about sending any Kestrels to this country in time to compete in the 1969 U.S. National Championships. The company would have preferred to wait until the design had been finalized and the German ATC issued. But the German pilots were so pleased with the performance of the Kestrel in May, 1969, in the German Nationals (which the Kestrel won in weak conditions, beating both the Nimbus and the SB-9) that an around-the-clock effort was mounted to rush four pre-production ships to the competition at Marfa. At the close of the contest in Texas, the Germans were much surprised to hear that several of the American owners were not totally in praise of the Kestrel's thermaling ability. (Not all the owners were critical, however; Ed Byars, for one, had no complaints about the climb of his ship.) But in Germany the Kestrel's circling performance in lift was

considered even more formidable than its flat glide angle at high speeds.

When the Germans expressed skepticism concerning the U.S. evaluation, the Americans suggested that perhaps the greater turbulence of the Texas thermals (as opposed to the smoother ones in Germany) had something to do with the difference of opinion. About that time, the Kestrel went off to compete in the Italian Nationals under conditions to which it was accustomed. The verdict: possibly the Americans had a point.

In any event, Glasflügel checked out the situation thoroughly and settled the matter once and for all. They identified the area of possible trouble and took ingenious steps that not only remedied the potential problem but improved all aspects of the ship's performance. The roll rate became 4.5 seconds; the weight, over and above the Kestrel's original estimate, is beneficial in contributing to an exceptionally strong and safe structure (as reflected by the ship's imposing rough-air redline of 155 mph). Slingsby's decision to manufacture the ship under license in various forms, including extended-wing versions, virtually assured the ship's success in England.

BJ-4

One of the most remarkable ships ever built must be the BJ-4 from South Africa. Readers of SOARING may be familiar with this ship from an article that appeared in May 1968, but the races in Marfa in 1969 gave the first chance for both the designers and the rest of the world to see how it would do in Open competition away from home territory. Certainly, many of us thought it would be the ship to beat the Marfa's strong conditions, particularly since 'Bomber' Jackson, holder of many world's records, was doing the flying.

The BJ-4 has a span of 58 feet and an empty weight of over 900 lbs. Fowler flaps increase the wing area by some 30 percent for climbing, and an ingenious spring plate fills the gap in the undersurface to reduce drag when the flaps are out. Full Fowler ailerons and a Fowler rudder, a bicycle

undercarriage, a 4-inch-thick wing section; all of those features just begin to suggest the ingenuity and work that went into this all-metal design.

We began to get an inkling of the ship's abilities when the South Africans said they hoped conditions would improve soon—during the most booming period of weather Marfans can remember. We soon began to see that the BJ was no great shakes in climb—about a match for a 2-32, I would say. True, in straight flight the BJ cruised off and left everyone at 120-130 mph, but it always seemed to have lost a bit by the top of the next thermal. Certainly one of the problems was the small, tight cores, often elusive, of the Marfa thermals in 1969. When the BJ zooms 600 to 800 feet up into a thermal, the pilot must pump the flaps down (three or four strokes on a ratchet handle), move the flap fairing lever, and adjust the aileron droop. All this, plus moving appropriate ratchet selectors, must be done in reverse on leaving a thermal.

The penalty for pulling up into a 'fooler' is very high, and Texas served up a lot of them in 1969. By the middle of the contest, Pat Beatty was ready to admit that the BJ-4 wasn't the answer and, characteristically, was already thinking of a BJ-5. My own feeling then was that the Four was a good deal too draggy in both climb and run configuration. The external Fowler ailerons and rudder, the flap tracks and the external mass balances needed revision on that model to affect a cleaner configuration, and a way to make the ailerons extend with the flaps needed to be worked out. The sacrifice in span loading continuity and 10 percent of available climb area in the '69 version could not be tolerated. These problems are very far from insurmountable, and I believe a variable-area ship (very probably a Beatty-Johl one or the British Sigma) may yet prove the ultimate answer for competition gliding.

FK-3

In the Open Class one of the most interesting designs at Marfa was the German FK-3, an all-metal 17.4-meter ship weighing about 570 lbs. empty. The aspect ratio is about 22, rather low for a modern ship, but this contributes to a very low wing loading of 5.4 lbs., which may be increased to 6 lbs.

with water ballast. Almost doubling the ballast on later models makes for better penetration.

The FK-3 was of especial interest because of all-metal construction. The wing is made up of a very few aluminum skins bonded to extremely closely spaced foam ribs. The surface smoothness obtained is remarkably good, and stays so despite g-loads. The ship at Marfa had an unpainted wing, but later competition models are filed and painted for an even better finish. The fuselage consists of a steel-tube frame with a nonstructural, molded glass nose—1-26 style. The inside of the cockpit looked a bit spartan on this early model—rather like a Formula 1 race car—but was certainly roomy and functional. Ventilation was especially good, a point normally lacking in German designs. Seating is fairly supine—about half way between the Cirrus and Diamant. The instrument panel is small—about like the Diamant.

I flew the FK-3 early in the morning and had ample chance to try its weak-weather performance. It climbs well at 45 mph with about 8 degrees of flap and seems capable of circling up inside most other ships. The sensation is like flying the old Weihe. Rate of roll is remarkable for so large a ship—about 4.5 seconds—but the really astonishing feature is the lightness of the ailerons. At first they were almost too light for me. I found myself wondering whether they had been connected! But I soon found myself entirely at home with them. Fore-and-aft stick forces were light and pleasant, although I could have used the trimmer, which had been removed from this particular ship.

Straight flight proved fast, with outstanding yaw stability. I was unable to make any real comparisons for lack of other ships, but a quick brush with an Austria SH showed that the FK-3 is certainly no dud. One thing that amazed me was the stiffness of the wing—reminiscent of the Sisu and tending to give a rather rough ride.

Landing the FK is very easy, due to ultra-effective dive brakes of the Ka-6 variety. How nice that some designers realize that even high-performance ships must land sometime. Had it been produced, the FK-3 could have become a very popular ship with its all-metal construction, excellent handling and high performance.

THE VIEW FROM VRSAC, 1972

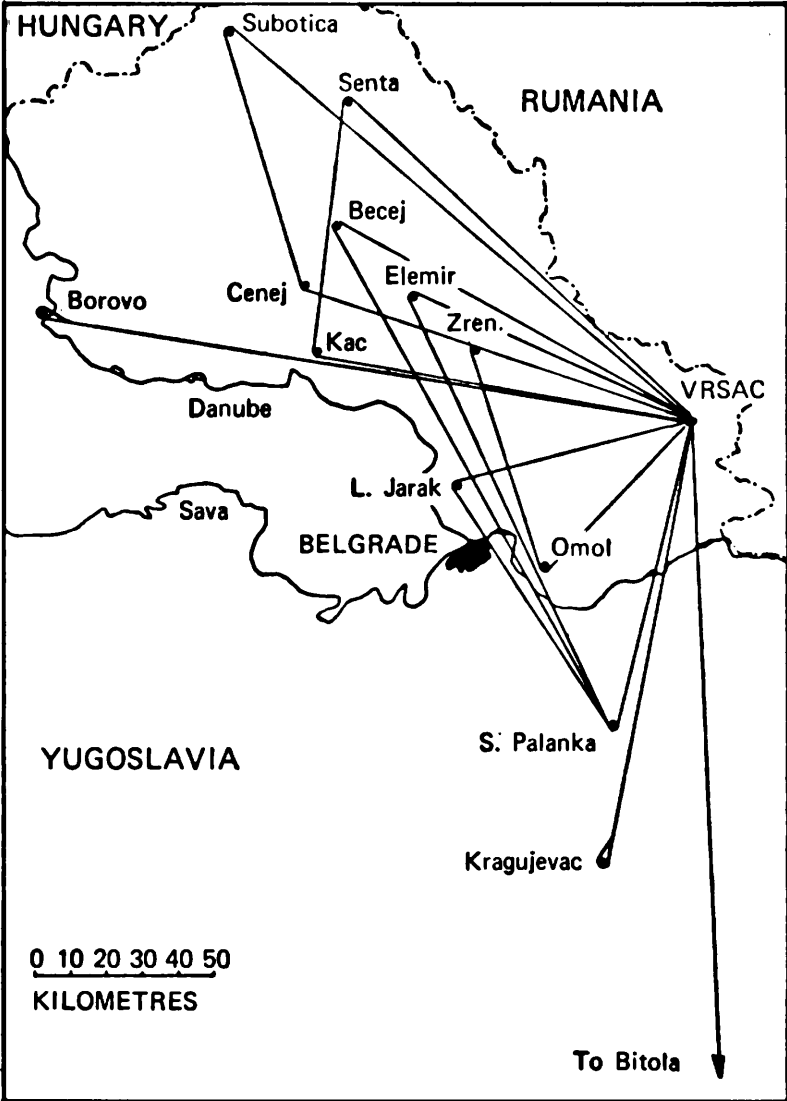
More than met the eye

Obviously, one of the favorite spectator sports at (and after) any World Soaring Championships is speculation on the state of the design art. Generally the white hats—the newer, heavier, and more expensive ships—win, and the pilots flying the older ships start to think wishfully of the wonders they would have accomplished if only they had been flying the Supersled Express Mark XIII. Vrsac in 1972 wasn't that way. There was no discernible correlation between the winners and ship performance. As Helmut Reichmann said when he thought he had won a day, "Today I was lucky." (He turned out to be wrong since the day became a no-contest day by a margin of seven kilometers.)

Despite the fact that there was no relationship between newness of ship design and winning in the 1972 World's Soaring Championship, it is interesting to examine the properties and the performance of the ships that were the last word in design that year. The following is a series of most unscientific, un-Bikle-like impressions based on a good deal of flying with and against these ships, and should provide interesting relief from the somewhat nuts-and-bolts character of the earlier chapters.

Nimbus II

In the Open Class at Vrsac the big new names were the Nimbus II and the ASW-17, which took first and second. Actually about the only similarity between the Nimbus I with which I won the 1970 contest at Marfa, and the Nimbus



Vrsac tasks and turnpoints

II, is the name. I found the Nimbus II to be much more like a blown-up Standard Cirrus when I had a chance to fly Klaus Holighaus' ship informally for about five hours in Germany before the Vrsac competition.

The Two is quite a bit smaller than the first Nimbus prototype, with a span of 67 feet as opposed to 72 feet. This, in turn, has reduced the weight by about 200 lbs. Rigging the Nimbus II is fairly easy with three people; it is possible with two—if they are strong. The “fairly” part refers to getting the inner wing panels on; this procedure goes easily once you learn the tricks, but can take ages otherwise. The inner panels are roughly the weight of a big (Open) Cirrus wing—around 185 lbs. The outer panels weigh about fifty pounds each and are no trouble to put on. The tail is just like the Standard Cirrus—easy to rig when you know how. The cockpit is roomy and comfortable, almost identical to the Standard Cirrus, and has lots of room for instruments, food and maps.

In flight, I found the Two to be amazingly light and responsive on the controls for such a big ship. Yaw stability was excellent and rate of roll very good—all pleasant changes from the original Nimbus, which turned reluctantly, sometimes not at all, and seemed to prefer flying sideways. Thermaling with two or three notches of flap, depending on the amount of water aboard, was easy. I tried out for a while against Dick Johnson in his ASW-17 and found that generally he took me a bit on the climb while I had him slightly on the run at speeds over 85 mph.

Later I discovered from Klaus that I had been using quite the wrong thermaling technique. The Nimbus II likes to be thermaled with a pronounced slip of about five degrees. Flown properly, I would say the two ships are remarkably even. My feeling was that the ASW-17 has a slight advantage in weak conditions, buggy conditions, or rain, due to having a more conservative, less separation-sensitive airfoil, while the Nimbus II would be better in medium and strong conditions due to being able to carry 100 lbs. more ballast. Like the Nimbus I, the Two needs half-water in any but survival conditions, full water generally. One afternoon we watched Klaus and Dick having at each other for an hour in dead, weak thermals at low altitude. Dick in his ASW-17

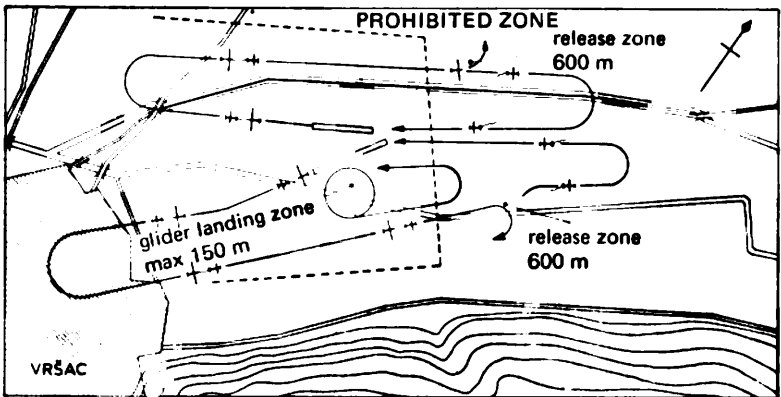
maintained his position on top, but the differences were well within the range of differences between ships of the same make. (Most people fail to realize that ships of the same make may differ quite noticeably in performance. Designers, when plied with enough drinks, will eventually admit that there are good ships and bad ships from the same molds.)

Landing the Nimbus II is a delight because of the large dive brakes and flaps. Wingtip clearance at touchdown is better than seven feet due to wing bend. I would rather put a Nimbus into a short field than most Standard Class ships.

ASW-17

The ASW-17 is a spectacularly beautiful ship, despite the huge vertical tail that looks like a barn door chasing a swallow. The tail is mounted on an incredibly slender tail boom. The cockpit is large and roomy; designers have noticed at last that pilots with enough money to buy these monsters are likely to be large, well-fed types. The wing is of rather curious design, having very long inner panels with about ten-foot tips. The result is that the inner panels "have a certain structural authority," in the words of Dick Johnson. Nobody was willing to divulge any weights, but I would guess 220 lbs. wouldn't be far off. Rigging seemed to go easily, if sweatily, and certainly the beautifully faired root was a lot easier to tape than the Nimbus.

Vrsac patterns



I had no chance to fly a Seventeen at Vrsac, but Dick seemed very happy with both handling and performance. On the practice days I noticed that he almost always wound up on the top of the stack on Vrsac Hill, seeming able, slowly but surely, to get through the 72-foot Glasflügel 604's and most of the Nimbuses in weak lift. Of course the weak, uncertain, and rainy weather during the contest tended to show the best points of the ASW-17 and the worst of the Nimbus and Glasflügel 604.

There seems to me no doubt that these two ships will be winning a lot of contests in the years to come. Both have combined large size and the accompanying high performance with excellent handling and landing characteristics.

604

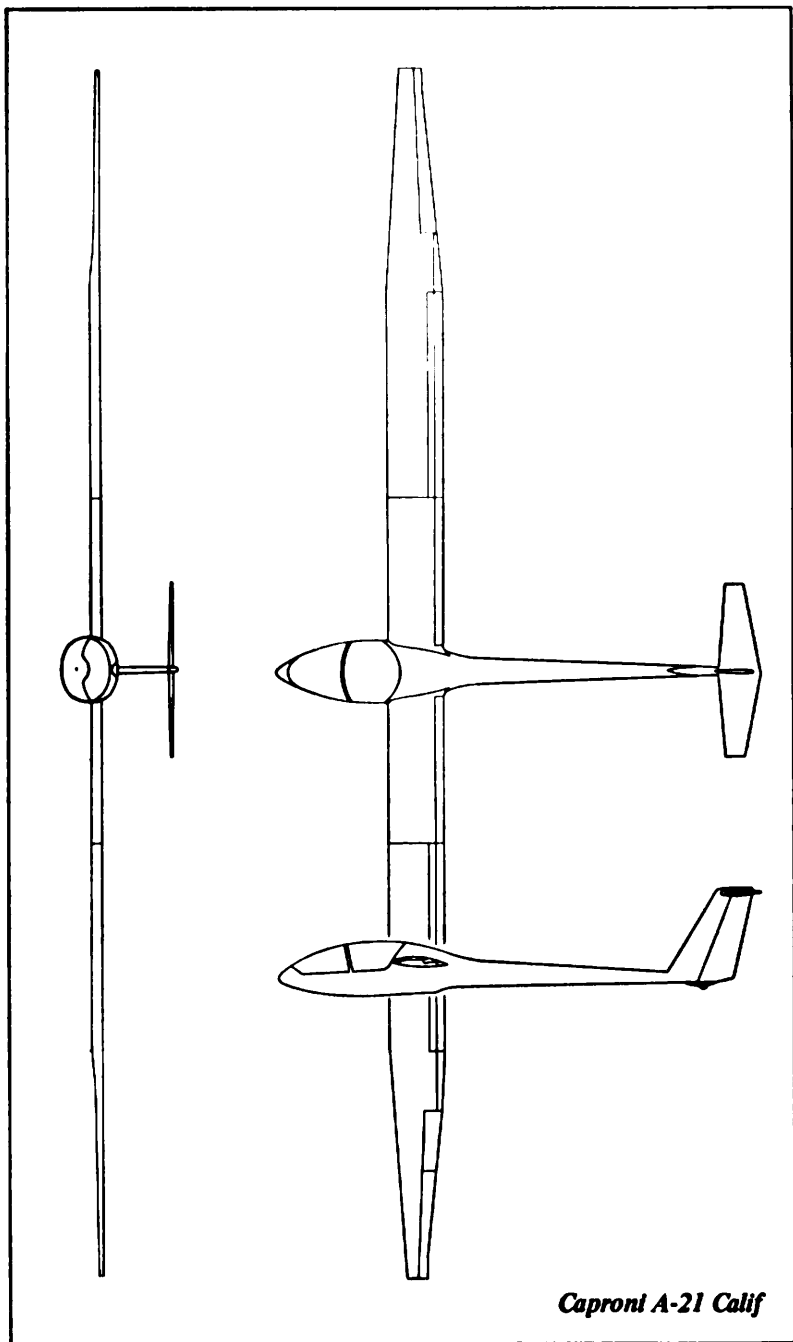
What of the other Open ships? There were several 72-foot span Glasflügel 604s entered (that is the production name for the Kestrel 22 that Walter Neubert flew so well in Marfa, 1970). I watched with interest one day as Walter and Klaus tried out against one another in weak lift. The two ships seemed even, with Klaus usually having an easier time due to the superior maneuverability of the smaller ship. The 604's three-piece wing makes it a bit heavier to rig, although Herr Hänle has designed a very ingenious trailer (of great cost) which allows the ship to be rigged by two men.

Jantar

The Jantar, Poland's first attempt at fiberglass, is a nicely built 19-meter ship that looks a great deal like a Kestrel. None of the pilots I talked to in 1972 seemed to think that it had any unusual edge in performance. Its success in Vrsac (3rd and 8th) seems to have been due entirely to the excellent flying of the Polish pilots. When built as production ships, they would—like the 19-meter Kestrel—be formidable competitors in the 19-meter class, but would probably prove too small for serious Open Class competition.

Calif A-15

The Italian Caproni Calif A-15 was the largest ship at the meet, with 75-1/2 feet of drooping aluminum wing and tail



Caproni A-21 Calif

that seemed borrowed from a 727. Unfortunately, this huge ship—instantly nicknamed the “Spaghetti Wagon”—did not seem at home in the weak conditions and only managed to do better than 20th on one day. My memories are mostly of seeing it steam around in huge circles while the Standard ships wafted up inside it. In better weather it might have done more, but even on the fairly good first day its speed was well below the better Standard Class ships.

Meanwhile, back on the other grid, what of the Standard ships that were newly displayed in 1972? At first glance one might be moved to say nothing, as the Polish Orion (1st and 3rd) was practically the only new ship there. A closer look proved that names and numbers can be deceptive and more was new than first met the eye.

Orion

The SZD-43 Orion with which Wroblewski and Kepka so convincingly wiped out the Standard Class looks exactly like a miniature Kestrel. It is mostly fiberglass with some wood and metal in the structure, and a good deal better built than the rather crude Fokas and Cobras that have been coming out of Poland. On closer inspection, one finds that the aspect ratio is only 19.4, a couple of points under the competition, and the wing area correspondingly large at about 126 sq. ft. My impressions of performance, gained both from flying against them myself and from talking to others, was that the ships were just about even with the Standard Libelle and LS-1 in performance. Their excellent showing seemed due to the superbly consistent flying of Wroblewski and Kepka, rather than any performance advantage.

LS-1

Another new design, hiding under an old name, was Reichmann's new LS-1 (mod.). This is actually a completely new ship, with a much longer and slimmer fuselage, rather like that of the ASW-17 in appearance. The tail has been modified to a conventional stabilizer-elevator configuration. A really good feature is the exit air vent around the base of the rudder. Designers in the past haven't given much thought to the fact that unless a low-pressure exit area is provided for

vent air it will come out at landing gear doors, control surface joints, and numerous other performance-robbing junctures. Performance of the LS-1 was hard to evaluate, as the pilot had a series of unfortunate 'bad breaks' during the contest. My impression during that contest was that the climb was very good, perhaps better than the earlier model.

Standard Cirrus

The big surprise for me at the meet, and a pleasant one, was that the 1972 model Standard Cirrus was a different ship from the old, with distinctly enhanced performance. This model, first produced early in 1972, differs from the old only in having 3/4 of a degree more wash-out in the wing. Klaus Holinghaus was very frank in saying that the purpose in making the change was to tame the hot landing characteristics of the older model, even if it turned out to cost a little in high-speed performance. Early tests showed that the new ship flew differently and climbed much better.

Prior to the 1972 Worlds', I was anxious to try out my new Cirrus after 300 hours in the old model. Since I was flying the old ship until a week before going to Germany, I felt that I would have a good basis for comparison. My first impression, while still on tow, was of much faster rate of roll. On measuring this with my stopwatch I found I averaged slightly over three seconds with the new ship as compared to a touch under four with the old. Low-speed performance was a happy change. Indicated stall came at 38 mph as opposed to 42 mph (same instrument panel, same static position on both ships). In thermals I found that the best speed to fly was down around 42-45 mph for moderate bank as opposed to 48-52 mph on the older ship. As I grew to know the ship better I discovered that the best technique seemed to be to fly just above the separation speed with about five degrees of slip. That method looks and feels all wrong, but the ship climbs like a shot.

Early impressions that I was climbing well soon became convictions that I could go up through anything. After one

day of comparison flying, Ben Greene gave up his two-month-old LS-1 and arranged to rent a '72 Cirrus. I had been able to outclimb and outrun the LS-1 with ease. Subsequent experience showed that the newer Standard Cirrus could outclimb Ian Pryde's well-flown Kestrel 19 and stay remarkably close to A. J. Smith's Nimbus II. As long as the thermals were of moderate strength, the smaller ship's greater maneuverability more than made up for its higher rate of sink. At Vrsac, Ben Greene and I grew used to outclimbing all comers, by being able to fly slower and stay closer to the core of the thermal. Tests at higher speeds showed that the newer ship was better than the old at speeds up to 100 mph.

An enormous advantage to the new ship, which did not show up in the Championships except on the first day, was the ability to climb well with virtually any amount of weight I could load into the ship. My experience with the older model had been that conditions rarely warranted carrying more than 115 lbs. of water; with the new ship I carried up to 170 lbs. and wished for more. Both Ben's ship and mine seemed approximately 1-3% better than the Libelles, LS-1s, ASW-15s, etc., mine being a bit the better of the two due to more extensive sealing. The safe approach speed on the Cirrus I purchased in 1972 had dropped from the 60 mph on the earlier model to a gentle 50-55 mph, with much shorter and safe landings the result.

Needless to say, the Schempp-Hirth people were pleased with that windfall. As Martin Schempp said to me, "One thing a designer needs is good luck." Like the other German manufacturers (with the exception of Glasflügel), Schempp-Hirth stated firmly in 1973 that it has no plans to move to a flapped Standard Class sailplane for several years. Given the many orders in Europe for the new Standard Cirrus, one can hardly blame designer/partner Klaus Holighaus for not wanting to monkey with the buzz-saw.

What conclusions could be drawn about the state of the art as seen at Vrsac? In both the Open and the Standard Class, it was my opinion that we had reached a plateau in design

development and that we may expect minor improvements on the ships that were flown in 1973 rather than any major changes in design. Such changes will yield small but useful improvements, as seen in the LS-1 and Standard Cirrus. Most of the designers did not expect flaps (first allowed in 1974) to have much effect on performance. In the Open Class, ships such as the Nimbus II and ASW-17 represented a happy compromise between maneuverability and max L/D. If the Sigma ever gets over its teething problems, or if the 30-meter span Akaflieg Braunschweig ship (March '71, November '72 SOARING) should prove successful, the Open Class might be back on the cost-weight-expense merry-go-round again. I think that 1972 crop of ships will be winning things for some time to come.

* * *

Scientific types will no doubt be upset that in my view of Vrsac hardware I do not assign finite values of advantage of one ship over the other. While it would be tempting to say that the ASW-17 is 3.7% better in climb than the Nimbus if the wings have 20 bugs per square foot on the leading edge, there is no known way to get such information, even for Paul Bikle. I based my conclusions on repeated observations of performance while the ships were being flown by outstanding pilots. And I did not actually fly many of the ships. Until a way is devised to measure performance in rough air, with bugs on the leading edge, in the rain, I feel that subjective observation will be a much better guide to choosing ships than endless L/D tests in ideally smooth conditions.

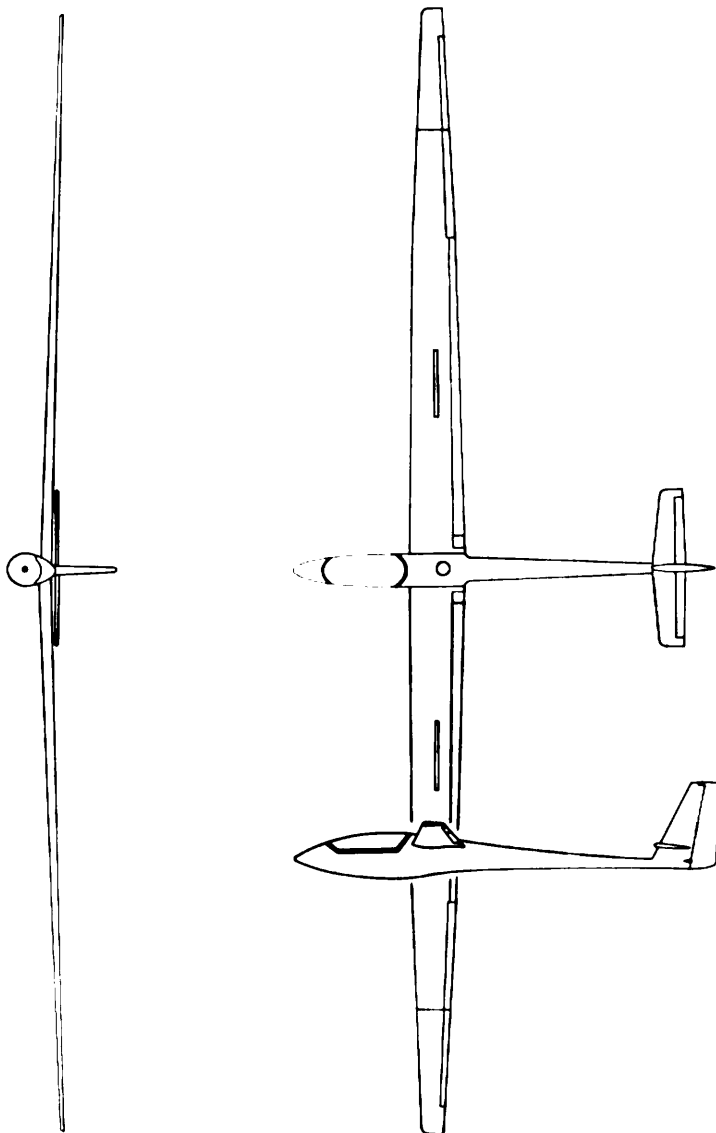
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COMPETITION FACE-OFF

ASW-17 vs Nimbus II

In 1972 two new designs appeared that dominated the Open Class at Vrsac. If their success at Waikerie in 1974 is any example, they seem likely to continue their supremacy for some time to come. The two designs were produced by Klaus Holighaus and Gerhardt Waibel, two of the three students who ten years ago revolutionized soaring with the fabulous D-36. Having won the 1973 U.S. Nationals in the '17 and the 1974 Internationals in the Nimbus II, I now have considerable competition experience in both types and feel that a comparison might be interesting. These comments go beyond my rather superficial Vrsac impressions.

In general, in 1972, most pilots seemed to feel that the '17 had a slight performance edge over the less exotic looking Nimbus. This opinion was based in part on tests between Dick Johnson in the '17 and A. J. Smith in the Nimbus II, as well as a good deal of contest experience in Yugoslavia. Few realized at the time that Dick's borrowed ship was some seventy pounds lighter than the later production models. Then too, flying in Yugoslavia, with a high incidence of rain, tended to favor the '17 with its less critical wing section. In 1973 in Liberal, three of the four '17s entered finished 1-2-3 against a field of some ten Nimbuses—but none of the latter were flown by serious contenders. In Australia the better Nimbi seemed to have a noticable edge on all but one of the '17s. What had happened? What factors in the design and flight characteristics accounted for these performances?



ASW-17

First, let's consider the ASW-17. Immediately one is struck by the sleek contours, beautiful lines and immaculate workmanship. In the air the remarkable maneuverability for so large a ship immediately becomes apparent. The older, 1962-design Wortman wing section does not suffer as much performance loss due to bugs or rain as does the 1967 section used on the Nimbus. However, to offset these strengths are a number of weaknesses that become apparent during a contest.

Certainly the first (or first-noticed) problem is the ship's great weight and difficult rigging. At 905 lbs. empty it is 150 lbs. heavier than the Nimbus, mostly in the inner wing panels. This weight, combined with the too-close fit of wing to fuselage, made rigging a near impossibility in hot weather until considerable fiberglass had been filed away. Unfortunately the heavy weight also interferes with the flexibility of performance. With a 200 lbs. load of water, the minimum wing loading is 7.1 lbs., compared to 6.1 for the Nimbus, giving the latter an edge in weak thermals. Conversely, the '17 carries only 240 lbs. of water for a maximum loading of 8.6. The Nimbus can be supplied with extra tanks to bring the loading to 9.3 for strong conditions, although these tanks created a bit of a rhubarb at Waikerie.

Another difficulty with the '17 results from the low and drooping wings. I found that even a stubble field was likely to produce ground loops due to a tip hitting the ground during a bump. The tendency is increased by lower surface dive brakes that hang some eight inches below the already low wing (the Nimbus has only upper-surface brakes and a much stiffer wing). Adding to landing difficulties is a wheel brake of hopelessly inadequate design. None of the brakes on the four '17s at Liberal ever really worked. Landing roll on a smooth surface is 1500, as half a ton of kinetic energy slowly dissipates and spectators scatter.

In the air, by far the most aggravating characteristic of the ship is its poor forward visibility. This is particularly frustrating in weak weather, when one wants to keep an eye on sailplanes out ahead. In the '17 they are in a blind

spot—one that does not exist on the Nimbus. Poor downward visibility in the '17 can cost many seconds at turnpoints. I watched Hans-Werner Grosse take several tries at positioning himself over one turn in Australia, each attempt taking a twenty-degree bank with resulting loss of altitude due to slipping. I figured that I gained at least a minute on that one turn due to the excellent downward visibility of the Nimbus.

The last weak point of the '17 lies in cockpit design. Gerhardt Waibel designs strikingly beautiful ships of very high performance, but he seems uninterested in the ergonomic comfort of the occupant. Landing the '17 requires that one fly with the right hand and do the following things with the left: 1. Lower gear. 2. Select landing flap. 3. Operate the dive brake normally. On touchdown one (a) promptly releases the dive brake and (b) reaches for the flap lever to select full negative flap position to increase aileron effectiveness and ward off the threatened group loop, (c) drops flap lever and lunges for the wheel brake handle, which lives on the end of eight inches of springy wire. One then heaves mightily while nothing much happens. Small wonder that in Australia Hans-Werner got mixed up during roll-out and retracted the gear instead of applying the brake. While bouncing around on a rough off-field landing, actually connecting with all these operations is rather unlikely! On the Nimbus only dive brakes need operation by the left hand. The highly effective wheel brake is on the stick, all handy-like. Because of the stiffer wings and better aileron response, the ground loop propensities of the Nimbus II are mild, and the landing position of the flap need not be altered under most landing conditions.

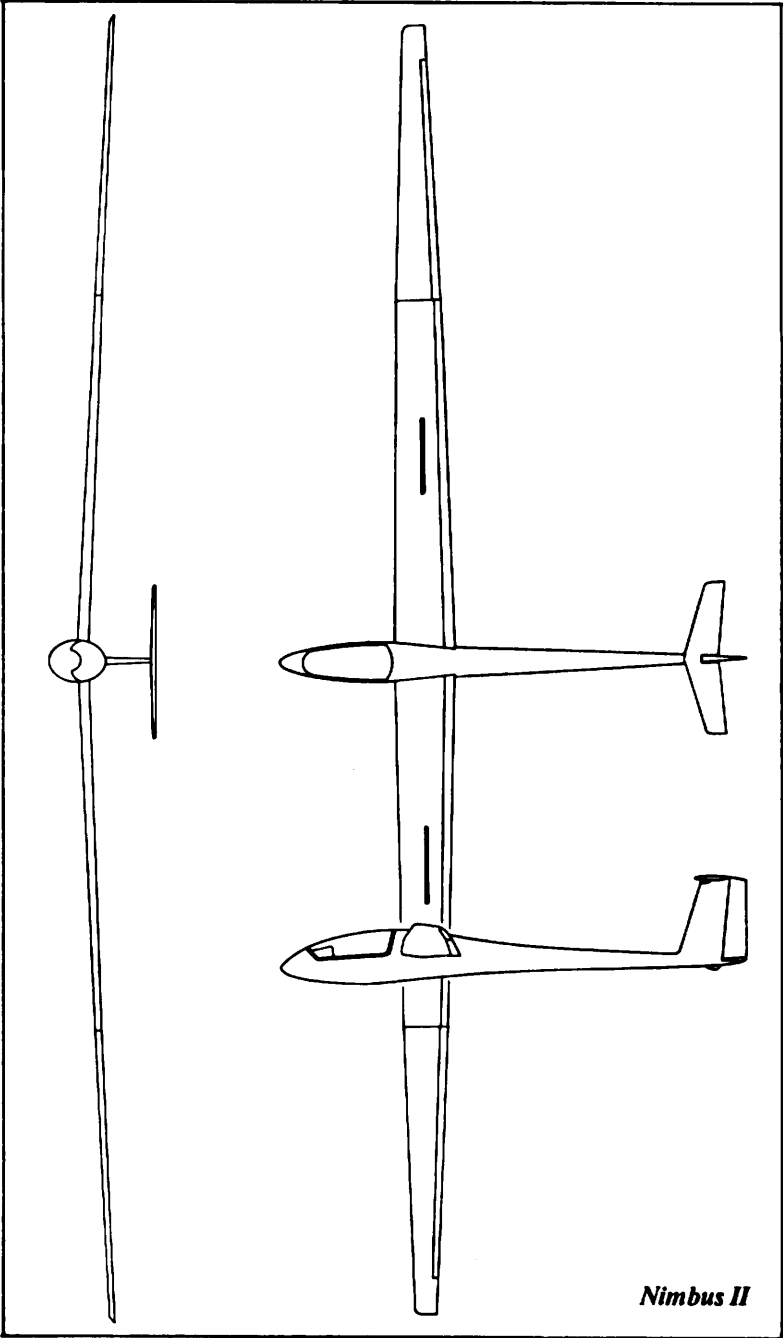
In short, the '17 is a ship of superb performance but one in which the pilot is likely to lose contest points because of inadequacies in detail design. Herr Waibel claims these details are not of great significance, but the majority of the '17 pilots in Australia were planning on converting to the Nimbus at the earliest opportunity.

Nimbus II

Why has the Nimbus II, seemingly of slightly inferior performance—especially in climb—finally done so well more

than two years after the design first appeared? Part of the secret lies in the fact that the ship is well built but relatively crude as it comes from the factory. The surfaces are good, but the wing- and flap-to-fuselage juncture is poor, no provision is made for exhausting vent air, and many other details of sealing need attention—more so than on the '17. Much of the reason for the difference probably results from the much higher labor rates at the Schempp-Hirth works and the realistic need to minimize man hours to produce a ship at a competitive price. In short, the Nimbus is an easy ship to clean up significantly, but very few people other than A. J. Smith did anything about it until 1974, and he did not have the time to undertake the more ambitious items. Another important factor, only learned in the Fall of 1973, was that the factory-recommended flap settings proved wrong by a large margin (see below in the Waikerie report). The handbook recommends six degrees for climb but ten degrees works far better. In run, the book recommends going to -4 at about 80 mph and -7 at 95. Actual tests showed 60-104 mph to be the proper range for -4 position. These discoveries, together with wing-root fairings worked out with the aid of Dr. 'Put' Putnam of Princeton's Forrestal Laboratory of Low Speed Aerodynamic Research, made significant differences. In Australia I found I could climb away from Dick Johnson's ASW-17 with ease, especially in weak weather, although Dick had always outclimbed the Nimbuses at Liberal in 1973. Even Hans-Werner's extended-wing '17 was not quite a match for my cleaned-up Nimbus. Interestingly, Ragot's '17—apparently fresh out of the factory crate—was the only one I had trouble out-climbing. Despite the performance, Ragot was looking forward to taking delivery of a Nimbus after the contest.

Since I could have flown either ship in Australia, what led me to choose the Nimbus over the '17? Highest on the list was the performance flexibility offered by the Nimbus's much wider range of wing loading. In fact we were never able to use the extremely heavy maximum loadings due to Committee prohibition on flying at significantly over normal gross weight. Tests at the heavier weights during practice showed the Nimbus to have superlative performance at gross weights of up to 1140 lbs. Secondly, I liked the practicality



Nimbus II

of the Nimbus, long a feature of Schempp-Hirth ships. Everything worked, the cockpit layout was good and the visibility outstanding. A third factor in my thinking was a long and close friendship with Klaus Holighaus, the designer, who offered much helpful data and advice during the preparation stages despite the fact that he was himself flying against me in Australia for the German team. Designers are all stubborn as mules—they couldn't be designers if they were not able to have an almost pathological belief in themselves—but Klaus has a considerably more creative and less defensive reaction to criticism than Gerhardt.

What next? I think that both ships badly need to be produced in Mark II versions. One imagines a ship with the maneuverability and basic climbing ability of the '17 combined with the practicality and flexibility of wing loading enjoyed by the Nimbus. There is no evidence at present that ships of significantly greater span will outperform the '17 and Nimbus II in contest conditions. I certainly feel that either of these ships would outperform the original, developmental Nimbus I with its 72-foot wings in all but the most extreme weather conditions, either weak or strong. Both the '17 and Nimbus II offer a glide ratio that has been measured at 48/1, combined with excellent handling and maneuverability. Each is the product of enormous thought on the part of what certainly must be not only the two most brilliant living designers, but designers who have been outstanding enough as pilots so that each has represented his country in World Championship competition.

The Open Class seems to be bumping into the farthest reaches of technological possibility with the ASW-17 and Nimbus II. Although these two great sailplanes represent the current limits, the fact that either has shortcomings—possibilities for improvement, however slight—indicates the direction of continued progress and the assurance that even these ships will ultimately bow to the refinements of the future.

TECHNIQUES

- 9 **LOW-LOSS FLYING***
Winning by not losing
- 10 **CONTEST STRATEGY***
Thinking ahead is half the battle
- 11 **PRACTICING FOR COMPETITION***
Essential for consistent results
- 12 **THE FIRST BIG CONTEST***
And how to fly it

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9

LOW-LOSS FLYING

Winning by not losing

In most kinds of competition, there are three possible ways to win. You can have equipment that completely outclasses that of your competitors (for instance, Dick Johnson in the Fifties with the RJ-5 which was a whole new departure; no other ship was in the same league). Or you can perform better than the other entrants in one or more aspects. Or you may win by specializing in avoiding mistakes.

Number one is out because at present there really are no ships available that will significantly outperform other ships in either class. International competition in the late 1960's and early 1970's has made it clear that you can't win by way of superior equipment. How about by performing dramatically better in thermaling or high speed cruising or something of that sort? That's out, too. There isn't anybody who is demonstrably, materially, better than any of the best other people today; and if you don't think so, take a look at the close point scores again.

In Yugoslavia, for example, with the best pilots in the world flying, there was an easily catchable difference of points among the first five pilots in both the Standard and Open classes. One more day could easily have brought and upset—the points were very close. Since you can't have better equipment and you can't be dramatically more skillful at thermaling or some other aspect of soaring, there remains a third possibility—to win by avoiding a whole lot of little mistakes.

Approaching the matter of avoiding mistakes from two points of view, first we'll consider the ship itself and what the pilot can do to make the ship save time, and second, we'll imagine a two-hundred-mile contest triangle through which we investigate what Pilot A and Pilot B might do that would make one win over the other, and by how much.

Few sailplane pilots appreciate properly how long a second is and how fast seconds add up. Perhaps because I used to race boats a lot, I became aware of this. We speak a lot in racing boats of seconds per mile. You don't hear that term much in sailplane flying, but it counts just the same. Just because you don't have somebody near you so you can see that he is beating you by a second a mile doesn't mean he's not doing it.

To dramatize what I'm talking about, in 1968 in Poland, I lost third place by 20 seconds and second place by 55 seconds. If a circle takes most of us about 20 seconds to fly—that is one circle during eight days of contest flying—I was one circle out of third place and three circles out of second place. If you would like another illustration, consider this: the U.S. Nationals have been won—and lost—four times in the last eight years by margins of under 20 points. In American contest flying, points tend to average about six to eight a minute, which isn't much of a margin.

There are numerous adjustments that can be made on any ship that will help the pilot gain the advantage in a contest. In Germany, in the Spring 1968, I was fortunate and had a sabbatical so I could spend a lot of time working on the Elfe. I spent about five to six hours a day on the Elfe for more than a month, doing a lot of little things such as installing aileron seals, improving canopy fit, improving dive brake fit, covering up the tow release, and improving the wing fillets. I followed a three-page list of modifications; there were about thirty or forty items all told.

In making comparison flights before and after with one of the Swiss Elfes (Bloch's), I estimated that we gained perhaps two to three percent from doing this. We modified A. J. Smith's ship to match mine, so the two ships were—at least supposedly—very much alike. The two to three percent

became about 30 minutes saved in an eight-day contest, which happens to be just about exactly the margin by which the Swiss ship lost. Yet the Swiss pilot Bloch—a very nice chap, rather a casual type—told me when I was starting to work on the Elfe, “Oh, these little things can’t make any real difference.” Well, I think they did make a real difference. They gave A. J. Smith and me a margin to play with over the Swiss Elfe.

Aside from changing around physical properties of the ship, what else can save a few seconds? In the ship you fly, does everything really work all the time and are you really confident about it? Many of the ships I fly—borrowed ones—have variometers like that of a BS-1 I flew that had a seven second lag. Some ships have total-energy systems that *don’t work at all or very badly; all sorts of little things that don’t happen the way they ought to happen.*

Do those malfunctions add up at all? I can tell you from my own experience in Texas in 1967. There I had a brand new Diamant 16.5, absolutely fresh out of the crate. I had about three hours flying on it before I took it to Texas. We discovered in practice in Texas that the total-energy system worked dreadfully, yet this was the system I had just taken out of my Austria in which it had worked perfectly for two years.

All sorts of experts were consulted but no one could figure out what was wrong. Finally, with the help of Paul Bikle, Dick Schreder, and others we found out what the problem was on the fourth contest day. At the same time the ballast tanks finally arrived from Switzerland, so I had total energy that worked and ballast tanks for the first time on the fifth day of the contest.

You might be interested in how the scores went: on days one through four I placed 28, 21, 1, and 13, (the 1 resulted from following Dick around, using his instruments). On days five through eight, with the working instruments, the places were, 6, 1, 1, 4. Now you may say, “Oh, well, he learned how to fly the ship.” Yes, no doubt that contributed to the difference in scores, but I don’t think an average that went from about sixteen to about three was entirely due to

becoming accustomed to the ship. It was partly due to knowing where the thermals were by having a decent total-energy system.

Having considered adjustments to the equipment that can save valuable seconds of contest time, let's now examine techniques that save seconds. To emphasize the importance of saving such tiny units of time, in a hypothetical situation, we'll add up the seconds saved, see what the total amounts to in miles an hour, and what the result is in points.

Suppose that we're flying together around a 200-mile triangle, that it's a pretty reasonable sort of eastern day, and that we have about 300 foot per minute lift. Imagine that the leader, whom we'll call Pilot B, averages 45 miles an hour, and that each pilot uses thermals averaging ten miles apart totaling 20 thermals for each pilot. Let's assume that each pilot has exactly the same ability, that neither can out-thermal the other and neither can out-cruise the other. Once they're set on cruise, they go exactly the same. They are both flying the same make of ship. Everything is as much alike as possible. Using the following ten items, Pilot B can beat Pilot A by an enormous margin.

First, consider the start. Some people don't realize that starting accurately is a very difficult thing to do and requires a great deal of practice. Imagine that our Pilot B crosses the starting line at 3200 feet and 140 miles an hour. We'll say 3280 feet is the starting altitude. He gains about 150 feet by pulling up as soon as he's safely across the line, doing so gradually to convert his speed into climb until he's down to his anticipated cruising speed.

Pilot A, on the other hand, hasn't done very much practicing on his starts and underestimates the amount of altitude he needs. He starts a bit low at 3000 feet and he's only doing 80 miles an hour as he crosses the line. He looks up, sees the other chap ahead but doesn't think very much of it; however, if he gets out his calculator, he'll find out that he needs 80 seconds to climb that lost altitude. There is no way to get it back. One second after the start, Pilot B is 80 seconds ahead!

Both our pilots now head toward likely looking clouds. As you know, it's rather common to hit a certain amount of sink alongside a likely looking cloud. Pilot A goes in toward a cloud, thinks he sees a really good looking one and begins to horse back on the stick slightly before he gets there, anticipating the bounce. So by the time he hits the sink, he's only going perhaps 65 miles an hour. The sink goes on for 12 seconds. He will lose about 120 feet. Conversely, Pilot B, holding his air speed at 90 miles an hour goes through the sink at that 90 miles an hour, and is in it for only 9 seconds, and of course loses only 90 feet.

Not very much difference. However, Pilot B can use his speed to pull up in the thermal and gains, from flying 90 miles an hour, approximately 150 feet before he turns. Pilot A has wasted most of this speed by pulling back gradually and losing in the sink, and the difference works out at exactly 37 seconds. If essentially the same thing occurred in 20 thermals in the 200 mile triangle, consider the advantage Pilot B would gain over Pilot A—740 seconds, or 12 minutes and 20 seconds.

Take another example: both pilots enter the thermal properly at high speed but Pilot A does what I've seen a lot of people do: he immediately rolls into a bank, a good tight turn so as not to lose the thermal, thereby, of course, wasting all his potential energy. Pilot B pulls up as usual before turning. Pilot B will get a total gain of approximately 150 feet which takes 30 seconds to climb, at our 300 feet per minute. On the 20 thermal day, that's 10 minutes.

Take a better case: Pilot A comes into a thermal, he sees 200 feet per minute on his total energy variometer, but thinking better things must be nearby, makes a couple of circles to search. He finds nothing better than 200 feet per minute and goes on. Pilot B pulls up, notes that he only gets 200 feet a minute on the variometer when he knows that the lift is averaging 300 feet a minute for the day, noses back down as soon as he's out of the best of the lift and pushes on. This gains him 15 seconds. You may think it might be a little bit more than that, but you have to allow for the fact that

Pilot A did gain something or other in his 200 feet per minute.

Now, Pilot A sees a gaggle. Gaggles have a remarkable fascination for the Pilot As of this world. Seeing the gaggle—say 20° off course—he goes over to join. The lift turns out to be 200 feet a minute. I don't know why, but whenever you see a large gaggle, the lift is generally feeble. But Pilot A is an optimistic type and he thinks it's got to be better, otherwise there wouldn't be all those ships there, so he makes about three turns, hoping for better things before he goes on. Pilot B sees the gaggle, notices that it doesn't seem to be doing anything very special and ignores the whole thing. The gain is 20 seconds all told from doing this. Now, you can imagine for yourself, how often on the average 200 mile flight you or I get lured by gaggles.

I think one thing to remember about what Dick Schreder has said on gaggles is that it's an awfully good idea to have at least a mental list of the top contest numbers. I find it handy to note the top paint jobs as well. Paul Bikle, for example, is a lovely type. I don't know a nicer man. He always paints the nose of his ship a nice shiny red. You can spot it from four miles away—a really good trick for the opposition. I like to have the most anonymous glider I can possibly get. If you could throw a veil over the numbers from start to finish, I'd do it.

If you're too far away to read numbers, there are other ways to tell whether gaggles are worthwhile or not. Obviously, when you are low and desperate, gaggles are always worthwhile. Otherwise, note the bank angles. High performance ships wrapped up in good tight angles of bank, usually indicate that the gaggle is worth going to. If you see a bunch of Ka-6s milling around in 20° banks, turn immediately in the other direction. It's almost certain that a decent thermal has tightly banked ships. The only exception is very late or very early in the day, when thermals are gentle sorts of things, easily frightened off by tightly banked, aggressive sailplanes.

We have investigated the various ways of entering thermals, but how about leaving thermals? My contention is that

leaving thermals unskillfully can be just as costly as entering them badly. Imagine that our friend Pilot A has climbed to within about 1000 feet of cloud base and sees the lift drop off from 300 feet a minute, which has been the average, to 200 feet a minute. He continues to circle, seeing ships above, four more times because he's sure it's going to get better, besides all those other chaps are up there and he doesn't want them getting ahead. Pilot B takes one look at the variometer and when it drops, tightens up, and gets out of the thermal right away. You'll find that even allowing for the extra altitude that A gained, B has gained 23 seconds by not climbing in the weaker lift.

As Dick Schreder has said in the past, I think one of the commonest mistakes that all of us make at one time or another is keeping on circling, fat, dumb and happy, when the lift has dropped off. If you find, as we so often found in Poland in 1968, that the lift drops off materially at, say, 5000 feet, although you can climb to 6000, you have no business flying around at 5100 feet. All you are doing is wasting time, precious seconds.

How about techniques of leaving thermals? Our adequate friend Pilot A leaves his thermal at thermaling speed of 50 miles an hour. Most thermals have a good bit of sink alongside and he is only going 60 or so when he hits it. Pilot B uses a technique that I first heard about from Adam Witek of Poland. On his last circle he tightens up hard at the far side, comes right across the middle of the thermal with the nose well down, gaining speed as fast as ever he can, so that by the time he hits the far side he's doing 80 or 90 miles an hour. He goes through the sink briskly, and gains five seconds, for each of 20 thermals.

It's a very good trick, that tightening up and going right through the center to gain your speed. If instead, you start gaining speed gradually you'll certainly do your gaining of speed in sink, which is not a very profitable way to fly. I'm not guessing at these figures. I worked them all out with my calculator, and I found that it cost five seconds under the conditions named to leave the thermal in a not-so-clever fashion.

Let's imagine that cruising between thermals, Pilot B flies exactly what his speed ring says. If it's 300 feet a minute, he flies the proper speed for 300 feet a minute. Pilot A does what I think most of us have done at one time or another. He says, "Well, gee, it doesn't look so good ahead, I'll just pull back ten miles an hour to be on the safe side." Well, that will be on the safe side all right, and some time or other it might be useful, but if you calculate what the one mile an hour average speed lost costs you for four and one-half hours, you'll find it adds up to six and one-half minutes.

Now, in this comparison we've been making an assumption which is very rarely true—that our two pilots are exactly equal in inter-thermal flying ability. The best pilots agree that the whole secret in soaring is inter-thermal flying. There is no top pilot in America or in the world that we've seen who can consistently out-thermal anybody else. You hear a lot about magic pilots and thermals, Dick Johnson and all that sort of thing, but you will not find that he can outclimb any other really good pilot by any very considerable margin. The only place that you can gain a lot is between thermals. For the sake of this study, we're just ignoring the fact that one pilot is going to be better than the other between thermals; however, all the top pilots I know work the hardest when they're flying from thermal to thermal.

The things to work at are indications of cloud streeting, indications that you're in a trough of sink, indications of the strength thermals are likely to have ahead. If you're down in Texas, and there are likely to be dust devils, a very clever trick is to time the duration of a few of those dust devils. There is absolutely no point in heading for a dust devil that is ten miles away when you know the dust devil is going to last six minutes. You just aren't going to get there in time. You are going to get there fairly low, stretching for it, and there won't be any dust devil when you get there. We have all pulled this trick once or twice, and it is a very grim feeling indeed.

I think there's almost invariably some piece of knowledge you can get by paying attention that can make you go faster between thermals. Knowledge that has to do with terrain,

with how the ship is performing. Even looking at how the flies are gathering on the leading edge will tell you something about what you ought to be doing next.

Terrain is often very important, particularly down in Marfa. I don't think there was anybody in '67 who wasn't caught in the McCamey trap at one time or another. You know, you are barreling along up in Fort Stockton in five meters, thinking you're really going and all of a sudden you'd be barreling along—and barreling along—and barreling along—and you'd passed up a whole lot of thermals you wish you hadn't. You had failed to notice that the terrain had changed fundamentally. It had all become sand, and sand doesn't make very good thermals. People with their eyes open see that sort of thing. Irrigation areas, for example, are sudden death all over the mid-west and especially around Texas where there are getting to be so many of them these days. Where you see irrigation areas you may assume there are no thermals; and you can count on an absence of thermals for a long way to leeward of the irrigation area as well.

Back to our mythical flight. Just for fun I calculated that Pilot A gave the turn a 400-yard margin to be on the safe side. It cost him 100 seconds for two turns. There's just no way to make it up, so 100 seconds are lost to the chap who just went over the turn and banked really sharply and got on about his business on the next leg.

How about final glide? Pilot B probably uses the optimum final glide for wind and thermal strength of 25/1 on his computer and he finishes off at the customary five feet off the deck, just as it says in the books. But Pilot A hasn't practiced with his computer very much, he doesn't trust it very much—some people don't when they don't practice with their computers—and he decides, "Gee, it looks like a long way," and he goes up to 20/1 just to make sure. Let's suppose the final glide is started from 25 miles out. Pilot A will need 1300 extra feet which will take him 260 seconds extra to climb. He will gain back 180 seconds by being able to come in faster, but he still loses 80 seconds overall. If our Pilot A, is one of those chaps that finishes at 300 feet (we see

a lot of this at the Nationals but especially at Regionals) he will have lost another minute, because it takes a minute to climb 300 feet at the finish line, just as it did at the start.

Suppose we add all those items up and see what happens. At the start—A loses 80 seconds; entering thermals—37 seconds each—times 20, making a total of 340 seconds; using weak thermals for approximately five times, losing 15 seconds a piece, will add 60 seconds; lured by a gaggle, three times will lose 60 seconds; unnecessary extra circles at the top of a thermal, will lose him 460 seconds; leaving 20 thermals too slowly at the cost of 5 seconds each will total 100 seconds lost; cruising too slowly will cost him 390 seconds; overflying the turns by too much of a margin will cost him 100 seconds; and a bad finish technique will cost him 80 seconds. What does this add up to? It adds up to 2070 seconds which is 34-1/2 minutes. Remember, these are pilots of identical abilities flying the same ship.

Now, if B finishes in four hours and 27 minutes—which he would at an average of 45 miles an hour—A will finish in 5 hours 1-1/2 minutes for an average of 39.8. If points cost five per minute which is a low figure under the U.S. rules, A will have lost 173 points. Multiply that by 8 days for the whole contest. If points count 12 per minute, as they did in the World Championship (I took the trouble to average them up to see what they count) Pilot A will lose 416 points for the day. Keep in mind that in this hypothetical flight, we've assumed that the pilots were identical, the ships were identical, that the only gains were in low-loss possibility factors.

Low-loss flying isn't dramatic. It isn't showy. And it does demand a good deal of discipline. But it works.

10

CONTEST STRATEGY

Thinking ahead is half the battle

We will consider this subject under four general categories based on the various kinds of tasks and problems. First, we will take that persistent relic, the free distance task. Following that we will cover its slightly disguised cousin, the cat's cradle. Next will come the speed task; and finally we will consider general strategic problems with the type of ship and one's current placing in the contest. I will illustrate all of these problems by reference to specific contest flights, and I will give you an idea of how successful I have been on each type of task so you will know whether or not to heed my advice.

First, let us consider the jolly old free distance task, dearly beloved of Minamoa owners. I have won two out of nine free distance tries, by the way, in case you think the grapes are entirely sour. A. J. Smith and Dick Schreder have equal records over the same years. No advocates of the task, that I know of, have won more than one. Since I have, many times, said all the nasty things I can think of about this expensive, pointless, outdated and luck-prone event, I will spare you my opinion of it now. Unfortunately, despite the low regard most of the better contest pilots have for the task, it is still very much with us (we had not one but two at the 1970 Standard Class Nationals, one of which turned into a no-contest day), so we might as well think of the smartest ways to fly the thing.

The reason that the free distance day is so luck-prone, and thus detested by the better competitors, is that one seldom has adequate or accurate weather information. For example, in 1964 there was supposed to be a 25-knot southerly wind, so everyone headed dutifully north into 'nothing' type weather. Actually the wind was quite light. A few of us decided to chance it and had the best flights, A. J. Smith winning. In Adrian, in 1965, it was supposed to be good to the west and raining in the south. One chap apparently got his directions mixed, went south and won easily. Those of us who went west found the rain. The weatherman apparently got his directions mixed, too. In 1969 there was an uncrossable front 200 miles north so the smart money went easy for about 350 miles. As it happened the front had a big hole, and people who drifted off downwind to the north found it and poured through with distances up to 520 miles. And so it goes.

What does all this tell us from a strategic point of view? The first lesson is that you cannot realistically trust the weather information. The next is that you had better use a sort of fail-safe plan. By this I mean that, unless you are hopelessly behind, you had better try for a relatively good flight rather than a flat out winner. The logic here is that most of your serious competitors are in the same boat and will probably make about the same choices given the same information. The types that win big on free distance days by trying the radical approach are hardly ever the pilots that end up in the top places.

The most important information that you need concerns the weather. You should listen to the briefing with great care, noting especially such natural barriers as fronts and such speed-producing factors as wind and thermal strength. If the free distance task comes after the third contest day, you should be beginning to have some idea of the idiosyncrasies of the weatherman. Does he, like Dave Owen, always seem very conservative on when thermals will begin? Does he never look out the hanger door to see what's actually happening? Does he consistently under- or over-estimate thermal strength? I like to go have a bit of a chat with the weatherman each day after the briefing, not so much because

I may get extra information, but just to get to know him and let him get to know me. This allows me to judge better the degree of certainty behind his predictions. I usually drop by once an hour before takeoff to see if there are any changes and particularly to see if the heating is going according to prediction.

Normally the weather briefing will show one or two definite directions to go. For instance, at Reno, in 1966, it was blowing 50-60 mph with weak thermals so no great concentration was needed. If there are conflicting choices, you should investigate the possibilities carefully. Too many pilots just turn downwind and hope for the best. You must plan to maximize flying hours and go where you can get the most distance. As another example, in 1969 at Marfa there was a front 200-250 miles downwind with little chance given either to cross it or run along it. West looked dead, east had a warm front. A narrow line to the northeast offered a crosswind turning to headwind after about 300 miles, with very weak thermals late in the day. The latter choice didn't sound very promising, but it was the correct one because it offered a chance to stay airborne for 8-1/2 hours. Even if you only averaged 40-45 mph you would have 340-380 miles, whereas the northern route offered 250 miles at most, with average speeds of 50-60 mph. I actually covered 376 miles to the northeast.

Terrain features should be considered in plotting course. If there is a choice, try to be over reasonably landable country at the end of the day. You can cover a lot of extra miles if you don't have to break off at 1500 feet to take the last available field. I lost 30 miles that way in 1966. I gained a few additional miles in 1969 by being able to pass up an airport when I was down to 300 feet to reach some obviously good fields beyond.

The pilot should make major changes of plan during the flight if conditions seem markedly different from the forecast. It is very important not to mill around aimlessly. Too many people circle interminably at the top of used-up thermals because they can't decide what to do next.

A few years ago Paul Bikle thought up the prescribed-area distance task, more irreverently known as cat's cradle or Bikle's basket. The idea was to test the pilot's evaluation of weather and course possibilities as in free distance, but without incurring the long, expensive retrieves. Unfortunately, the task has usually turned either into a nine-hour race (in good weather or predictable conditions) or a straight-luck job in questionable weather.

In 1969 Paul thought up a great improvement in his system but, unfortunately, contest directors (at least in the Standard Nationals) often did not call the task on the sorts of days that Paul specified, so we ended up with the worst of two worlds. We have been averaging about two cat's cradles per contest lately, so the task deserves a good deal of strategic consideration. Incidentally, I have flown nine cat's cradles in national or international competition, and have won four, for a win average of about 45 percent.

In determining where to go in a cat's cradle, the most important thing is to plan backwards. The key to doing well lies in being in the right spot three hours before the anticipated end of the flying day. A normal, prescribed-area envelope will be about 250 miles long and perhaps 200 high, so there is quite a lot of room to move around. The whole point lies in being as far upwind as you think you will be able to fly in the last three hours so that, as the thermals weaken, you can take maximum advantage of the wind. For example, if you think that the day will end at seven and you expect to average 35 mph for the last three hours, and the wind is 15 mph, you should try to make your last turn about 150 miles upwind at around 4:00 o'clock.

In 1969, in the Nationals, in the second cat's cradle, we had a 15 mph wind from the east. Wally and I chose to buck that wind up to Odessa (145 miles), then turn southeast to buck it again to Big Lake for another 80 miles. We rounded Big Lake according to plan at about 5:00 o'clock, having covered only 225 miles. Next, we flew west to Wink with a quartering tailwind and finally turned downwind to Sierra Blanca, the extreme western end of the course, arriving there at about sundown with just enough altitude to glide the last

20 miles back into the dying wind, for a total of 480 miles. During the last weak hour we passed many pilots who had allowed themselves to get downwind too early and were stuck trying to get upwind in 60 fpm thermals. At 5:00 o'clock some of those pilots must have had a 70-mile lead on Wally and me, but they don't count up the points until you land.

An even more interesting example of the same sort of strategic planning came on the first day of the Standard Nationals in Elmira in 1969. As many readers may remember, the wind was about 15 mph out of the WNW with about 400-500 fpm thermals predicted. With this in mind, I planned to go downwind to Wurtsboro (140 miles), back west to Bloomsburg (140 miles), using the heart of the day to buck the wind and, arriving there a bit after five, coast downwind as far as possible. In actual fact, I soon discovered the thermals were far weaker than forecast; so, after about 25 miles, I turned south to go to Mount Pocono, arriving there about 2:00 o'clock. Once there, I turned west toward Bloomsburg, bucking the wind in 300 fpm lift, and arrived about 4:30 with the day obviously beginning to die. I turned east in thermals which varied from zero sink to 100 fpm and managed to drift 120 miles before landing at about 7:00 o'clock for a flight of 262 miles. I later discovered that most of my competitors had gone to Wurtsboro first but then had not been able to get far enough upwind to use the last two hours of the day effectively, many of them having run out of course to the east by 5:30. The next best flights were about 210 miles.

The kind of planning that I have been recommending takes some rather close calculation of likely speeds. A successful pilot should be able to figure his average speed in a given set of conditions to within 3-5 mph. Always work out speeds when practicing, just to see how close you can get.

As previously stated, the key to successful area distance flight is weather information, and equally of course, the weather is usually absent entirely (as at Elmira last summer) or doubtful at best. Unfortunately cat's cradles tend to be called in rather chancy weather, so results often have more to

do with luck in not getting blocked by a big storm over your turn than any great wisdom displayed by the pilot. As in free distance flying, the fail-safe method seems best. Try to avoid turn points that will leave you with no productive alternate if you find them blocked when you get within ten miles. The whole U.S. team lost because of that kind of mistake on the first day of the Internationals one year.

An interesting and typical weather decision turned up on the second area distance in the World's in 1970. The prediction called for 600-800 fpm thermals in the western half of the area with scattered cu-nim, and 400-600 fpm in the eastern half with no chance of storms. The western sector would obviously produce the best flights if there was no blocking by storms, the eastern end would give less mileage but no blocking and the chance of a long downwind final glide. The whole U.S. team chose to buck the wind and weaker thermals to head east, partly influenced—in my case—by being well up in the standings, but very much influenced by our collective disaster with cu-nims on the first day.

All turned out about as predicted, except that there were no storms anywhere. Wally Scott and I turned in about 482 miles, Neubert of Germany in the Kestrel 22 won with 500 miles, all done in the western sector. I still feel I made the right decision. In Neubert's shoes, I would have done as he did, since he had to have a very good day in order to climb back up in the standings. Wally should probably have taken a chance on the west, in view of his relatively poor standing at the time, but he may have been partly influenced by the advantages of team flying. There is no question that our team flying worked superbly and helped both our scores a lot. A more effective teammate or a better pilot than Wally Scott would be hard to imagine.

The strategy of choosing takeoff times assumes great importance on distance days. Ideally, I would take the earliest possible time plus ten minutes or ten minutes after the first man, whichever was later. The theory here is that you will have a few other ships launched ahead of you to mark whatever little, early thermals there may be. Of course, if you have reason to think that everyone is taking off far too

late, it pays to keep your later time until the last minute and then move quickly up to the head of the line and get off. The reason for the last minute move is that sailplane pilots often show a depressing similarity to sheep, in that they will do whatever they see some other pilot do. In the Worlds' in 1960, Dick Schreder dashed to his ship, jumped in and launched into an obviously dead sky—and watched 60 of the world's best follow suite. He did it just for fun.

Assuming that you do get off among the first and it is very weak, don't be in too big a hurry to dash right out on course. Many such top pilots such as Dick Johnson will mill around for half an hour or more waiting for conditions to improve, and, especially, waiting for some of the more impatient types to get out on course. Keep in mind that one can make fabulous time jumping from gaggle to well marked gaggle and soon be right up with the leaders. Of course, if you realize that everyone is hanging back unnecessarily, you had better get going. Unfortunately, if you are at all well known, you will immediately attract a minnow pack of followers. The best bet is to ignore them; they are usually quick to become lost.

Speed tasks are, for me, the most fun to fly since the luck element is fairly low, and one is somewhat less dependent on inaccurate or doubtful weather reports than in distance tasks. They are also cheap and relatively non-tiring, since retrieves are seldom involved. I am supposed to like them because they are a big specialty of mine, but actually, I have won 23 out of 54 flown for an average of 48 percent as opposed to a 45 percent average on cat's cradle tasks. My experience has been that in an 8-day contest of all speed tasks, all the elements of judgment and weak-weather ability will be tested fully as well as if distance tasks were thrown in.

The basic strategy in speed tasks has to do with time and its proper use. As soon as the task and weather have been announced, the pilot should get busy with his computer and figure out likely speeds. He needs to know the best possible speed, the likely speed and a minimum likely speed. If the course is 200 miles and the maximum lift predicted is 400 fpm, he might figure 54 mph as maximum, 46 mph as likely and 35 as least likely. The times, thus, are 3:40, 4:20 and

5:40. If the lift should be starting at noon and ending about 8:00 o'clock the pilot would want to start between 13:45 and 14:00 .

The reasoning is that if the weather is much better than anticipated, you will still be doing most of your flying in the heart of the day; if the weather is about as predicted, you will be utilizing the best 4-1/2 hour stretch; and if things really fall apart, you will still make it home. With the latter in mind, a pilot should get airborne about an hour before the planned start so that he can feel out the day. This hour of leeway should be used to time climbs in order to determine lift strength and ceiling. If conditions seem markedly worse than anticipated, move up the start time accordingly. A false start or two during the pre-start period will often encourage competitors to start too early. There is a strong psychological pressure to get going; it should be resisted. Those who don't resist it will serve as thermal finders for you all the way around the course.

If your chosen starting time is 3:00 o'clock, and everyone else seems to be long gone by 2:30, consider the advisability of starting early. Those others may know something you don't. You will also lose their valuable thermal marking service—especially helpful on weak days—if you stick too closely to plan. Another general rule: if in doubt, start earlier. You may not win the day, but you may save the contest. I probably lost the 1968 Hahnweide contest in Germany by starting too late on a 300-km triangle. I made great time until I hit the ground 60 miles short of the finish. I certainly scuppered myself on the first day of the 1967 Nationals by starting a bit too late in my greed for a few extra points.

The growing prevalence of designating starts causes a strategy problem. Especially on good days, with fairly short tasks, one is often launched two to three hours before the best starting time. The endless milling around while awaiting the magic hour is boring and extremely sapping of the competitive drive so necessary for winning. Almost everyone starts too early under these conditions, and you might want to adjust your strategy accordingly. When flying under our good old pilot-selected takeoff system, it is a good idea to

keep an eye on unpredicted weather that may influence takeoff time. Early observation of the growing cu-nim that turned into The Great Tornado of the 1967 Nationals allowed me to move my launch time up an hour and win the day. Such sneaky maneuvers are best done quietly. If you always have your ship out on the line early, fewer people will wonder about your sudden activity. Make sure the crew is loitering nearby.

The other strategic aspects of speed-task flying, such as knowledge and use of terrain, have been covered under the other type tasks. Needless to say, you always round downwind turns at maximum altitude and upwind ones as low as you dare, but these are more facets of tactics than of strategy.

We have covered strategy for particular tasks; now what about overall strategy? There are two major considerations: ship and place in contest.

First, consider the ship. You will be unhappy to learn that not all of us always get to fly the best ship for a given contest. A. J. Smith first made his reputation in an LO-150, hardly a world beater even ten years ago; Dick Schreder and I both had our first wins in the HP-8 which—at close to eight pounds wing loading—sometimes left a few things to be desired. The point is to utilize up to the maximum the things you can expect to do with your equipment.

If you fly a Ka-6, you cannot hope realistically to win speed days. Trying to beat the lead sleds at their own game will result in your taking too many chances and ending up on the deck. The trick is to pull a Dick Johnson. Dick has never won a speed day as long as I have been flying against him. On the other hand, he never loses by all that much; and, with our point system—which gives disproportionately small encouragement to speed—he does very well. With a light ship you must do as Dick does, and become a weak-weather specialist. A Ka-6 is right up there with the latest glass ships when the thermals drop into the 100 fpm category, as John Seymour kept demonstrating in 1970 at Elmira.

Consistency when others are being inconsistent wins a lot of contests. Ed Makula, flying a Foka in Reno in 1966, gave a

perfect illustration of this principle. Conversely, if you fly a heavy ship you must do well on speed tasks in good weather and just try to hang in there very cautiously in bad weather. I find it very difficult to discipline myself to fly at max L/D when I am used to cruising 30 mph faster. There is an almost ungovernable tendency to drop the nose and lose the trailing gaggle, but it is depressing to watch from the ground a few minutes later as they drift cautiously on overhead.

Your ship's performance may influence your overall approach to the contest. In Marfa, in the Internationals I was confident that the Nimbus' performance edge would bail me out even after the first disastrous day. Consequently I flew quite conservatively, especially towards the end. Neubert's bad luck on the second day allowed me to do this; otherwise I would have had to push really hard. In Elmira in 1970 I decided to fly extremely cautiously, never really trying to win a day (and seldom winning by much of a margin), because I felt sure that in the very weak weather my ship had no real advantage, but that consistency would be everything.

Practice days can be important strategically. One should never lose a chance to defeat another ship in either climb or glide, and one should never continue a comparison flight if the other pilot can see he is beating you. A. J. Smith and I took great and planned delight in Poland in flying rings around all the Fokas we could find, just to demoralize the opposition. I did the same with the Nimbus in 1970. Pilots who think they will be beaten are beaten.

Your place in a contest, or your anticipated place, is another major strategic consideration. Generally speaking, the farther up you are in the standings or the higher you expect to be, the more cautiously you fly. Winning individual days is not important. It is not losing days that counts. On the other hand, if you are tanked for some reason as Dick Schreder, I, and so many others were on the first day in Texas in 1967, you had better consider a go-for-broke approach. My thinking that year was influenced by the fact that I didn't expect I could get on the U.S. team for the following year unless I was in the first five. As a result, I took far more chances than I usually do and finally made it to fourth spot.

Strategy by itself will never win a contest. Tactical flying is still far more important. Still, proper use of strategic considerations can often save the pilot from hasty and rash decisions which will waste the valuable seconds saved by careful flying. Strategy consists of taking the long-range view of a course of action, to see where it will get you at the end of the meet. Too often a failure to consider overall objectives causes a pilot to take chances not justified in terms of the desired long-range result.

11 PRACTICING FOR COMPETITION

Essential for consistent results

Practice is obviously the key to improvement whether a pilot has two hours or two thousand, but over the years I have seen a great many pilots who confuse practicing with just plain flying. Practice for competition must always be channeled toward specific improvement and specific problems. Meaningful practice must cover not only the mechanical aspects of flying itself but everything that can lead towards winning. In this discussion I would like to cover three general areas that seem vital to consider if a pilot wishes to compete seriously. These three areas are psychological conditioning, making use of the past, and actual flying itself.

I would like to start with the psychological aspect because I feel that for most people it is the biggest single stumbling block. Soaring is made up of decisions, and decisions are relatively easy when there is little pressure. Unfortunately pressure is the essence of competition flying, and some people who do well in day-to-day flying tend to come apart under stress. I remember in the early 'Sixties, down at the Marfa records camps, doing a lot of flying with Ben Greene and thinking he was about as fine a pilot as I'd ever flown with—cool, smooth, always making the right decision. But until a couple of years ago, he couldn't seem to put it together under contest pressure. The basic difference I see between Ben now and Ben then isn't the technical skills, which are much the same. The difference is in his present ability to keep the pressure under control, so it works for him rather than against him.

How do you practice to get this control? The only way is to enter all the contests you can. Big contests are especially important. Many people who do well in Regionals never seem able to put it all together in the big contests. I know pilots that I would consider hard to beat in a fifteen-ship contest that I would never consider as competition in the Nationals. Their mental attitude is all wrong. They begin to think about all the people who could beat them rather than all the people they are going to beat.

An important thing to realize is that pressure is good; that the butterflies in the belly help performance as long as you keep them under control. It is important that the crew as well as the pilot be able to handle pressure. A good crew has to be hopped up about the team effort, has to really care. I would far rather have a thoroughly competitive crew than a don't-give-a-damn one who had a few more skills. But, like the pilot, the crew has to be able to handle the pressure. Crew members who start running around like chickens with their heads cut off are worse than useless and very distracting to the pilot.

One of the hardest things to learn is proper pacing in competition. Beginners tend to use up all their psychic energy in the first four days of a meet and they have nothing left for the last half. This may be one reason why some of the newer pilots, who do very well in Regionals, can't seem to handle a Nationals. In 1971 in Bryan, a pilot who was well up in the first ten at the end of the fifth day told me that he was just going to try to hang on to his spot for the rest of the contest. He no longer had the aggressive attitude that it takes to win, yet he could easily have beaten at least one of the pilots ahead of him.

On the morning of a contest day, I like to have all the mechanical and technical problems out of the way at least an hour before takeoff. Planning that way gives me time to psych myself up. While concentrating on the task itself, something I have often noticed before take-off is a growing sense of loneliness, of growing farther and farther away from friends and crew as one gets more and more immersed in this thing that you have to do alone. I always like crossing the finish and landing. It feels like coming back to humanity.

On speed days, the period between take-off and crossing the start line offers problems. There is a tendency to do a lot of gaggle flying and waste a lot of energy trying to outclimb people. If possible, go off a couple of miles and find a thermal of your own to laze around in. If there are only one or two thermals, just fly around in big lazy circles, relaxing as much as possible. You don't start to make points until you cross the starting line. I find it important to hold on to just the right amount of tension during these waits that can take two hours and more.

Tension will inevitably mount as you near the end of a contest, particularly if you are doing well. It is very important to keep control just as you would keep control of physical energy if you were running a race. I remember in the Nationals in Marfa in '69 when Wally Scott, Rudy Alleman and I were nearly even in points going into the last day. When the 350-mile task was announced, I looked over at Rudy and watched his face fall. I knew right away that he was pretty well licked. Looking over at Wally, I could see his thin little smile. Nobody handles tension better than Wally.

A good pilot must be aware of the psychological state of competitors. Some people are all finished if they have one bad day; some never give up. On the final day of the World's in Texas, Hans-Werner Grosse, a couple of hundred points down in second place, came over and said "George, how are we going to beat that Frenchman (Mercier, standing third)?" Immediately it was clear that Hans-Werner was concerned about keeping second rather than winning first; there was no need for me to worry much about him.

There is no real way to practice acquiring the right mental attitude except by entering all the meets you can and by being constantly aware of the importance of tension and its pacing. No amount of flying skill will enable you to win if you go to pieces under pressure.

The second major factor in realistic practice is to incorporate information gathered from experience. Every pilot who seriously wants to win must be aware of his own strong and weak points. He must be able to look back at flights and contests of the past and decide what he did well

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and what he did badly. Sometimes it helps to ask friends what they think are your strong and weak points, but politeness frequently prevents criticism that is sharp enough to be of any use.

In my own case, I find that I fly best in relatively predicatable weather where patterns of lift can be established and used. My weakest point seems to be in making use of banded or cycling weather such as we had in Nebraska in '64, Poland in '68 and Bryan in '71. A. J. Smith is far and away the best pilot I know at flying in such conditions. He got a 3-1-1 in those three contests; I averaged about 18th. Obviously, in both thinking and actual practice, I need to work diligently on that problem.

In trying to ascertain past performance, don't be misled by good placings that you didn't deserve and don't be disturbed unduly by just plain bad luck. On the second day at Bryan I finished 2nd behind A. J. Smith in my Standard Cirrus. Although that may seem to have been a successful flight, actually I made several rather bad mistakes. On the first leg I allowed myself to be lulled into complacency by the relatively strong conditions around Bryan and got much too low looking for a big thermal out beyond Napoleon. I should have seen the indications of weaker lift there. The second leg went very well, because I recognized the distant spacing of the few strong thermals and waited to get to them before circling even though it meant getting lower than I like to be.

At the second turn, observing very little action, I made a real beginner's mistake in joining a gaggle that obviously wasn't doing very much. The penalty was dragging a lot of them along for half the third leg. Finally I made a navigational error during my last climb, thermalled higher than necessary, and lost perhaps five minutes in finishing too high. Although I finished second, it wasn't a good flight.

Conversely, on the 5th day I finished 42nd, but feel the flight was not unsuccessful. With wide-spaced but fairly strong dry thermals, I left the last turn at 6000 feet and about 80 mph to try to leave a large gaggle behind. In one of those nightmare cases that haunt your dreams, I found absolutely not a ripple and landed 35 miles farther on. I

discovered later that the rest of the gaggle had set out at max L/D, spreading out to increase chances of thermal finding, and had finished slowly but safely. However, I was trying to win and felt the risk worth taking.

It is important to be very skeptical about attributing problems to luck. If 'back luck' always seems to haunt you under certain circumstances, it's more likely to be bad judgment.

Learn to look at performance realistically, not in terms of final placings. In the competition in Bryan, the pilot who ended up 5th had daily placings of 27-35-2-13-12-23-20-19. The pilot who finished seventh had 6-4-20-22-2-2-4-29. They were flying ships of roughly equal performance. The seventh place man is obviously the better pilot, having five days in the top ten as opposed to one for the fifth place man. A study of scores matched to days would show that the higher-placing pilot did his best on the weakest and least predictable days; the man in seventh place did his worst on these days on which luck is likely to be a major factor. The fifth place finisher did rather badly on the honest speed days, which shows the need of more practice in aggressive flying. The seventh place finisher did extremely well on the more predictable days, but his consistently low performance on the weak days would indicate need for greater caution and more practice under these conditions.

Having covered the psychological factors and the uses of past experience, let's now consider actual practice flying. Certainly the most important point to remember is that if you aren't flying cross country, you aren't practicing. There is almost no point at all to piling up hours within five miles of the airport. Actually, I think that such flying is actively detrimental. Quite a few of the pilots and instructors at my own field have grown so used to the three "reliable" home thermals that they seem utterly lost if they have to find lift over strange territory. For many years I have entered in the remarks column of my log-book the number of XC miles covered, not bothering to log flights of under fifty miles. Adding up those miles gives a realistic idea of practice. I usually try to get in 1000-1500 miles during the spring before the big contests.

The best type of practice is to get a group of friends together and organize a competition around a course. Frequently at Wurtsboro we choose a course after we have been airborne awhile and all start together from some common altitude. While fun, this is not as good practice as starting separately at the time each pilot thinks best. When starting together there is too much tendency for the less experienced pilots to just follow the leader, learning little about decision making. On these practice tasks it is important to really compete. Practice should be as contest-like as possible. In practice, as well as in contests, success seems to be inversely proportionate to the amount of time spent on the radio. Talkers aren't winners.

In practice flying, special attention must be given to weak points. If you decide that your thermaling needs work, give thermaling special practice. One good technique for this is to drop down to 800 feet and try to get back up. As soon as you reach 2000 feet open the dive brakes and try again. It's less wasteful of tows if you practice this just before you plan to land at the end of the day. One of the reasons Wally Scott is so good is that he invariably auto tows with a ratty old tow line that breaks every other launch. Nobody has as much practice as Wally at getting away from 300 feet. In 1971, I noticed in my own flying that my final glides were getting sloppy, so I especially concentrated on them during the following season.

Too many pilots only practice on good days. Anyone can fly on good days with nice, regular, cloud-marked thermals. It's the bad days that separate the men from the boys. Even when the weather is too weak to make XC worthwhile, it can be conducive to an hour or two of weak weather practice and thermaling. Sometimes a 15-mile triangle can be laid out with the field in the center, so that you can practice against time and other ships without the bother of a retrieve. If the practice is to be meaningful, you should not stay in one thermal all afternoon but try to find others even if you don't manage to win the I-Stayed-Up-Longer-Than-You-Did trophy. Contests are frequently won and lost on weak days. It takes confidence and practice to do well in such weather. The assurance that comes from experience is necessary in

making the decisions as when to hold and await better conditions that so frequently decide the difference between the winner and also-ran.

Weak days are especially good for practicing gaggle flying, since most of the local pilots will obligingly create gaggles for you to play with, without even being asked. Here the big problem is how to climb through other ships. In contests one frequently gets stuck below a slow climber who can hold up progress for minutes at a time. Practice various ways to get through, such as making really tight turns, luring him away from the core (if he will take his eyes out of the cockpit long enough to notice you), and making wide turns. Notice particularly the effect it has on your ship if you follow in his downwash and how far back you have to be to escape the effect. Get used to flying in close quarters with other ships and especially to using them in place of the variometer as an indication of the size and shape of the thermal.

For most pilots, the biggest single avenue for improvement lies in entering and leaving thermals. If you can save 15 seconds on getting centered in each thermal, you will gain five minutes on the average contest flight. It takes a lot of conscious practice to enter thermals properly, especially from high speed and in the bigger and less maneuverable ships that are being forced upon us in the Open Class. Too many pilots begin to turn immediately as they pull back on entering a thermal without realizing that the high speed will ensure that they end up well to one side of the core. The correct technique is to pull back, but keep the wings level until the speed drops to ten miles above circling speed. At this point one banks into thermaling angle and begins to circle. During the first circle or two it is especially important to note the strongest and weakest parts of the thermal and pursue some plan to get really centered immediately. Some pilots take a long time to edge into the core. This is time wasted. A good way to practice entering thermals is to come into a thermal below an already circling ship. Come in fast, pull up, make your turn and then see if you really are lined up right below him. All too often you will find yourself well beyond or to one side of your target. Since successful contest flying involves a fair amount of swiping other people's hard-won lift, this maneuver needs practice.

Leaving thermals is also important. Too many people seem hypnotized by lift. Be the first kid in your gaggle to leave! Practice getting out as soon as the lift declines to a pre-selected figure, don't dawdle about hoping things will get better. If the thermal is reasonably wide, it can pay to tighten up the last turn and cut across the middle while gaining speed. At any rate practice getting the ship up to cruise quickly and decisively. Too many people can't seem to bear to get the nose down for the first mile or so.

If you are flying a course with competitors, practice getting into their blind spot before you peel out. It may take them a circle or two to realize they have been left. Keep in mind that if all this practicing does any good you should be winning enough things so people will think you know what you are doing. Don't make it easy to follow you. Escaping gaggles is extremely important, especially in the Standard Class where ship performance is virtually identical.

During practice flights get used to spotting other gliders at maximum distance. Often the only indication of a distant gaggle is an occasional flash of the wings. Ability to see gaggles at a distance may have important bearing on your decisions about the weather up ahead. One of the reasons that a fairly late start on a speed day often works well is that one can step from gaggle to gaggle, saving valuable time on centering. It is important to practice judging whether the ships in gaggles up ahead are climbing well or not. You may just want to bump the thermal and keep on running. Nothing is more demoralizing than working your heart out in a thermal and seeing some hot shot like A. J. bomb right on by it.

Another interesting item to work on with a cooperative friend in a similar type ship is whether the so called 'dolphin' technique of pulling up sharply in minor thermals works for you and your ship. Have your friend hold his speed steady through the thermal while you dolphin. You may be surprised to discover that you are losing quite a bit. Dolphining doesn't seem to work on ships that are prone to easy separation, such as the Phoebus. It also takes good timing, which itself takes plenty of practice. I find that it

only gives a really clear cut advantage in big, predictable thermals or with ships with lots of kinetic energy such as the ASW-12.

An item that you can practice on weak days is turn point photography. Use the ends of the various runways as turn points and the other ends as the target. Practice picking out lines of reference from a couple of miles away so that you can tell when you have actually arrived over the turn without any wild slips to check position. Arriving at the wrong spot and having to correct is very expensive in time. Practice taking the photos themselves without any wild gyrations. Spinning out while trying to get lined up is a stupid way to lose a couple of thousand feet—as I found out in Texas in 1970. But even if you never manage to do anything dramatic like that, the couple of hundred feet you lose on each turn through poor line up and faulty technique are four hundred feet you will have to climb back somewhere along the course. Much of this practice can be done by just clicking the camera shutter, but it pays to run a film through each camera every once in a while just to make sure you really are getting what you think you are and that the pictures are clear and readable.

Speaking of equipment, practice periods are a fine time to make sure everything works in the way of equipment, instruments, computers, etc. To win, you must have confidence in all your instruments and gear. It is especially important to be certain that the total-energy system is functioning perfectly. If you aren't too experienced, get someone who is to fly your ship and give you an idea of whether the instruments are doing all they should do. A surprising number of pilots fly around with poor instrument systems, just because they have no idea how good a system can be. Most of the better pilots will be glad to try your ship out if you offer to pay the tow. During practice, use any computers you have aboard as much as possible. This is especially important if you are using something complex like the Skye computer-variometer or one of those ultra-elaborate circular computers. Gadgets of that type are an active detriment unless you are so used to them that you barely have to glance at them. Do enough final glides at various

speeds so that you know precisely how your ship functions in relationship to the computer. Eight miles out on a low approach is no place to start wondering if your calculator really works.

Finally, during practice, experiment with different approaches to problems, the behavior of streets, likely and unlikely thermal sources. If there are waves about, don't just sit there getting higher and colder; experiment with methods of getting from wave to wave, and with the relationships of hill to wave to lennie. Who knows, the next Nationals might be at Reno! Soaring is still a young sport; much of the attendant knowledge hasn't yet been recorded in books and must be gained by personal experimentation.

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THE FIRST BIG CONTEST

And how to fly it

In every pilot's competitive career there comes the problem of the first big contest. How big is big? For most of us it is the Nationals that first qualifies as 'big', but increasingly now the more important Regional competition such as Chester's April extravaganza—with upwards of forty ships and often many of the U.S. team pilots—churns up the stomach butterflies, telling you know that this is IT. Don't hang back; if they will have you, enter. I have never heard of a pilot who didn't feel that he learned more about soaring in his first day or two at a big meet than in all the hours piled up just flying around. I certainly felt that way in 1962, when the US Nationals was the first contest I ever entered. I also felt that it would have helped enormously if I had had some idea of what I was getting into and what to do about it.

What ship to take? There is really no point in entering a big contest without a competitive ship. Entering with a 1-23 or a Ka-6 merely insures that you will do badly, without ever learning whether it was you or the ship. It also encourages making excuses for yourself instead of learning. What is competitive? In the Open class, in the mid '70s, I would say only the Nimbus II, 604, and ASW-17, which makes for tough financial sledding for most of us. Luckily there is the Standard class. All the 15-meter glass ships are competitive, including the 301 Libelle with locked flaps (provided it has been fixed up intelligently). As a case in point, Rob Buck's old 301—with some thoughtful cleaning up—seemed to many

to have been the best Standard class ship in the 1974 Internationals in Australia. Of the older and now less expensive ships, the Austria SH has about 95% of the performance of any of the glass jobs if it is in good shape—Tommy Beltz spent years embarrassing the glass brigade with one.

How about instruments? Simple is good. I have yet to see a variometer that I liked as much as the PZL. In fact, the only reason I carry an electric at all is for the audio. At the moment I am carrying a Cambridge because it is cheap and reliable. The Ball instrument can be very good. Most electric variometers vary far more from instrument to instrument than from make to make. I have never had a satisfactory vario that cost over \$300 (and I have tried plenty). Getting all steamed up about instruments and searching for super varios is almost a sure sign of an also-ran. If you see some super-expensive instrument in a leader's ship, try and find out if he paid for it and really uses it. The ultra expensive new computer varios with audios that tell you when to slow and when to go seem to me to be too expensive. They take too much time twiddling knobs, and lead to jerky and inefficient flying.

There have been two really significant advances in varios in the last fifteen years. One is the Althaus or Braunschweig TE unit, which gives accurate and trouble-free total energy. The other is the new Schuemann total energy unit, which is compensated for the ship's rate of sink and thus tells what the air is doing. I would credit the Schuemann with giving me quite a few points in the last three contests since I installed it. One last thought on instruments: try to persuade an experienced contest pilot to fly your ship and tell you what he thinks of them.

A few words on preparing a ship for that first contest. Contrary to popular mysticism, endless hours spent sanding and sealing will not make any very significant difference. In general wing sanding is a waste of time unless you are an expert and/or it is good for your soul (both true in the case of A. J. Smith). Sealing is worthwhile and is the quickest way to get noticeable improvement in performance. Canopies, tails and gear doors are probably the top priorities, but in

general anything you can do to prevent high pressure inside air from escaping into the slipstream will be a good idea. If there is any choice that has to be made between flying and fettling, fly unless you have had at least fifty hours in the ship in the last three months. And if you fly, fly cross country. Diddling around the airport is a waste of time.

What should one do about the crew? As in instruments—if I may quote Browning—“less is more”.* Take the minimum number that can do the job. One crewman is usually ample for the Standard ships, two for the open. Any more get in each other’s way, get bored for lack of things to do and are generally more trouble than they are worth. If she likes soaring and is competitive, your wife is ideal. If you have any choice in who to take, look first for competitiveness. A good crew must really want to win. In descending order of importance would come reasonable driving ability, then mechanical aptitude or the ability to wangle it.

My Suzanne doesn’t know much about fuel pumps, but it seldom takes her more than ten seconds to find a crowd of people who do (Yeah! Ed.). Further comment might cause me trouble. The lowliest, and least popular and frequently the most important job for a crew is the daily wipe down of the glider. Suzanne does this for me, and I have lost count of the times she has noticed missing tape, dents, scratches and occasionally serious problems that everyone else had been too busy doing ‘expert’ things to notice.

Crewing must be a team effort. Each person should know what they are responsible for and where to be when. Top pilots seldom adopt the Captain Bligh manner. Yelling at people rarely improves overall effort and often causes lasting resentment. Perhaps I might voice one little prejudice of my own: I think the pilot should perform, or check personally, all key jobs such as putting on the tail, securing the controls, unloading the cameras, etc. If a pilot should be killed or a contest lost because some vital job is improperly done—two things that very nearly happened to the US and German teams in Australia—no crew member should have to spend the rest of his or her life blaming themselves.

*An aphorism popularly—and inaccurately—attributed to Mies Van der Rohe.

So much for preparation. How about the contest? The inexperienced pilot should have realistic aims. Statistics show that winning one's first big contest is very unlikely; a more realistic aim would be to try for the top ten. Why not shoot for the top? The reason is that to have any real hope of winning the inexperienced pilot will have to take too many chances. Remember, the important thing in contest flying is not winning any given day. The important thing is not losing. In my own first Nationals in 1962 I got a first, a second and a fifth—but I also made mistakes on enough days to finish 12th overall. Concentrate on flying well and consistently every day. Flashes of brilliance punctuated by periods of inattention never won anything in any sport.

Don't be a one-weather pilot psychologically. Almost all long contests have weak days, hazy days, sometimes days on which one wouldn't bother to take a tow back home at the club. Each day is worth a thousand points. Too many pilots seem to give up and apparently decide mentally to pick up their marbles and go home unless it's their kind of weather. Those downright ghastly days are the days when the Dick Johnsons pick up a lot of their points.

What about the practice period? I like to arrive at the site of a big contest five to seven days early, if possible. Generally I try to fly between three and four hours a day, going to most of the turn points if known. My way is to try to find out when the 'average' day starts in the area, when it finishes and what kinds of features tend to be thermal producers (wheat fields, hills, forests, etc.). I listen to local knowledge with reservations. If the locals were such hot shots they would be flying, not talking, wouldn't they? It is interesting to remember that in 14 World Championships the host country has won the Open Class only once.

Avoid getting psyched out. At any big meet there is always at least one super ship, super instrument or super modification that appears to outdo the field utterly. Sometimes one of them even works. Most people, however—the ones you want to beat—will have equipment very similar to your own and will be putting on their pants one leg at a time.

Avoid over-practice. If time allows you to get to the site of a major contest a month before it starts, think twice about getting there more than a week early. The Germans flew in Australia for a full month before the 1974 Worlds, but I doubt if it helped them much. They merely succeeded in learning a lot about some weather patterns that were no longer present by the time the contest started. Too much flying makes one stale.

Avoid, too, the temptation to get sucked into giving your all on the formal practice days, when eager reporters start adding up points and making predictions. The normal eight to ten days of a big contest is a long period over which to put out maximum energy. There is no advantage to expending one's allotment before the points count. I like to fly at about 95% on one practice day, just to see how things are going, but on other days I just admire the scenery. If you are new to contest flying, the practice period is a good time to become used to gaggle flying and watch how one's climb techniques compare with the better known pilots'. At Liberal, in 1973, hardly a Nimbus was being thermalled correctly. Owners seemed to settle back, secure in their knowledge that the ASW-17 was superior in climb. In Australia, well flown Nimbuses consistently outclimbed the -17s. The Liberal owners just weren't experimenting enough.

By the time you come to the first pilot's meeting, you should have taken time to throw out of your pilots' bag all that vast heap of "Chamber of Commerce" stuff about the local area. Keep the rules (read at least three times), the briefing forms, landing cards, maps and the pencil and ruler that Rainco so thoughtfully provides. Fortunately all the information you need these days is normally well displayed on giant boards and needs only to be copied onto your briefing form. Be especially careful to note the time interval period and the time the launches stop for re-light purposes if re-lights are allowed.

The first really crucial decision is choice of start time. On a distance day, choose about ten minutes after the first ship or twenty minutes after the met man thinks you can stay up. Being first is lonely and likely to lead to relights. On a speed

day, calculate the likely duration of the flight and plan to cross the line to make best use of the strongest part of the day. Plan takeoff between half and three quarters of an hour before start time. Thus, if the task is a 200 mile triangle, and the weatherman predicts 400 fpm, you should average about 55 mph, taking about 3:40 hours. If the weather is badly off, you might average only 45 mph, in which case the task would take 4:30 hours. If things really boom you might average 63 mph or 3:10. Since it's safer to be pessimistic, figure four hours. The peak of the day will be 2-5 o'clock so plan to start right around 1330, taking off around 12:30-12:45.

A word on meteorology. Try to get to know the peculiarities and competence of your friendly met man. Is he under the impression that gliders can't stay in the air when lift is under 500 fpm, thus always calling the start of the day two hours late? Is he the head-in-the-teletype character who assures us there will be no cloud even as the cu are popping outside the hanger door? Is he conservative or optimistic? Practice days are a good time to start assessing his competence and style. Keep in mind that few met men are active glider pilots and that weather reporting stations—in the US at least—are very sparsely scattered.

Pilots' meeting is over and the tension starts to intensify. What should one do next? First of all, get the ship out to the line early. This will avoid the traffic and last-minute rushes that can cause vital things to be overlooked. Double check that everything needed in flight is in the ship. Whenever possible, leave all flight equipment such as 'chute, calculator, spare landing card, water bottle, pencil, etc., in the ship at all times. Fold the map and paperclip it so that only the parts you need are showing; map folding in the air is time-consuming and dangerous.

Decide on a general plan of how you want to fly the course and discuss with the crew where you want them to be and when. Eat something, preferably protein, even if you don't feel like it, and do so as near lunchtime as take-off permits. Drink liquids in reasonable quantities (I like iced tea), keeping in mind the length of the flight. Don't let minor problems disturb your overall plan but do keep an eye on the weather for changes that might make you want to reconsider

take-off time. The last hour before take off is usually a lonely time for the pilot as he becomes more and more mentally involved with things only he can do.

Once launched, spend half an hour or so flying around as effortlessly as possible, getting the feel of the day. What seems to be average thermal strength, what is effective ceiling, wind strength, direction, etc.? Try not to get involved in big gaggles as they require a lot of attention. Don't let more than half the time interval go by without making a start for identification. As the time for your start draws near get somewhere near the initial point at around 4000-4500 feet. Hang around until you see a group of at least 3-5 gliders start, wait two minutes and follow. Most gliders take about 800 feet and two miles to get from 60 to 140 mph. Once safely across the line—say 100' low to be on the safe side—pull up slowly until you are back down to cruise speed. Now check on those three or four chaps you watched start first, on whom you have been keeping a beady eye all along. See which one is climbing best and home in on his thermal. A good first thermal is absolutely necessary because you will be too low to do much picking and choosing.

Modify your start-time plans to be ready sooner if everyone seems to be leaving much earlier than you. Adjust your time to a later point if your start time makes you practically first across the line. Flying alone is slow. Ideally you want at least half the pack out on course ahead of you.

One of the biggest differences between contest and other flying is the presence of other ships. Use them. Scientific types are always trying to invent variors that will see thermals five or ten miles ahead. But other ships are just such an invention. Train yourself to estimate the rates of climb of different types of gaggles. Steeply banked ships show a good thermal, slightly banked ships or ships that change bank often show a weak or broken thermal.

Don't get hung up on trying to follow a certain ship. It is hard to do, at best, and tends to leave you in a mental vacuum when he finally does lose you. Don't join the large group that mills around aimlessly at the top of a thermal waiting for some well-known pilot to leave. Conversely, take

trouble to know the numbers of the top four or five ships; their actions may be quite educational. Learn how to tell the good pilots. This is quite easy even at a distance since their style is decisive and definite; they are usually followed by a fair sized minnow pack.

In terms of general strategy, the term you will hear experienced pilots use most often is 'operating band.' This is that strip of air below which you don't voluntarily venture and above which you cannot profitably climb. On a typical day, with cloud bases at 5000', the operating band may be between 3000 and 4200 feet. Above 4200' there is lift but the climb rate drops off by one third; below 3000' the thermals are too broken and wide spaced to be worth the risk. Top pilots are seldom seen going low in search of the big one. In the course of a meet you will need upwards of 150 thermals, so the odds against hitting a big one at low altitude that many times are poor. Even if you don't actually go down, circling forever in that last-minute save at 1200 feet can cost half an hour or more.

Navigation is an important point that seldom seems to get mentioned. Many articles on contest flying seem to assume that no competent pilot would ever do anything so mundane as to get lost. Nothing could be further from the truth. In Australia the Swedish Open Class pilot got so hopelessly lost on a day with 30-mile visibility that he had to land, having overshot the turn point by fifty miles. Many will remember some very well known pilots getting lost for hours in 1973 at Chester. Obviously poor visibility, cloud flying and haze compound the problem, but one can get lost under very good conditions by inattention. Uncertainty about position generally cuts average speed at least in half as one looks desperately around for something recognizable and ignores flying technique.

How can one avoid the problems of being lost? Plenty of practice is a very good way. If you fly powered aircraft, get in the habit of forgetting the VOR/DMEs. Haul out the trusty old sectional, not occasionally but habitually. In the contest, pick out known courses in the start area that are the

same as the legs of the planned courses, fly them for a few minutes and note down the compass headings. This will give you corrections for wind unless it changes radically during the course of the day. When leaving thermals, take a quick look at the compass to see that you are on the right heading, especially in very good visibility. A surprising number of pilots have headed out of a thermal 90° off course. If towns are widely scattered, as in Texas, check them off on the chart as you go by or, better yet, note the time on the chart. It is very easy to lose track of the number of similar sized towns you have passed along a long straight road. In bad visibility check your position on the chart at least every five miles, noting the time. A short detour to follow a road, railway or river to a turn can often save a lot of time compared with taking a straight course that has few landmarks. Avoid the temptation to ignore navigation because "you can't afford the time," assuming that no one else needs to take time for it. Navigation normally takes between five and 25% of your time, depending on conditions. Remember, lost is slow.

How much, how often, and in what way to use the radio often seems to puzzle the newcomer. As a general rule, keep in mind the fact that the compulsive talkers very rarely end up on the first page of the results. I like to give my position to the crew every 30 to 45 minutes so they know what is going on. Less frequent reports tend to make the crew either nervous or bored, neither of which tends to improve their performance. For position reports, the Dick Johnson grid system is the best technique I have tried. To use it, draw horizontal and vertical lines on your pilot's and crew's maps ten miles apart using fine-point magic marker. At each intersection of the lines write an arbitrary number, duplicating it on the crew chart. When giving a position, just give the distance and direction from any intersection, as 5 NE of 37. Note that if you are one of the devious types that likes to confuse the enemy, the same position could be referred to by reference to any of four grid numbers. I usually like to use a color code to indicate condition, with perhaps red indicating excellent; blue, fair; black, poor; and green, landing. Change the colors each day if you are concerned with secrecy. Some use words like Dick Johnson's "Bright Stars" to indicate that all is well. Some indication of how

you are doing helps the crew to know how close to stick. Avoid long reports or complex codes. A usual report would go "Double X three West of 14. Green." Crews should be discouraged from calling pilots except in cases of real emergencies that will affect the pilot.

Towards the end of every successful race comes the final glide. Even for the most experienced, it tends to be a sweaty process. It becomes less so if you are quite conservative, as are most of the better pilots. Anyone who has been around a few years has a story or two about that time he sneaked in at 47-1/2 to 1 and rolled across the finish line, but most of us avoid such situations when possible. I prefer not to make final glides that require more than 25/1 in the Standard class and 30/1 in the Open. In general a Huth-type final glide calculator will show that, unless conditions are very weak or you have a strong tail wind, any lift over perhaps 150 fpm will call for quite a conservative glide angle for best speed.

Do use a simple final-glide calculator that has about 25-30 miles worth of the sectional on it. The simpler it is, the better. Mine is homemade and has a revolving mileage scale on one side and a circular slide rule on the other. I also carry a couple of glide-angle charts showing glide ratios at various speeds in plus or minus 10, 20, 30 knot winds. Try not to go more than five miles without rechecking whether you are gaining or losing on your glide path and adjusting speed accordingly. If you find yourself getting really 'fat' five or ten miles out, start adding enough speed so that you won't end up with extra altitude and a ship at redline. Ideally you should be down to fifty feet, in ground effect, a mile or two from the finish, burning off your altitude cushion. Crossing the finish line at 200 feet and doing a grandstand 'finish' six feet over the crowd a mile away loses you points.

After you cross the line assume there are five other ships close behind, pull up slowly, watch the airspeed extra carefully and land with full awareness that other competitors may not have too many options left. There is a lot of dangerous flying done around the finish, most of it unnecessary. In fiberglass ships *do not* exceed red line. Glass ships are strong but flutter prone. Flutter at low altitude is very bad news.

Contests are great fun. Bigger ones are greater fun. Doing well is still greater fun. The key to success is really surprisingly simple. A good ship, adequate instruments, consistency and concentration are all you need to start playing the game effectively. Experience, and the resulting growth of judgement, make each contest more enjoyable and usually more successful. One caution: it's easy to get hooked!

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13

STARTING AT CHAVENAY, 1959

How is your technical French?

Soaring didn't really start for me in Chavenay, a tiny village twenty five miles west of Paris. It really started back in the late Thirties when as a boy I discovered a copy of Terence Horseley's **SOARING FLIGHT** in the local library. I must have pretty well worn out their copy, mooning over pictures of the then fabulous Minamoa, reading accounts by the great Philip Wills, becoming utterly entranced with the idea of silent flight.

Soaring and money both being in short supply for young boys in the 'thirties, I had to wait through school, army and college before I could even take up power flying in 1953, with a transition to gliding always in my mind. As way led to way, I wasn't to see a glider until 1959, when I soloed in the U.S. after a ten-minute ride with an instructor who himself had soloed only the day before (soaring was somewhat casual in the 'fifties). After only a few flights in the stodgy two-place trainer, I became bored. The handling was poor, the performance terrible. There seemed no connection with the early dream.

That summer, while living in Paris, I was invited to dinner in the country by a cousin. While sitting on the lawn, sipping *apertifs*, I heard a power ship pass low overhead. Glancing up, I saw a sailplane attached behind it. After a few questions, I found that one of the largest flying training fields in France was only a mile away. Needless to say, the next day my trusty old *Deux Cheveaux* was chugging over to the glider

field. There, a swan among ducks, was a Breguet 901, the best sailplane in the world. It fairly gleamed among the trainers. A few questions in my half forgotten French elicited that, *Mais oui*, one could fly there. *Le prix?* It worked out around fifty dollars a month for all the flying I could fit in. When could one start? *Maintenant, naturellement*. Almost before I knew it, I was being strapped into the Caudron 800 two seater for a check ride with M. Melleton, *Le Chef de L'Aérodrome*.

I was about to discover that check rides in France are different. As the tow plane revved up (a 1921 vintage Moraine-Saulnier, originally designed to be the nemesis of the Fokkers in World War I) so did M. Melleton's French. Since I could understand only an occasional word, I just did a normal take off. The French torrent settled back to METO, so I judged that all was well. A couple of turns and stalls were accomplished satisfactorily, and since we were now down to pattern attitude and the word *piste* (runway) seemed to crop up increasingly often in the non-stop flow of idiomatic French information, I entered a normal pattern.

Downwind was OK, base looked just about right, but as I settled into final, M. Melleton went to War Emergency Override on tongue power. Not able to deduce what I was doing wrong, I dodged a couple of trainers zig-zagging back and forth in the way, thinking they would really catch it from *M. Le Chef* when they landed. We touched down just where everyone else seemed to be landing and rolled up to the end of the line. But then I caught it, or at least so I gathered. Something obviously had been very wrong.

Finally a lanky US Air Force Captain strolled up and translated my sins. It seemed my tow and air work had been adequate, even good; *mals sacré bleu, quelle atérissage!* What was wrong with the landing, I wondered. I thought I had done rather well considering all those idiots roaming back and forth in the pattern. Patiently the Air Force type explained the French method of flying patterns.

One, it seems, flies normally until entering final. At that point Gallic individuality can be restrained no longer and each ship begins a series of wide S turns until down to fifty

feet, whereupon it lands. The fact that three or four different ships might be S-ing on down the final at one time seemed to bother only my rigidly regimentalized American mind. As was so often to be the case in the next couple of months at Chavenay, I was to discover that apparent madness was actually French logic in disguise. Yes, at the airfield, perhaps, the S turns gave the pattern a certain random appearance, but the pilots were being trained, not for the airfield but for the inevitable off-field landings when they started cross county. Getting high and S turning into the field is still the best approach.

Once M. Melleton understood that my disgraceful pattern flying was not ineptness but merely a result of the barbaric practices to be found in non-French nations, he decided that I might forego an additional check ride. I was ready for the single seater.

The single seater to which I was introduced was no Breguet. The Emouchet was a sturdy French version of the famous Grunau Baby—the *dernier cri* (literally) in soaring, vintage 1934. As it lay on its skid in 1959, looking rather weary, this particular Emouchet was perhaps fifteen years old and the veteran of many a solo. With a 40-foot span an open cockpit, the ship was reputed to have been capable of a 15/1 glide ratio—when new. As I climbed in, however, she instantly transformed herself into the wonderful old Minamoa I had seen in Horsley's book so many years before. Once aloft, the air rushing over my face, the wings seeming extensions of my arms from the narrow cockpit, I knew that this was the experience I had dreamed about.

It would be nice to say that I wound into a thermal immediately off tow and soared off into the middle distance as awed onlookers on the ground cried "Who *is* that masked man?" In practice, I was back on the ground in ten minutes, watching some other student take over my lovely bird. That day, late in the evening, Camille Labar, member of the French National Team, skimmed over the field in the Breguet after completing a 440 km triangle. There were, it seemed, a few things to be learned.

Every sunny day saw me and Bob Litle, the Air Force type, out at the field. Most of them saw us back *on* the field

after flights of ten, fifteen, sometimes twenty minutes. Once I beat the tow plane down. Gradually, through Bob, and as my aeronautical French improved, I began to learn the customs of L'Aeroclub Gaston Caudron and a few things about the air. Both were frustrating. How, I wondered, could anyone learn to fly if, promptly at twelve, just as the good thermals were starting, everyone knocked off for lunch? The sacred *l'heure de déjeuner* was just as sacred on the air field as anywhere else in France. The thermals were starting? Let them wait! Lunch was a matter of a certain seriousness, not a quick-bite-and-back-to-flying affair. The five courses served in the club house (seventy five cents, *vin compris*) took the full two hours that Frenchmen devote to these matters of importance. It was delicious and included a bottle of wine between each two diners. Brought up on the US idea of plenty of time between bottle and throttle, I was appalled at first, but people seemed to function pretty well afterwards.

Two o'clock finally arrived, the requisite belches were belched, pants tops rebuttoned, and flying recommenced. That is, it did if the tow plane would start. Starting the Moraine-Saulnier's vintage radial was rather an art—an art requiring six people and a lot of patience. Five of the six joined hands, last man grabbing the lower end of the ten-foot prop. Man six, in the cockpit, yelled *coupé* (switch off) and away went the daisy chain at high lope. The propeller moved reluctantly through three cylinders. On cylinder two, the daisy chain being clear, the cockpit man cried *Contact*, and turned on the switch.

If the engine caught on the remaining cylinder, all was well and a miracle had occurred—a miracle I was not to witness during two long months of prop pulling. Twenty minutes was par, and a good deal of wine had usually gone up in sweat before the big engine finally began to tick over. Once started, the brakeless Moraine moved jerkily over to the line, wing walkers assisting if there was any weight to the wind.

Meanwhile the other club members were hauling the sailplane fleet out to the line—by hand. Apparently to encourage physical conditioning, no cars were allowed to assist with what was sometimes a half-mile pull of a dozen or

so sailplanes. It was a decidedly mixed bag of a fleet. It started with the lowly Emouchet and moved on up through the AV-36 flying wing, the Nord 2000 (designed for Olympic competition in 1939), the Weihe (a top mid-thirties design, this particular specimen so elderly that it creaked even when being moved on the ground) and finally the lovely Breguet. The Breguet was pulled out if Labar or one of the other handful of pilots privileged to fly it was there.

Takeoff was in order of excellence of performance, with the lords of the sky off on their seemingly impossibly long 200 and 300 km cross countries going first. Finally, somewhat after three as a rule, we tadpoles were able to fly. Looking back on my log for June 1959, I see six flights of under twenty minutes—mostly in booming weather—before the triumphant entry of 2:05 hours with a Silver C height gain of 1800 meters thrown into the bargain. I must have managed to learn something, since the next four flights were all an hour and a half or more. I felt I was getting somewhere. So, it seemed, did M. Melleton.

During the long clubhouse lunches, while I tried to revive my college French, I had begun to gather that the aero club was strongly subsidized by the government. This was why flying was so incredibly cheap. Further, I began to learn that size of subsidy varied sharply with results produced and that results were measured solely by the number of FAI badges won. These badges graduated rapidly in difficulty from the lowly B, which merely involved staying above release height for five minutes, on to the formidable silver C with need of a five hour duration and fifty kilometer distance flight, on up to the Gold and Diamond C's. The latter had an incredible requirement for a 500 km distance flight, a feat only accomplished three times to that date in France, first by the redoubtable Labar. Monsieur Melleton's policy was one of rather forceful encouragement of pilots to try badge flights—a sort of coming-ready-or-not approach.

Knowing this, I should not have been too surprised at what happened when I showed up at the club one Sunday morning. Mostly I had come out to have a good lunch in pleasant surroundings, basking in the adulation of those mere

mortals, the spectators, who flocked to the aérodrome on weekends. Flying was seldom possible on weekends as ships were reserved long in advance and members of the barbaric hordes from developing nations (i.e., non French) were naturally rather far down the totem pole. Scarcely had I arrived on the field, however, neatly dressed in jacket and tie, than I was collared by M. Melleton: "*Ahhh, Monsieur Moffat* (pronounced Mo-Fa)! *C'est le jour de cinq heures.*" Even as these words were pronounced I was being jammed lunchless, and still in coat and tie, into a particularly elderly specimen of Emouchet. Or at least most of me was. The Emouchet was not designed for Americans, and the top foot and a half of me always hung refreshingly out in the breeze that whistled past the open cockpit.

The day turned out to be really good, with lovely cumulus spaced three or four miles apart. In no time I was up to a fat six thousand feet, happy, hungry and a little chilly. The Emouchet climbed beautifully at its customary 30 mph, showed off its best fourteen-to-one glide angle at 40 mph and fairly screamed through patches of sink at a breathtaking 50, already getting a bit close to the redline at 60. Most of the clouds had 500 fpm thermals; it was a beautiful day.

Those readers who fly modern sailplanes may not realize that the operative word in the last sentence was *most*. Missing an occasional thermal in a modern ship means only a bit of exasperation for the pilot as he bombs on to the next cloud. In the Emouchet a missed thermal could cost 3000 feet; miss two and you were back on the ground waiting for the next suitable five-hour day, something that occurred possibly one day out of ten. Furthermore, we had strict instructions not to land off field, so thermal searching had to be within range of the airport. All of these factors made "Get high and stay high" the order of the day.

Was it during the second hour or the third when I began to notice how chilly it was at six thousand feet? Was it the third hour or the fourth when I began to be more worried about freezing to death than staying up? Some time around the fourth hour, tie wrapped three times around my neck for a scarf, collar turned up, every last possible inch of me scrunched into a cockpit designed for midgets; the vibration

started, quietly at first. Soon the whole ship was shaking on a cycle of three times a second or thereabouts, and I became thoroughly alarmed. Everything I could see seemed to be in one piece, but I couldn't help but think of all the elderly bits of plywood held together by 1940-vintage glue. Had that been a good year for glue, or did it, like some wines, "mature quickly and lose its body"?

The shaking increased. I thought about my club-issue parachute, a beat-up specimen held on by one enormous band around the chest—and nothing else. Bob Litle and I had often wondered what kept the wearer from simply slipping out when the 'chute opened. The problem was rapidly becoming less and less theoretical. By now the shaking was violent. I could easily see the wings shudder against the horizon.

I don't recall at what point, while searching frantically around for some cause of what seemed to be a rapidly disintegrating glider, I noticed my hand. By now I was so cold that I was shivering uncontrollably, my hand on the stick shaking back and forth over an inch or more. Could it be ...? I took my hand off the stick. Instantly the ship resumed normal flight. I grabbed it again. The shaking recommenced. A surge of affection for my trusty Emouchet engulfed me. How could I have doubted that noble collection of sticks and fabric? How could I have failed to appreciate the heady strength of the glues of 1940?

As anyone who has done his first five-hour flight will know, solving one problem usually gives sufficient time for noticing another. This one was the trivial matter of chronological time. What time had I taken off? With all the bustle of rounding up a barograph, getting declarations signed, nailing a towplane—which had been attempting to slink quietly away for lunch—I had quite forgotten to note the time of departure. Around twelve, yes; but was it a quarter of or a quarter after? Painfully, my cold-congealed mind attempted to stave off starvation signals from my stomach long enough to consider the matter. No luck. Finally I decided to assume a quarter after, to be on the safe side.

Slowly the hands of my watch reached five. Clouds were beginning to disipate. There had to be just one more thermal,

surely? I slid in under a small cloud and felt the wonderfully manic lift of the Emouchet in the pulsing air. This was it! At cloudbase the hands read ten after the hour. I started a long, slow circuit of the field, letting the altitude I had been conserving all day trickle slowly through my fingers, almost forgetting the still uncontrollable shivering in a feeling of accomplishment, almost one of regret that the test was over.

As the Emouchet slid to a stop on its skid, dozens of clubmates rushed up to congratulate me. The duration turned out to be 5.40. As soon as I could, I broke away to the small restaurant to some long delayed lunch. *Le déjeuner à cinq heures? Mais non, monsieur! Monsieur* must surely realize that the lunch is over at two?" Impasse! Fortunately a clubmate happened by and explained to the chef the reason for my dilatory behavior. "*Bon!*" Very soon I was attempting to eat a delicious omelette. One problem remained: my hands were still shaking so hard from the cold that bits of omelette refused to stay on the fork.

The following day I arrived at the club in time for lunch, thinking to do a little local flying and perhaps admire the AV-36 a bit. Only the Silver 'C' distance leg remained and already I was beginning to dream of flying a more advanced ship. The French club very wisely didn't let students out of the Emouchet until the Silver C badge was complete. Only then did one get to try more advanced types, moving slowing up the ranks from AV-36 to Nord 2000, to the venerable Weihe, and finally, for a lucky few, the Breguet. With total Gallic logic the French moved students, not by the ease or simplicity of the next type of ship, but by its cost. As it happened the AV-36, a flying wing, was a fairly tricky ship to fly, especially on landings. But *ca ne fait rien*—it was cheap.

As usual M. Melleton's ideas and mine didn't coincide. No sooner had he seen me than a gleam came into his eye. He rushed over, grabbed my shoulder, and started hurrying me out to the line. "*Ahhhh, Monsieur Mo-Fa! Pour aujourd'hui, La Distance!*" Fortunately I had managed to have lunch before he saw me. Not so fortunately, at least in view of his mandates, I had a date in Paris at seven with a girl who didn't look as though she was used to being kept waiting. M. Melleton, who sometimes understood my aeronautical

French, seemed totally deaf to my social equivalent. To every objection he merely cried “*A Chartres!*” in more and more positive tones. “But I have no map,” I protested. One was found. “But how will I get back?” I asked. A torrent of French emerged, amidst which only the word *remorqueur* (trailer) rang a bell with me. Meanwhile, I was being packed bodily into the Emouchet, over my admittedly weakening protests as I began to realize that the coveted Silver C was practically within my grasp.

Once aloft, I immediately found a 600-fpm thermal right up to cloud base at 5500 feet. Dropping the nose a bit, the Emouchet and I set off to the South at a breathtaking 45 mph—and a glide ratio of 12/1. Fifty kilometers—Silver C distance—is just a one or two thermal jaunt in most modern ships. In the Emouchet it was a challenge and an adventure.

Speeding along, high and happy, it took me about ten minutes to get lost. Out came my borrowed map, disarmingly entitled *Les Environs de Paris*. Unfortunately it turned out to be about three feet square with a scale of one inch to three kilometers. Every ten minutes of flight required another massive refolding effort, and you haven’t lived until you have wrestled with several square feet of stiffly folded paper in an open cockpit while attempting to make some pretense of flying. Fortunately the flying was fairly easy and I seldom got below 4000 feet.

An hour or so after takeoff—not exactly lost, but perhaps not exactly pinpointed as to position—I was anxiously scanning the horizon for Chartres. Surely the great cathedral, which I had first met through Henry Adams remarkable book *Mont St. Michel et Chartres*, should be at least visible, with its two so differing spires? Surely in an hour I must have flown at least forty kilometers? Increasingly uncertain of my whereabouts, I scanned first map, then ground. The former had an embarrassment of riches, mainly cultural. The latter just sort of sat there, waiting.

Was it the tenth or the twentieth look, in a desperate attempt to find something—anything—that made sense, that I saw it? Far below and somewhat behind me, surely there was something distinctive about the church in that town of many



Suzanne and George with the Standard Cirrus

towns so lately passed? Slowly the pattern fell into place. Of course, *there* was the river, *there* the airport. Chagrined, with five thousand feet to spare, I orbited the town, watching the cathedral, familiar from so many pictures, grow into life.

Once landed, my papers signed, elation high, I began to think more and more about getting back. There was, of course, that girl. Perhaps . . .? Queries directed toward the local people were little help. They assumed that a *remorqueur* would come for me—in time. Quickly an idea formed: why not fly back? Coming had taken only an hour in excellent lift. A good deal of excited sign language indicated that I would like a tow. Gallic heads were shaken, glances exchanged, misgivings furtively expressed, shoulders shrugged. If the mad American wished a tow, *pourquoi pas?*, why not? Naturally, as in all things Gallic, no undue haste was allowed to upset the natural order of events. It was almost 4:30 when I finally towed off.

On release, I expected to hook immediately into another 600-fpm thermal. After all, I had turned up my nose at anything much less on the trip from Chavenay. But things had changed. To stay in the air at all I had to take a paltry 200 feet per minute, watching the altimeter register gained altitude with maddening sloth. Topping out at a mere 4500

feet, I began almost immediately to realize the difference between a five mph headwind and a five mph tailwind. One hour of hard work later, with the shadows beginning to lengthen, I was scarcely half way home. Painfully, over Rambouillet, I climbed back to 4000 feet with perhaps twenty miles to go.

No longer confident, I set off into a cloudless sky towards the North. Slowly the altimeter unwound, slowly the landmarks crept past. Finally at six o'clock, position uncertain in a dying sky, I was low over a small town in zero sink. Endless circling in feeble lift only resulted in drift to the South—away from home. One last glide and, suddenly, I was quite low over a hilltop town, sure the airfield was only a few miles away, but uncertain of the exact heading. Abruptly, concern over getting home was replaced with concern over my first off-field landing. The uncut grainfields looked less than promising. Below me some farmers stopped to look up. Five hundred feet.

In one corner of a large field a swath of new-cut grain appeared, perhaps seventy yards long. Nursing the dive brakes, I grazed the tops of the uncut grain, felt the last of my speed fall away, and plunked down in the single narrow strip. The ship slid to a stop in the quiet of evening. I hadn't made it back.

A garbled phone call, an hour's wait, and the rickety old trailer arrived, driven by M. Butin, one of the instructors. It appeared I had landed within seven miles of the airport. Butin was furious, thinking he had had to make a retrieve for a Silver C distance aspirant who had managed only a paltry seven miles in four hours. I couldn't understand his rage, or what all the shouting was about. After all, I had made the distance—something not everyone did on his first try. Gradually, as I identified individual words from his tirade, I understood. Going back to the glider, I retrieved my papers signed by the people at Chatres and presented them to Butin.

There was a long silence. Suddenly Butin's face broke into a smile. "*Il a fait le retour*" (he has made the return), "*Il a fait le retour.*" I was unique. Apparently no one else had ever tried to fly back from a Silver C distance attempt. Wine

appeared as if by magic. Toasts were toasted, there in the field. The ship shed its wings and took to the trailer. We drove back to the airfield, Butin still smiling, shaking his head at the madness of Americans, muttering, "*Il a fait le retour.*" I had my Silver C, but did not make my date in Paris!

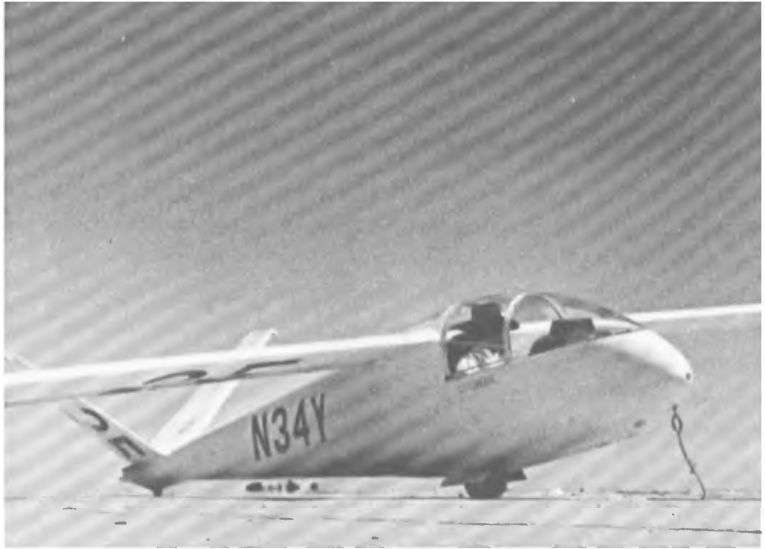
Years later when I returned to Chavenay, by now holder of three world's records, M. Butin's first words on seeing me were "*Il a fait le retour.*" The whole clubhouse broke up in laughter once more, as they had on that night back in 1959.

14

RECORDS AT EL MIRAGE, 1962

During the two weeks of practice for the participation in the 29th Nationals at El Mirage in 1962, in which I ultimately finished twelfth, it became increasingly obvious that this was the place to try for the 100- and 300-kilometer triangle speed records. Lift made good exceeded 1000 fpm with surprising frequency (on one day I averaged 1350 fpm for 4,000 feet) with cloud bases at around 12,000 feet over the terrain. This compared very favorably with the 730 fpm which was the best I had found in a month of wearing grooves around a 100-km. triangle in Marfa, Texas, earlier in the summer.

After ten days in Pasadena following the contest, to recover from it and strep throat, I got back on August 15th, assembled the ship with the help of Ross Briegleb, and added some inevitable micro-balloons to the equally inevitable cracks in the HP-8. The next day did not look especially promising, so I continued to micro-balloon and sand, wishing the last of my throat would go away so that I'd feel better. By two o'clock a line of shallow and ragged-looking cu was building at 15,000 on a heading of 15°; but as they looked a good deal less than record shattering, I decided not to fly, hoping to feel better the next day. An hour later, however, Ross landed and reported "really bodacious" thermals under the street. With the help of Gus Briegleb we decided on Boron and Helendale airport as turning points for a 100-km. triangle, and the next hour was a whirlwind of barograph finding, camera sealing, and placard writing.

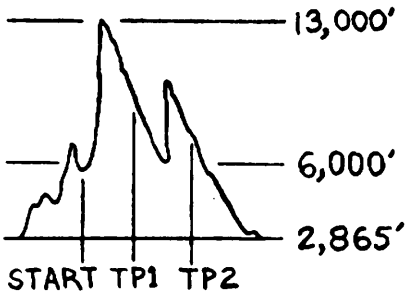


UVEGES

HP-8 at El Mirage

As I towed off behind the PT-23, the clouds seemed to be dying, and on release at 4300 feet my worst suspicions were confirmed as I blew rapidly down wind in zero sink. Very slowly we climbed to 5,000 (all altitudes asl, with the terrain at about 3,000 ft.) and then ascended rather quickly in 5 m/sec. to 7,000. After flying five miles upwind to the starting line, I peeled off to cross over at 5750 feet and 135 mph. The beginning of the street was five miles downwind but on the way I met first zero sink and then 5 m/sec. lift (all lift figures are as observed on the PZL Variometer. True climbs usually averaged about 2/3 of these values).

Since this was not good enough for a record-breaking triangle, I pressed on in lift at minimum sink speed of 55 mph. Ten miles down course I found the best looking cloud with a solid 7-9 m/sec. in wide, smooth lift. I straightened up at 13,000, when it began to weaken, and left the street to head for the turn point some fifteen miles off. Driving along in moderate turbulence at 115-20 IAS, I reached the turn-point with 20 minutes elapsed. After the usual aerobatics involved in taking pictures at high speed in



100-km record barograph trace

turbulent air, we headed for the second turn point at the same speed. The cloud street crossed a leg about fifteen miles away. I watched the altimeter unwind rather nervously but finally slid under the first cloud with 6,000.

To my consternation, lift was a feeble 2-3 m/sec. After wasting a minute trying to find a strong core, I dashed on

to the only other cloud nearby to breathe a long sigh as the Crossfell slid to a firm 8 m/sec. up. While climbing, I worked out the altitude needed to get home and decided to leave the thermal at 10,000. Since the lift was so good, I made one more circle for insurance and finally left with 10,400. The last turn point, arrived promptly, got photographed, and off we boomed for El Mirage at 115 mph. Things went uneventfully, if roughly, with the accelerometer constantly banging between zero and two G's accompanied by the usual disheartening noises of an all-metal ship driven hard.

The remainder of the flight was easy enough, except for a bad bit of 10 m/sec. sink over the Shadow Mountains. After a couple of miles, however, the needle swung up to zero sink, making it unnecessary to slacken speed. We crossed the far boundary of the field with about 100 feet and 140 mph and zoomed up across the finish wires at 120. A rather hectic 270° turn while sprouting wheel, spoiler and flap brought the HP-8 down, with Ross running up to tell me that the time was 54:24 for the 70.5-mile course.

The next day looked extremely promising for the 300-km. attempt, but came to nothing when smoke from a forest fire cut off all lift half way down the first leg. That day had the best lift of any during three weeks at El Mirage. Saturday had only 5 m/sec. lift and wasn't suitable for record flying.

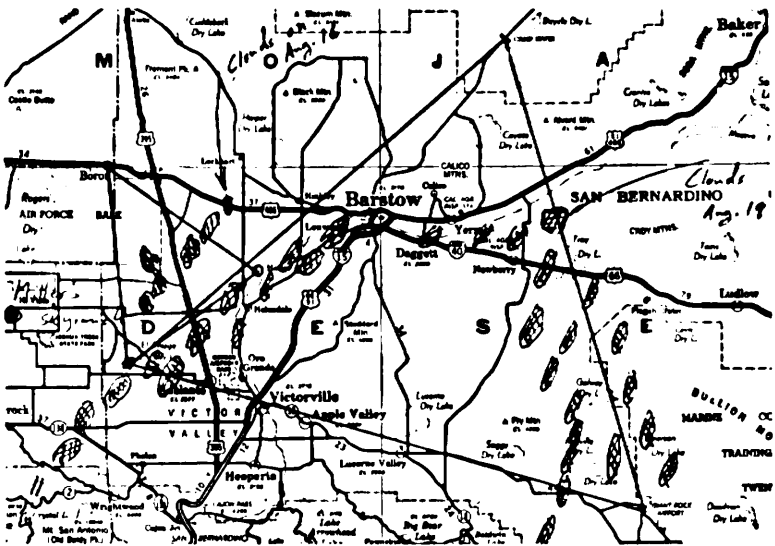
On Sunday, things looked poor up to 1300 PDT so I decided just to fly around a bit. After getting launched at

1400 I was appalled to discover that the innocuous looking ragged street of clouds just forming had steady 8 m/sec. lift. After a quick trip downwind for fifteen miles, just to be sure, I pulled full brakes, landed, leapt out of the ship to collect baro, and task board, etc. Bertha Ryan kindly agreed to be observer.

I was back in the air at 1450 after much help from everyone, planning a 208-mile (335 km.) triangle to Camp Irwin and Giant Rock airport. After release, all thermals seemed to vanish, so I spent a miserable fifteen minutes getting to 7,000 cursing and fuming at the wasted time. Finally, at 1511 by my watch, I dove across the line at 5,700 feet, racing for the start of the street five miles away. Once there, the lift seemed only fair so we pressed on, mostly climbing in straight flight. Near Barstow, 39 miles out, the street ended, so I circled to 15,000, straightening out just at base. From Barstow, the clouds veered to the east, following the line of route 466. That left me with some sixty miles to go in dead air, so I reduced speed to the 110 mph, which my calculator showed would get me there with 2,000 feet in hand. The next thirty minutes crept by very slowly, although I was encouraged to find the speed averaged 75 mph for the first leg. No lift worth circling in was encountered, although some dry thermals at lower altitude helped after Camp Irwin. Finally, at about 5,000 msl, we reached the clouds.

The first three didn't give enough lift to circle, but after five miles a boomer took us up to 13,000 at 8 m/sec. indicated. I left the lift at that point, to be low enough under the clouds to see the best ones to head for, as rough streets extended toward the second turnpoint. Flying at 120 mph between and 55 mph underneath brought me within seven miles of the turn with little loss of altitude.

At that point, the problems started. With no landmarks for the previous 25 miles I couldn't find the turnpoint. Those who have flown in the desert will appreciate the difficulty of finding a dirt-on-dirt strip in the middle of nowhere. As I searched, inattentive flying cost heavily in altitude and extra distance. I finally found the field lurking in the shadow of a large rock (one of hundreds), took pictures and darted off to



300-km record route in California

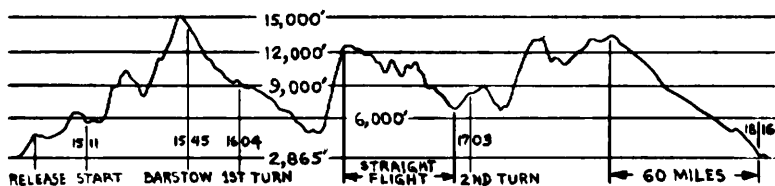
the cloud street crossing the leg home. Speed for the second leg was 70 mph.

The trip home looked precarious, because it lay across the notorious Lucerne Valley region, a spot where we had learned all too well during the contest not to expect lift. The last clouds crossed the course some sixty miles from home, with a slight headwind just to make things interesting. Heading for a dust devil at the edge of the street, I climbed quickly to 12,500, but there the lift tapered sharply. Leaving promptly to try a newly forming cell five miles away, I ran into steady 10-12 m/sec. down, watching the hard-won altitude spin off the altimeter.

On arriving at the new cloud, I found only 2 m/sec. lift, tapering to half that above 13,000. For fifteen nightmarish minutes I watched the record tick away as I tried to reach the necessary 15,000 for a fast trip home. Each cell of the cloud would last four or five turns and then decay, necessitating another search. Finally at 13,900, with all the cloud in

obvious decay. I set off into the 10-15 knot afternoon headwind. Very dimly I could see the glimmer of El Mirage Dry Lake, looking impossibly far away. The glide angle calculator showed just under 29 needed to get home so I set the speed at 85 mph, knowing that the 65 of max L/D would get me home too slowly to break the record.

The next twenty minutes were agonizing. As check points went by, we would be first above and then below the glide path. At Apple Valley things looked pretty unlikely. By Victorville a bit of reduced sink put me four hundred feet above. At George Field a strong sink stole three hundred of those feet. Ten miles out things still looked marginal when a little thermal—without rhyme nor reason, probably prompted by Ross Briegleb's Ritual Thermal Dance then going on at the finish line—gave a glorious 300 feet in straight flight. I pushed over to 100 mph, got cold feet and pulled back to 90, saw—at last—that we would make it and swept across the field at 130 to climb across the finish. Once on the ground, life seemed very peaceful as everyone rushed up with congratulations.



300-km record barograph trace

Successful record flying demands two things—a fast ship and good conditions. My experience in Texas showed clearly that if one cannot get more than 5 m/sec. lift, modern records cannot be set. My times there were usually between 60-64 mph. At El Mirage, flying at the same inter-thermal speeds, the 50% better lift allowed record speeds even despite such pilot stupidities as not being able to find the second turn point.

A successful record setting ship must be able to reach at least 115 mph while retaining a 20/1 L/D. Only those who

have flown such sailplanes know how simple it is to fly fast triangles in a ship that rarely cruises under 100 mph.

Given reasonably good conditions, the deciding factor on a record flight is usually the first long climb. One must have a strong thermal for the climb out. A good tail wind on the first leg helps to keep the average up and costs little on the last leg. The next requirement is cloud streets on at least one leg. The records are high enough now so that the usual yo-yo technique of thermal-to-thermal flying will not suffice. High terrain such as at Marfa and El Mirage helps enormously by putting much of the flight above 10,000 feet where one gets a 20-30% speed increment over the indicated airspeed. In fact, El Mirage seems to me an almost ideal place for setting speed records.

THERMAL TIGHTROPE

1962 Nationals at El Mirage

“It’s like a fishhook, this pass.” Strange how such thoughts float into the mind, despite very active concentration on the flying involved. Perhaps it was on the fiftieth beat along the hill, perhaps the hundredth. “It’s like a fishhook”—the thought came unsought, full-blown—“and I’m the fish.”

The usable part of the ridge was perhaps a quarter mile—the part near the business end of the hook. The long shank, the part you would tie the leader to, trailed off to the east, on off toward the second turn-point. The workable part, the western slope, consisted of a short ridge facing the light westerly wind, which, flowing gently up from the San Joaquin Valley, wafted over the first mountains, and then died as it met the hot southerly of the Mojave Desert. This wind, damp with the Pacific and sweet with the smell of crops from the rich valley to the west, managed, just managed, to hold the heavy sailplane at ridge level. Sometimes it would rise a few feet, sometimes fall below the low mountaintop as we beat back and forth like a boat tacking against the current, hoping for a thermal so we could spiral up and leave behind this cage of a mountaintop.

No thermal. Turn, slide in beside the rocky hill, one wing almost touching the mountain scrub—only close to the face will the rising air support the heavy ship. Dodge an outcropping of rock, tuck into a canyon for the updraft in its depth, pull up over a minor ridge, drop the nose to regain safe speed. Already I had reached the end of my cage, barred

by a wall of rock too high to surmount. Time to turn again and repeat the whole process for the 20 seconds or so that it would take to reach the other end of my slope, where the curving mountain no longer forces the west wind up and my glider began to sink in the downdraft.

Back and forth. Back and forth. Time loses meaning in the endless repetition. My mind wandered, leaving to habit the infinite touches on the controls that kept me above the rocks.

Back at the morning pilots' meeting the fifth day of the 1962 Nationals Soaring Championships, Tehachapi Pass held no significance. I had never heard of it, could not have told it from a hundred other rocky passes in the parched desert we had been flying over for a week.

"Gentlemen, today's task will be a speed triangle from El Mirage northwest to Tehachapi Airport, east to Johannesburg and then home, distance 156 miles." Oats Schwarzenberg's voice sounded incisive and oddly formal despite the flat midwestern drawl. As he went on to give details, thirty-odd pilots scanned maps for the turnpoints; began to assess the problems of the flight.

The meteorologist reported on the prospects of the day. Thermals beginning around noon, weak until mid-afternoon except strong in the mountains north of the second leg of the course.

"Wind will be southerly 15 to 20 knots, gusting higher. No cloud." In short, a weak, difficult day, especially for me, in the HP-8, one of the heaviest sailplanes flying, designed for record-breaking in strong conditions where lift of 1,000 fpm and more can allow use of the ship's high speed. Most sailplanes, like the German Ka-6s, are designed to waft up in the slightest lift, circling at 45 mph. The HP-8 cannot circle slower than 67 mph and needs a bigger and stronger core of rising air. The desert normally serves up powerful thermals, allowing the HP-8 to use its enormous speed in straight flight.

I choose a late takeoff time—one o'clock—hoping to let the thermals gather strength as the desert heats. Already as I release from the tow plane at 2,000 feet, there are several columns of circling sailplanes—gaggles, to the pilots—and one

or two brave souls heading out on course. I join the nearest gaggle—seven sailplanes circling with seemingly effortless grace, climbing slowly. In each cockpit the grace is belied; the pilot sweats, constantly moving the controls, banking in toward the strong core of the thermal, dodging other ships, checking airspeed and variometer.

The ships fly at different speeds, have pilots of different skills and experience. Each pilot has his own notion of the geography of this invisible fountain of air holding us all aloft. Each pilot curses as his ship bucks in the turbulence, raising or dropping the airspeed a few miles an hour—accurate airspeed control alone allows efficient climbing. Each pilot wishes for three more eyes, wonders why someone else is getting in the way, checks instruments all the while endlessly turning.

It's a relief to reach the top of the thermal—a scant 3,500 feet above the desert. I head out on course at 80 mph, pushed along by the strong southerly. Below me, ahead, I can see flashes in the sun as the early starters struggle up in weak thermals. An hour has passed since the rush over the starting line at El Mirage.

All at once the sky is empty, and I am low. No more circling ships show the thermals. Some have been too optimistic and have had to land; thermals have been scarce and weak. I veer to the left, heading for Mojave, hoping that the heat of the sun-baked town will form some lift.

With a thousand feet remaining, I slide over the town at 70 mph, my speed of least sink. No lift. A mile to the west lies the single hump of a low mountain; I veer further left to get on its windward face and feel a sign of relief as the ship lifts to the rising air. The hill triggers a weak thermal and soon I am climbing slowly, drifting off across the desert to the north. I fly the endless circles with great care. There is no place to land if I lose this thermal.

At 3,500 feet, my thermal peters out. I head north for Tehachapi Pass, hoping for lift from the low hills on its southern side. The ship seems barely to move as I wait for the hills to arrive. Getting lower and lower over the scarred desert, I wish that I had tried for those few final feet in the

last thermal—but struggling in the weak bubbles at the top takes too long. Each wasted second counts contest points.

The hills arrive—and there is no lift. Turning west, I slide along their tops. There must be a thermal. There is not. Checked by the rising ground, I turn back to the east. Still no thermal. In a few seconds, I will be below the hills and will have to land—there is one possibility of a field. The only other hope is to turn downwind, jump the hills into the 10-mile-long pass and hope for lift from the higher mountains on its northern side. There are no fields at all, no place to land but rock if there is no lift.

A pilot's decisions are made in odd circumstances. He sits—lies almost—in a comfortable cockpit controlling the ship by almost invisible motions of hands and feet. There is none of the physical urgency or weariness that influences decisions in so many sports. Perhaps because of this, the nervous pressure is heightened still further. Choose wrong and you lose the contest. Choose worse and you lose the ship. Choose right and you tiptoe across the tightrope of the sky and continue flying—maybe win.

At the last moment, I turn away from the friendly field, dart through a low spot in the ridge, and into Tehachapi Pass. Perhaps 800 feet below lies the valley floor with its narrow road. No place at all to land. The only hope lies in the steep canyons of the northern side. The few seconds that it takes to reach them seem an age as I wait to see if we sink or fly.

The first canyon offers nothing. The ship continues to sink at its inexorable two feet per second. I turn to fly east along the cliffs toward the low ground. Nothing. Finally venturing into a shallow canyon, I find a whoosh of rising air. Turning to avoid the wall, I am soon back out and again sinking, but I have gained a few feet. I continue east along the scalloped mountainside, gaining a few feet in each canyon, losing as I am forced out. All the time we move east we are getting farther from the first turn. I reverse course and start back into the pass. I can see that it turns north ahead, but I am too close to the rock to look at the map for what lies beyond. We inch along, halfway up the mountainside, gaining here, losing there. The valley floor seems very close.

Decisions should be based on information. If I knew the wind would continue, if I knew what lay around the blind turn at the end of the pass, then I could decide. Here there is no information. Impulse—no decision—pushes me past the point of no return. The point from which I can no longer get back to the known problems to the west. With a strange hollow feeling—partly fear, partly relief—I fly into the blind corner.

Immediately, there is a good lift with green landing fields below. Gliding is a manic-depressive sport. A moment ago I was thinking that if I ever get back out of this pass, I'd land and give up all this nonsense. Now as I slide up the mountainside in the westerly seabreeze, I am already wondering how to increase speed.

At the top of the slope, the ridge-lift gives out, but a few beats along it and I find a thermal, small and narrow at first but increasing rapidly until soon, 7,000 feet above the ground, I can see the whole of the pass below and Tahachapi Airport 10 miles off to the west. The lift is still good but I am drifting away from the turnpoint with each circle, so as soon as I calculate that I can make the turnpoint and get back to my ridge, I set off. The turn seems to take an age to arrive, and as I bank over it, noting the identifying panels, I am appalled to see how far away my ridge looks and how low I am. Why, oh, why didn't I gain a few more feet before starting? The old story. Twenty-five hundred feet. This is what I have left, this and 10 miles to glide. It would be easy if I had only to land at the foot of the mountains, but I must arrive at least halfway up it to get the ridge-lift. My little plastic calculator says I should make it, pushed by the tailwind. My eye is less optimistic. The calculator claims that we can go 40 feet for every foot we lose. I spot several sailplanes on the fields below. They had calculators, too.

At such moments, there should be something to do. In other sports, one can run faster, try harder, concentrate more. In soaring, one sits quietly and waits to see what happens. The sailplane is doing all it can do. I am only the curious passenger. In nine minutes, I will have the answer.

The mountain is suddenly here. We are still high enough; the fading westerly lazily lifts the sailplane to ridge-top height.

But there we are trapped. The dying breeze, moist with the valley crops, forms no thermal this time. We beat back and forth along the ridge, unable to get back through the pass to the east because of strong sink, blocked on the other end by a rock wall of higher mountain. Time and again we encounter promising turbulence and circle endlessly in a small thermal. Time and again the lift is too weak to sustain the HP-8 and we sink back to the ridge.

It's like a fishhook, this ridge. The thought floats into the mind. The ship swims back and forth in its aquarium of air. The sun gets lower.

The sun is the sailplane's engine. The sun's heat stirs the thermal—sometimes tornadolike dust devils here in the desert—the rising air that alone makes our flight possible. The end of every flight is as inevitable as sunset. Five o'clock. With every minute now, the sun will sink a few degrees. An already weak day will get a little weaker.

Already the frustrating bubbles of lift are growing more infrequent. If we do not get away soon, we will not, stuck here hardly a third of the way home. With each beat along the ridge, the frustration increases. I move away from the ridge a few feet to study the map, already sinking slowly. Going back through the pass is hopeless; strong sink would have me on the rocks before the halfway point. How about the other end? According to my chart, if I could once get over the mountainous barrier, perhaps five miles wide, I could glide into the flat lands, perhaps pick up a thermal, at least gain a few miles.

I tuck in close to the ridge, gain back the feet lost in map-reading. By flying fast and pulling up at the end of a beat, I can just see over the mountain barrier at the northeast end of my ridge. Off to the east lies another ridge, perhaps half a mile away, and apparently another beyond that. I cannot see whether the valleys have any usable exit. The terrain is impossible for landing. Back and forth. Back and forth. Finally, more out of frustration than plan, cursing the

whole long wasted afternoon on this fishhook of a ridge, I put the nose down, let the speed build up to 100 mph and jump the barrier ridge. The valley slopes away to the north into rough country. We must make the next ridge. Once more the speed builds, once more the rocks whisper past, 20 feet below. Another valley, another ridge, this one a hair lower.

There were perhaps 10 ridges in all. The lot of them could hardly have taken five minutes to clear, but I can remember that it seemed unbelievable when the last dropped behind and the long, flat valley spread out toward the rising ground of Johannesburg. Suddenly, all was going to be well.

The rest of the flight? Interesting, but a bit of an anticlimax. Final glides. How I hate them. Inexorably, one watches the precious altitude wind down, knows the inevitable end of the flight. The calculator tells you the place of landing in terms of miles. It cannot see the endless desert unrolling below. It cannot feel the temptation to break off the glide to land at a decent field, nor the need for contest points that makes you continue straight. Calculators don't walk to telephones, carry heavy sailplanes back to their trailers. Final glides are fine things—for calculators.

Beside a road, 20 miles short of El Mirage, in the desert, the flight is over. We place eighth.

16 1964 NATIONAL COMPETITION And flying a 300-Km triangle

Of course, it's a wise pilot who analyzes and learns from past competition in order to aid his cause in future situations.

The 1964 Nationals at McCook, Nebraska, will go down in history as the year the 'lead sleds' got their comeuppance. With the single exception of A. J. Smith's brilliantly flown Sisu 1A, no ship of over six pound wing loading managed to break into the top ten. None of Schreder's HPs could top 25th (that was my final position) and the Maestro himself barely squeezed out Paul Bikle for 30th.

What happened that year?

Hindsight always works better than foresight, especially when trying to rationalize a twenty-fifth-place standing. After talking a good deal to such notables as Wally Scott and others with the view from the top, I surmised that the results stemmed from several factors. The first and most important was the uncertainty of thermal strength and height. Everyone had the experience of taking a three-meter thermal right off tow to 7,000 MSL (ground was at 3,000 MSL), bashing off at 80 or 90 mph, and never seeing another thermal of half that strength or altitude all the rest of the way around the course. Time and again, after a slow start, the day would begin to gain strength only to drop the fast ships flat on their high-speed faces during an ensuing slump. Cycling of the thermals on a rather short-term basis proved the order of most days, recognized entirely too late by most of us. For

example, on the last contest day, one could leave the field with about 1,500 feet in hand between 12:00 and 1:00, hardly stay aloft from then until 3:00, and then scratch away for the next hour. Meantime, down at the first turn, everyone was getting 700 fpm to 10-11,000 MSL.

That type of weather demonstrated a point of which I think too few of us have been aware. The fast ships can handle weak thermals fairly well, as good showings at Elmira have pointed out, but they cannot do much in weak, inconsistent weather. The heavy-ship pilot only realizes peak performance by planning on likely thermal strength and frequency. The high inter-thermal speeds he must use to beat the Skylarks' thermaling advantage must be based on anticipated conditions.

By the middle of the 1964 contest most of the 'bomb guiders' had the experiences like leaving a 5,000 foot 500 fpm thermal and finding nothing above 100 fpm until they hit the ground. The high incidence of dry thermals and the unproductive nature of the clouds further demoralized the heavyweights into sacrificing their vital speed. At max L/D of 36 to 1, a Sisu won't beat a 36 to 1 Skylark. A contributing factor was the rather short mileage of the speed tasks. A pilot who managed to find two or three of the tall, strong thermals was home and dry, another might crawl slowly around the course mostly under 2,000 feet. On the second day Wally Scott and Graham Thomson, two of the best Ka-6 drivers in the business, managed 49 and 23 mph respectively.

The final point which led to the lightweight's monopoly was the importance of tight turning radius. Watching Dick Johnson waft slowly up from a hangar-top low point was a shattering experience for those of us who circle between 60 and 70 mph.

Does McCook indicate that we should all trade in our high-speed ships on some floaters. I think not. While the rules—particularly the high number of points given for just staying in the air around a speed task—still encourage the latter types, the high average position of the heavier jobs shows hope for that type.

Flying a 300-Km Triangle

The first time I ever heard of the 300-km triangle record, back in the summer of 1959 when I was first starting to fly seriously in the elderly Olympias and AV-36s of L'Aero Club Gaston Caudron, it was an astronomical 77 km/h, a speed that completely passed my comprehension of possibility. The first time I flew a 300-km triangle, still in France, it took a hardworking six and a half hours. There seemed to me, in 1964, something almost indecent about having whipped around the same distance in two hours and forty minutes.

I remember that the day, August 6, 1964, didn't look especially promising, with a stability index of plus four. Wally Scott dutifully declared a goal and return record attempt, as did I. He took off at about 10:15 and half an hour later was still in sight of the field—low. I thought about my 7.85 lbs. wing loading and stayed put. By lunchtime Wally was back, there wasn't a cloud in the sky, and we (Ben Greene, Red Wright and Wally) were all tearing up our later declarations for the 500-km triangle record. At 1:30 the cu began to pop so I got out a piece of paper and wearily wrote out a 300-km triangle declaration. The others had writer's cramp by this time and didn't bother. They agreed to come along for the ride, however—after all, what's a 300-km triangle in Odessa, Texas?

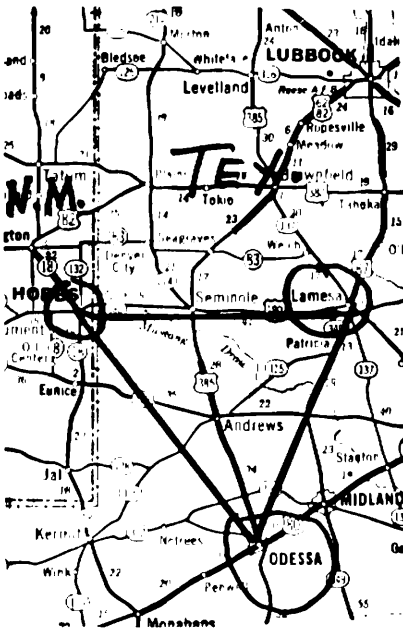
Airborne at just after two, I flew for about 20 minutes waiting for the others, as Ian Burgin, the tow pilot, was also to time us. At about 14:25 he radioed that he was ready, so I lined up a dust devil some five miles down course and split-S-d over the line. Apparently I became carried away by my enthusiasm and was alarmed to see the airspeed swing past 180 mph just as I hit a terrific bump, and then Ian said I would have to try again as I was slightly out of position! Five minutes later I started at a modest 160 mph and headed out.

Needless to say my dust devil had disappeared and I sank rapidly lower and lower, plugging along at 110 IAS. Ten miles out I was forced to work several little thermals, deserting each one as soon as I could to press on to the boomer that I knew I had to find for the first long climb. The others, starting unofficially about five minutes later, were

conversing happily about their 1,200 fpm climb while I struggled along below 3,000 feet. Finally, about 20 miles out, I found a real thermal and carried it to base, only to find Wally Scott just above me in his Ka-6 after a later start. Ben was well ahead. Thinking to catch up, I went on up "in the shade" (Texas euphemism for cloud flying). The variometer dropped slightly, but I stuck it out for 1,500 feet above base (13,000 MSL), hoping for better things. This excursion wasted me about a minute so, disgusted, I pushed over to 120 mph and went for the first turn. Fortunately the clouds streeeted for the rest of the leg so I caught Red and Wally. Ben was a couple of thousand feet over me as we thermaled up over the first turn from about 4,000 above the terrain. The thermal was a good one, averaging perhpas 750 fpm up to base, now at 13,500. Wally Scott and Red Wright in his new Sisu 1A had cut the corner a bit to scout the clouds ahead and reported excellent lift under a street leading to the second turn.

The average on the first leg was just under 70 mph. The second leg was a breeze, with excellent lift cells along the street often giving as much as 1,000 feet in straight flight. Half way along the leg, at Seminole, I paused to thermal up from about 7,500 MSL after seeing Red in trouble down lower. The last 15 miles, in to Lamesa, were in the clear, and I arrived at about 2,500 off the deck with Ben circling a bit above me as I took the pictures. Our thermal was weak, so as soon as I gained enough to reach them, I took off for a group of dust devils 10

300-km record route in Texas



miles ahead. One by one they vanished as I approached, seeming to ooze along with agonizing slowness. Finally I hooked into the last one at 1,500 feet, after 25 miles without a decent thermal, and was blasted up at 800 fpm. Ben, still maddeningly above me, reported that strength diminished at 11,500 but that a sort of a clear-air street extended for 10 miles towards home. That proved to be the case. At 50 miles out I was still a little below glide path despite the streets, so at 35 miles out both Ben and I stopped to work an excellent thermal. As soon as I had enough to make it home at 25-1, I left at 95 mph. This kept me right on glide path down to the 30-mile mark. Shortly after, an area of zero sink put Odessa in the bag, so much that I flew the last ten miles at 135, finally pulling away from Ben and crossing the finish at about 25 feet. Ben zoomed across in the Austria with its far lower rough air red line speed a few minutes later. Our actual elapsed times for the course must have been within seconds of each other.

A NEAR MISS

The Nationals at Reno, 1966

Looking back in retrospect at the National competition in Reno in 1966, there was much that could be learned about ships, tasks and rules.

First, let's consider the ships. Although nothing could be more dangerous and potentially misleading, all of us have a strong tendency to try to judge sailplane performance from Nationals' placing. About the only safe comment would be that only the good ones got anywhere near the top. Beyond that point we move into conjecture. Dick Schreder's new HP-14, finished at the very last moment and still very far from being in contest trim, won by the greatest margin in years. Judging from comparative performance against the Sisus and Austrias, Dick came up with a real winner. In level flight, the HP-14 always seemed a bit better than the Austrias and at least as good as the best of the Sisus—up to 80 mph. In climb it seemed equal to the SH-1 and better than the Sisu in weak thermals.

Another very potent newcomer in 1966 was the Libelle, placing third and sixth despite the fact that the pilots had little time in their ships. The Libelles were able to glide even with anything on the straight—Graham Thomson and Carroll Klein having a five-mph advantage on my SH-1 at any speed—and to be able to climb at least even with the Ka-6CR in weak thermals despite a wing loading of over six lbs. Undoubtedly, a lot of pilots are going to do very well in these beautifully built little ships. However, the miniscule dive

brakes—about as effective as those of a 2-22A—and the resultant very flat approach and long landing roll are going to make a lot of Eastern pilots opt for the model with a tail parachute. In a test landing over trees, using full slip, the Libelle took over twice the landing distance of an Austria and three times that of a Sisu, all flown by the same pilot!

The Austria SH-1 also made an excellent showing, coming second (me) and seventh in the very strong Reno conditions. The best of the long-wing SHK's came 11th and 13th, their extra ability in weak-thermal climbing proving less of an advantage than the ability to drive fast in very turbulent air. The top Ka-6E, flown by Wally Scott, was able to finish only 16th. Rudy Mozer, flying a sister ship, had to drop out for health reasons after the fourth day, having placed 19, 21, and 35th for the days flown. Dave Johnson did the best of the Ka-6CR pilots with a 25th. Obviously, the strong thermals and enormous distances between them were not to the taste of the fine light-and-medium-weather ship that did so well at Adrian.

The Dart 17R did well at Reno with a ninth and 24th. Both these ships seemed to have good penetration—near that of the Austrias up to 80 mph—combined with the traditional Slingsby climbing ability and handling.

The many Sibus entered that year showed the continued ability of this design, particularly in strong weather, with a 4, 8, 12, and 14 showing. A. J. Smith's ship especially, much lightened over the other models, seemed to climb fully as well as the SH-1's, even in one very weak thermal where A. J. and I chased each other's tails for three-quarters of an hour. That particular Sisu seemed fully up to the Libelles at both ends of the performance scale. Heavier Sibus looked very good in strong weather, but tended to suffer when the lift fell below 200 fpm, which it did so often during the last two or three hours of the day.

Before discussing the tasks and possible improvements or lessons to be learned, we should insert some enlightening information about the weather at Reno. As the speeds and distances indicate, lift varied from strong to stronger. Everyone grew used to seeing 1000 fpm on the clock and

most of us found quite a bit more on many occasions. Wave was generally a factor for at least some of the pilots and was often the deciding element. Unlike the thermal lift, the wave was seldom strong and often very weak, sometimes 150 fpm or less (although it went as high as 30,000 ft.). As a result, pilots who went very high and flew all the way around a triangle in wave were often beaten by 10-15 mph by pilots who stayed low and played the thermals. Most of the thermals were dry and spaced very far apart, tending to increase the luck factor somewhat over cumulus conditions. An added feature was the ability to get away as early as 10:30 in the morning and fly until very late in the evening. On most of the distance tasks, the leaders landed more because of darkness rather than lack of lift. The result of this meteorological largesse was that the winners generally flew for ten hours on distance days and then faced long retrieves, which frequently brought them back to Reno a couple of hours before dawn.

A difficulty with the distance task, which becomes increasingly apparent and must obviously be solved if we are to have fair contests, is the penalty involved because of long take-off lines. The towing was handled very well in Reno, but 60 sailplanes still take about an hour to launch and no planned change seems likely to speed up the process significantly. The result is that on a typical day, with five to seven hours of flying, the pilot with the luck of being able to choose an early time may enjoy a 15 to 20% advantage over the contestant who gets stuck at the end of the list. Theoretically, slipping the choice for starting times corrects this situation: in practice it seldom does, as one can easily be either high or low on the list for all three of the distance days, having the opposite positions on the speed days when starting time is less important.

A possible way of cutting down this luck element would be to prohibit any sailplane from starting until at least half the ships have been launched, a legal start requiring identification of a ground panel which would not be displayed until that time. Arguments against this idea include the undeniable fact that it would increase congestion near the start.

Reno made clear once again that free distance as a task entails a high degree of luck, proves little, and costs a lot. One wonders how much longer we are to be saddled with this holdover from the 'thirties, when sheer distance seemed so remarkable. In what other sport is ability measured by having all the contestants set off in any direction they please over little-known territory? Imagine the Indianapolis Race with all cars free to leave the stadium and go as far as possible before sundown in any direction. Increase the similarity to gliding by equipping the contestants with maps giving only the vaguest information as to road conditions, detours, bridges out, etc.

In Reno, the task committee wisely chose to have free distance on a day with rather weak and broken thermals, on which a wind gusting to 50 knots indicated the direction to take. As it happened, the day put a premium on not going too fast. Only two of the top 10 made flights of over 375 miles, most being on the ground by six o'clock. I was three hours late due to a relight and had to leave a cloud street, stretching out on course as far as the eye could see, and abandon 600-fpm lift and 130-mph cruise speed (at 18,000 ft.) in order to land before dark. Of course the condition hadn't been there when earlier pilots reached the same place. As usual on free-distance days, a number of pilots who never seem to do much when flying the same course as the others suddenly showed unprecedented skill.

Free distance is supposed to measure a pilot's ability to read and interpret the weather, but the results for the last several years make it painfully clear that luck is more of a factor than meteorological ability. Weather information is too skimpy and too often just plain wrong. In Reno the cloudless sky that prevailed for most of the free-distance days offered little to read.

One factor that contestants often lose sight of is the cost of a free-distance task. At Reno in 1966, most of the leaders went 350 miles or more. Car miles varied from about 800 up. Only the hardest got back to Reno without holing up at a motel. It goes without saying that such a task is expensive and proves little. Deleting the free-distance day at Reno does

not affect the position of the first four in the contest and makes little change among the first 10.

An added factor to consider is the danger element. If a ship is unaccounted for over the wild and generally uninhabited areas characteristic of Reno and Marfa on a fixed-course day, at least the searchers have some idea of where to look. On a free-distance day, there isn't a clue. At a recent Canadian Nationals it took two days to find a ship that crashed within 25 miles of take-off. The pilot had been killed instantly, but what if he had merely been too injured to move? Less dramatic but quite as real is highway safety.

Perhaps the one thing at Reno in 1966 that received the most praise, and rightly, was the new starting gate set-up pioneered by Paul Bikle and the Southern California Competition Club that he headed. The device seemed capable of reading altitude to well within the accuracy limits of the average altimeter, and offered pilots immediate verification of their starts. We hope that the same group may be able to come up with turn-point identification that can be read from only one position and from any altitude. The clock-type panels used in '66, although excellent in theory, proved invisible from very high altitudes and had the added disadvantage of being readable at different distances depending on the placing of the marker panel. Those differences often gave one competitor an advantage of several miles over another. The best suggestion which came up in discussion of the problem at Reno was the use of one, two or three strobe lights hidden by a circular canvas shield. Contestants would merely record the number of lights seen and give the time. This system would insure each competitor flying the same distance.

The last department that seems to offer significant room for improvement is towing. Chuck Glattley's fine organization at Reno certainly did everything possible under the existing rules, but the fact remains that a tow to 2000 ft. is a long process at mile-high sites like Reno and Marfa. All of us had our share of hair-raising tows that resulted from tight thermaling by the tow ship, and most of us, at times, were in extremely dangerous situations wherein only the high penalty

in contest points kept us from releasing. A great improvement would result if we abandoned the rule that states that ships must be dropped at a fixed point at 2000 feet. Instead, require that all the tow ships follow the same flight path and that they go, as soon as practicable, to the side of the airport away from the course line for the day. Pilots may release at any point before being waved off at 2000 ft. Most pilots would naturally release in the first good thermal, freeing the tow ship sooner.

Most of the contestants at Reno would agree that Marshall Claybourn ran a magnificent contest in 1966, with tasks that were as good as could possibly have been chosen within present requirements. Marshall himself commented after the contest that he was appalled at the territory over which he was forced to send competitors.

The time has come for the U.S. to reconsider the contest rules. The American soaring movement has come of age. We need not look to England and Europe for precedent in everything that we do, following along 10 years behind as we have done in the past. Specifically, we should abandon the expensive and outmoded free-distance task, relic of the days when most contestants were after their FAI badges. We should limit the required number of distance tasks to three and make them around a closed course, the furthest marker to be no more than 60 miles from takeoff (speed-task turn points might have the same rule), and we should modify the release-point rules to allow release at the pilot's discretion. The increases in both ship and pilot performance make these changes mandatory if we are to have fair, meaningful contests.

18 THE FIRST BIG WIN Marfa, 1969

When I arrived in Marfa, Texas, a week before the 1969 U.S. National Championship races, and looked at the list of entries, it was a sobering experience. Although I had flown in larger contests and had flown against practically all the serious pilots at one time or another, I had never competed against so many top-notch pilots, flying such outstanding ships.

During the practice week, I flew with relatively few other ships, since I was tied up with commitments to the Drew Associates' soaring movie "The Sunship Game." From what little comparison flying I did, I decided that only Wally Scott in the ASW-12 had any real performance edge over my long-winged Cirrus B. Fortunately for my peace of mind, I had little idea of how much of an edge Wally was to have. Of the other highly rated ships, I thought the Kestrel's climbing abilities to be less than I had anticipated, especially in weak weather, and the fabulous BJ-4 I judged to be too inflexible to be a good contest ship. The ASW-12, with its unreliable tail chute as the only drag device, seemed an airport-only sort of ship which was the reason I had canceled my order two years earlier. This turned out to be true and undoubtedly cost Wally the contest on the distance days. He never placed below 2nd on speed tasks.

The first contest day, a 262-mile trip around Van Horn and Fort Stockton, proved easy and quick under an almost cloudless sky until the final leg. I was lucky to get to 14,000

feet at Fort Stockton and managed to stay high for most of the seemingly endless last leg into a 30-knot wind. About 30 miles out I started a tentative final glide, needing about 30-1 to make it. Small patches of reduced sink brought the glide ratio needed down to 15-1 at 15 miles out. I pushed over to 110 mph and more—and then lost 4,500 feet in five miles of seemingly endless sink. Finally at 500 feet in the mountains with seven miles to go, I found a low ridge with lift that turned into a 500-fpm thermal. No longer feeling the least bit brave, I climbed to what seemed a ridiculous height and came in at 11-1 in my 45-1 Cirrus, just comfortably making the finish line at zero feet to be first back at 64.8 mph. Wally eased in over the wires a bit later with 63.6, followed by 44 others with slower times. A few, notably Ben Greene, were forced down within sight of the finish by the same sink that had so nearly finished me.

The second day, a 240-mile triangle to Pecos and Van Horn, proved a disaster from start to finish. I took a tentative start at about 1340 to feel out the weather, not really planning to leave until about 1415. Thermal strength was good at about 500 fpm. Returning, I started again at 1410 but found only weak lift. My third start at 1440 was little better, and it took until 1505 to get high enough for a final lunge across the line. This time I was determined to take any thermal to get going. Unfortunately, I encountered nothing and soon found myself on the lower of twin mountains, facing a 20-plus-knot southwest wind, and sinking rapidly. At 500 feet I found a weak thermal which took 20 minutes to get me to 2000 feet and then quit. I started a long glide back to Marfa for a relight, but finally hit a 300-fpm thermal about five miles from the field. My watch said 1550. I debated recrossing the line but decided that for me the day had become a distance task and set off.

Aided by a tailwind, the first leg went quickly, but from Pecos to Van Horn we bucked a heavy headwind with mostly 200 to 300-fpm thermals. Aside from an 800-foot low in the middle of the leg, there were no special problems, but I arrived at Van Horn at about 1900 feet—and proceeded to make another bad mistake. The direct route home looked very dead so I took a wide circuit to the south, only to find



UVEGES

Decisions . . . decisions

every cloud decaying as I reached it. I finally drifted in late and slow, discovering I had lost 20 minutes on the last leg to Gleb Derujinsky (in the other Cirrus B), with whom I had rounded the last turn. Still, I felt very lucky to have arrived at all. I finished 13th for the day at 46.6 mph. Wally Scott won with 58.3. My time, minus the 40 minutes wasted at the start, would have been 54 mph for 2nd place.

The next day, a speed run to Van Horn and back, proved uneventful. Wally won at 62.3 mph. Ross Briegleb, in his speedy Diamant, and I were 2nd and 3rd.

Nobody was too surprised when Marshall Claybourn announced free distance for the fourth day. If we had to have this outdated relic of a task at all, the weather seemed good for it. The general situation, with a stable area west and a front hanging 200 miles north and swinging off to the northeast through Oklahoma, and still another front straight east, gave a sensible choice of direction. Both met man Dave Owens and the visiting French team meteorologist figured that a narrow corridor east-northeast offered the only possibility for a flight of over 300 miles. The local talent—Wally, Ben Greene, Dick Johnson, and I—all followed this advice carefully, despite the necessity of bucking a strong southeast wind for the final three hours in very weak lift. The Cirrus was in its element in such weak weather, so when my crew guided me into a field 374 miles out, I felt I had gone about as far as any. Imagine my shock on calling in to learn of five flights of over 500 miles, with many more in the 400's. Those who had never heard that crossing fronts is impossible in the southwest, or who had merely taken the line of least resistance and drifted downwind, had found a hole in the supposedly uncrossable front and had poured through. Needless to say, the two next days—rest days—offered some of the best weather of the contest. Actually I wasn't too unhappy, as I closed up almost 80 points on Wally at a cost of only \$120 for gas, motels, etc.—fairly cheap as free distance goes.

The fifth day seemed almost the start of a new contest after two rest days. The cat's-cradle call was welcome to me, despite the fact that I think it a bad task, simply because it

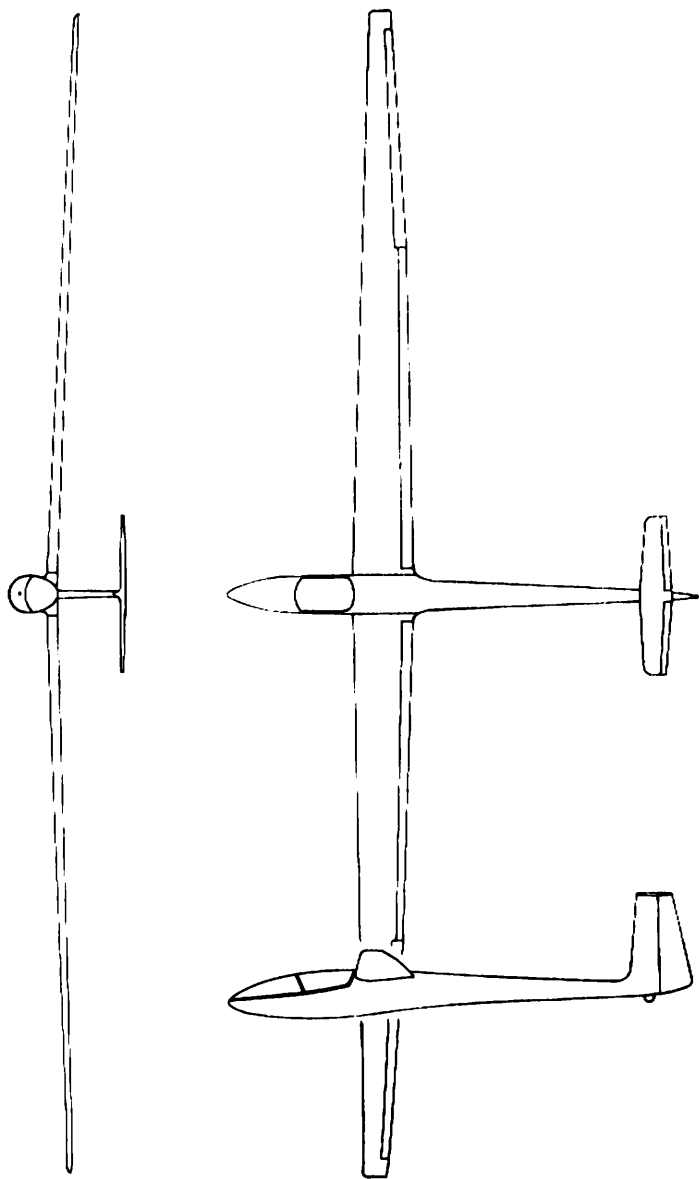
offered the best chance to catch Wally. The day was fairly easy and straight-forward with almost all the top pilots choosing the same Van Horn-Pecos turn points. By dint of concentrating on speed I was able to get twice around by 2015, but unfortunately was unable to climb again after rounding Marfa the second time and had to settle for a landing on the outskirts of town and a 482-mile 1st place, gaining 112 points on Wally and a fair number on John Brittingham and Rudy Allemann.

The sixth day, a 275-mile speed run to Pecos and McCamey, gave me a 2nd place for the day but dropped me 78 points on Wally, who made a brilliant run at 65.7 mph to my 61 mph. Gloom.

The seventh-day cat's cradle was won on the first leg, when I found a dry street running into Van Horn, got an 8 to 10-mile lead on the pack, and managed to get around Pecos, Marfa, and back to Van Horn by 1700. My calculator showed one-and-a-quarter to one-and-a-half hours needed to buck the wind to Pecos. I decided that if I could get there by 1830, I would be okay to get back out of this irrigation-damped sink hole. I arrived at 1825 and drifted slowly back to Van Horn with the last thermals of the day, arriving with 1500 useless feet after a 53-1 final glide. I flew around for the Drew Associates photography plane for a while before landing at the airport for 475 miles and a comfortable lead of 70 points.

The final day was a 345-mile speed task to McCamey and Van Horn. It seemed to me a bad call—the only one of the contest—simply because for many pilots it would be the fourth straight day of six to nine hours in the cockpit. From a personal point of view I liked the task, because Wally would have to beat me by half an hour to win, and Rudy Allemann looked too exhausted to do well on a long day. I endeavored to look as rested and casual as possible.

The day turned out to be far better than forecast. I started a minute after Wally so that I could keep an eye on him. I tried following him but proved unable to keep up with the ASW-12, which both outclimbed and outran me. Fortunately I had a bit of good luck at the first turn and caught up. I saw very few ships on the 150-mile second leg, but managed to



ASW-12

make good time, especially on the second half when the clouds proved to give 1000-to-1200-fpm lift to 13,000. Coming out of the second turn, I saw a T-tail circling and slid in 500 feet under Wally. It must have been a low moment for him.

The direct route home was cloudless, but a line of cu's stretched off about 10 miles north of course. Wally set out straight, knowing, as he told me later, that I would take the clouds and realizing that he could only gain the necessary time by doing something different. As it happened, the clouds paid handsomely and I was first home to win the day and the contest.

Winning is a combination of ship, skill, and luck. I had incorporated two out of the three several times before; this time, finally, all three fell together. As an examination of the scores would show, I beat Wally Scott on the distance days, when I could take any chance field, while he was often forced miles back to land at airports. Twice I was able to leave airports at altitudes of 300 and 800 feet to go on to fields and gain another few miles. A great factor in this was my crew chief, Ralph Boehm, who always contrived to be under me to check out chancy looking fields. Often without him I would have been tempted to give up the last few miles in order to land safely. The superb performance of the Cirrus, combined with its flexibility, comfort, and ease of flying, made it the best possible ship for the long, strong days at Marfa.

Final Scores, U.S. National Championships, 1969
Marfa, Texas, June 24-July 3, 1969

1.	Moffat	Cirrus B	7413
2.	Scott	ASW-12	7321
3.	Brittingham	Cirrus	7073
4.	Allemann	Libelle	7063
5.	Mears	Libelle	7014
6.	Briegleb, R.	Diamant 16.5	6986
7.	Smith	Sisu 1A	6976
8.	Wroblewski (Poland)	HP-14	6621
9.	Semans	Phoebus C	6558
10.	Wodl (Austria)	FK-3	6547

“WELCOME BACK, WORLD CHAMPION”

A win at the Worlds (Marfa, 1970)

When the final thermal died and the last super-ship whistled across the finish line, the winner of the International Soaring Championship turned out to be an American.

FIRST DAY:

The tension has been building gradually all during the practice week, sometimes almost unnoticed during the frantic moments when instruments didn't work, last-minute changes had to be made, and always, for me, the desperate attempt to get more time on the Nimbus. This sleek monster, the largest competition glider in the world, has only just arrived from the Schempp-Hirth factory in Germany. Its 72-foot-span and all-up weight of 1,400 pounds make it half again larger than anything I have ever flown, and it obviously needs some special flying technique. I estimate that you would need 150 hours to get the most out of it. I have 12 hours when we arrive in Marfa.

As we sit in the pilots' meeting on the first day, waiting for the contest task to be announced, all that is past; there is nothing but the tension.

Cat's cradle. Or, more reverently, distance in a prescribed area. The object is to cover as much distance as possible within the limits of a large, rough oval some 150 by 250

miles in size. There are seven turn points, which pilots may round in any order, except that one may not retrace a course just flown.

We launch at 12 o'clock in an order chosen by lot. Cloud base is only 1,800 feet above the mile-high plain. Lift is weak and uncertain, and forecast to stay that way. Mindful of the weatherman's prediction of slightly better weather to the west, most pilots start slowly toward Van Horn. I move toward the mountains, hoping for better lift.

The first real problem occurs some 70 miles out. An enormous blue hole, full of sink, stretches away to the west. If I turn north, toward Ardoin, I have only 25 miles before reaching the clouds in the pass north of Van Horn. The air is silky smooth as the ship slips along at best L/D speed of 75 mph, going 50 feet forward for every foot lost. The clouds ahead are much lower, right down on the mountaintops, perhaps 1,500 feet above the valley. Lift is very weak, and we struggle along for an hour, never more than 2,000 feet above the ground, before finally reaching the turn at Ardoin. I turn northeast toward Guadeloupe Pass, hoping to make Carlsbad. For an hour, I try to get through and am forced back to the plain four times by low ceilings and lack of thermals. My teammate, Wally Scott, joins me and has the same problem. Ceiling is only 500 feet above the peaks, and there is no place even to crash-land successfully. We swing away to the south, only to be forced down at 4:30 in the afternoon by the blow-off from a large thunderstorm. I make 178 miles for twenty-first place and 550 points out of a possible 1,000. The winner, ex-World Champion Ed Makula of Poland, has gone straight north to Carlsbad and lands on the outskirts of Marfa at nine o'clock.

SECOND DAY

This time, we have a race to Pecos and return, 163 miles in all. The weather looks good except for a strong probability of thunderstorms in the Davis Mountains, which are on the course. Sure enough, by release time at 1300, there are already two large storms with a narrow tunnel between. I cross the start line as quickly as possible and dart between

the storms just in time. Wally and I seem to be in the lead, averaging almost 80 mph. At Balmorea, though, with only 50 miles to go, we get completely blocked by the storms. For an hour, we circle and wait, searching for an opening, making experimental runs to the edge of the storm and watching all the slower ships catch up to us. Finally, the ground warms again, a few weak thermals begin to form and we creep home through the rain squalls. I am eighth, at a slow 43 mph, but only 15 out of 40 have completed the course, so I move up to tenth overall.

THIRD DAY:

We have a speed triangle of 230 miles, with good weather predicted. As usual, we load 240 pounds of water in the wings to increase speed. Unfortunately, soon after the starting line opens, a thunderstorm forms over Marfa. Most of us have to make a detour to the south in order to miss it, and even then we find slow going. Things are slow to Van Horn, but then they pick up, as bases go to 8,000 AGL and thermals increase to a Texas-like 800/1,000 feet per minute. On the final glide home the way is blocked by the same thunderstorm over Marfa. It looks very forbidding, so I get high, expecting strong sink in the rain. Actually, the sink isn't too bad, and I come in at 137 mph—placard speed—for the last 15 miles and then have to use the tail chute to get down to the regulation 1,000 feet to cross the finish. This is a bit embarrassing and wastes a couple of minutes. Ed Makula misjudges the sink, however, lands one mile short of the field and loses 450 points. I turn out to have won the day at 66.1 mph and move up to fifth place overall.

FOURTH DAY:

The task turns out to be the same and the weather a good deal better. Unfortunately, I have some sort of infection, have had chills and high fever all night and can only sit up for a few minutes at a time. Our team doctor gives me shots and antibiotics, and I lie under the wing until the moment of takeoff. I am not at all sure I will be able to fly for four hours. Competition sailplanes are rigged to be unstable, and must be flown every second. Fortunately, the semi-reclining



Marfa turnpoint (note wing flex)

seat is very comfortable, and going on oxygen right away makes me feel a bit better. I decide to start a little early, to save energy. On course, everything goes well but I again finish too high and make a rather hairy landing when the tail chute won't release. The crew tows the ship in and tells me I am first, with 79.4 mph. The information doesn't mean much at the time, and I go back to bed.

FIFTH DAY:

Still sick, but at least able to sit up, I find that we have moved into second overall. The task is 245 miles out and return to Ardoin. It looks fairly easy but doesn't turn out to be so. As we start, a line of thunderstorms crosses the course to the north, giving violent lift to 9,000 feet above ground. Unfortunately, beyond the storms a vast blue hole stretches away to the northwest. I start out on tippy-toe at 85 mph. The glide goes on and on in dead-smooth air for more than half an hour. Finally, at 2,500 feet over rough country, I feel the telltale turbulence and find a small, rough thermal back to 6,000. I catch Wally near the turn but become so involved

with taking the required turnpoint picture that the ship tucks into a spin. Instant opposite rudder has no reaction at all. The Nimbus has never been spun, and the designer has told me that he doesn't think it will recover due to the long wings and very short tail arm. For three turns, he seems to be right. Finally, I try flexing the floppy wings by yanking on the stick, a technique I have read about. For some reason, it works, the rudder takes hold and all is well. I have lost 1,500 feet; the fault is entirely my bad piloting.

On the way home, Wally and I join up for some loose team flying, sharing information of thermals and the best route to take. We finish first and second at 63 and 60 mph, with all the others down in the fifties. This gives me a precarious 32-point overall lead (out of 4,456 points) over Germany's potent Hans-Werner Grosse. The English, French and Polish are not far behind.

SIXTH DAY:

I feel a lot better after two days of shots and pills. This is just as well, as the task is another cat's cradle.

As luck has it, I am last on the takeoff order. This means a 25-minute advantage—say 20 miles—for the earlier ships. I finally release at 1230 at the usual 2,000 AGL. Bases are at 5,500 with about 500-fpm lift, so I start north for Wink. Once clear of the mountains, we see that Wink appears to be in a large hole, so Wally and I deviate east to his home town of Odessa. On the plains, the thermals drop to 300/400 fpm and often prove rather elusive. The wind is strong, and we don't reach Odessa until 1515. From there, we decide to angle off to Big Lake, 79 miles southeast. Progress is slow over almost total desert, and we are pleased to finally arrive at 1645.

We now turn downwind for Wink, planning to have the wind under us as the thermals weaken at the end of the day. Our plan is to reach Wink, then swing south back to Marfa and finally drift downwind to Sierra Blanca at sundown. Unfortunately, halfway to Marfa we realize that the day is dying quicker than we had thought. Wally and I decide to deviate directly to Sierra Blanca. Lift is down to 100/200 fpm, and we use every thermal, with the Nimbus slowly

gaining on Wally's Schleicher ASW-12. Near Sierra Blanca, we take any lift, no matter how weak, and finally drift over the turn with the last light to take our final pictures at nine o'clock. I have about 2,000 feet on Wally and hope to make it back over the hills to Van Horn. I watch Wally dropping farther and farther into the gloom below and finally see him land safely on the highway in just about the last spot before the bad country in the hills. I move into the hills but hit strong downwash from them and am forced back. My crew radios that there is no place to land in the hills, so I drop the flaps and burn off altitude to land on the road half a mile ahead of Wally as crew chief Ralph Boehm and my wife Suzanne block off traffic with the long trailer. We have covered 482 miles in eight and three-quarter hours of flying. We finally arrive back in Marfa at 0200, to learn the western half of the course had better conditions. Neubert of Germany is first with 500 miles. We are sixth, but have improved our overall lead to 180 points over Hans-Werner, who only managed 419 miles. Wally and I are pleased that we have much the best distance of anyone who went east.

SEVENTH DAY:

We wake in the morning to the shocking (in West Texas) sound of rain. All the tow pilots, who are ranchers in real life, walk around with big smiles; all the sailplane pilots glower. No contest. The next day, the tow pilots' smiles are even bigger. On the third day, they are practically going twice around.

Finally, on the fourth day, the weather clears a bit, and we have a task set to Pecos and return—163 miles. The met man is anything but encouraging, predicting low ceilings and weak lift. We lighten the Nimbus as much as possible, dumping all water ballast and removing the oxygen system. The ships line up on the takeoff grid at 1130, but the sky looks dead. Ed Makula and I feel we would be lucky to get back, as Pecos is notorious for lack of lift even on good days. At 1200, we are still sitting about. Finally, at 1240, we see a few weak wisps of cumulus, and launch begins. The Nimbus is off at 1320. Lift is very weak, ceiling at 2,700 feet. I start fairly early at 1350, barely able to get the 3,300 feet allowing for crossing

the starting gate. I move out very cautiously, using every bit of lift. A stream of other gliders follow, anxious to use anything I can find. Twenty miles out, at Fort Davis, we are down to 1,500 feet, with bases just above the hilltops. We pussyfoot into the high mountains to the north and breathe long sighs of relief as the land drops away 3,000 feet onto the Pecos plain. Forty miles from home, we meet Walter Neubert in his big Kestrel 22, the other 72-foot ship in the contest. The Nimbus outclimbs him easily, but as we straighten out for home, he has five mph on me as a result of his 150 pounds of water aboard. I curse myself for believing the weather man and finish eighth with a slow 57 mph. Neubert is first with 63. I am still a comfortable overall fifth with 160 points on Hans-Werner and some 300 on Michel Mercier of France who is standing third. Still, it has been my worst flying of the contest, and I feel very depressed.

EIGHTH DAY:

The task is a 325-mile triangle to Sierra Blanca, Fort Stockton and return. Lift is predicted at 600 fpm and bases at 6,000. Most of us think it will be a good deal better than this, as met man Dave Owen is generally pretty conservative. I put off starting until 1320, waiting for things to be better, and turn out to have started about 10 minutes too late. The first leg is easy, with the wind under us, but the long, 150-mile second leg seems to be forever, Wally and I deviate south on course into the mountains, expecting better lift off the high ground, but find only trouble with weak disorganized thermals. Fort Stockton is in the middle of a 40-mile blue hole, and the glide in is a nervous one. We finally round the turn almost together and start back to Marfa across a cloudless void. Fortunately, there are some dry thermals and we do fairly well until, 30 miles out, neither of us can find the last thermal we need. We waste what seems endless minutes searching, but I finally slide across the finish around 1830 to find that I am first—but only by two seconds over Mercier in his ASW-12. My overall lead is up to 230 points.

NINTH DAY:

As I sit in the pilots' meeting on this final day, I realize that I am really tired. During the contest, I have averaged better than five hours a day in the cockpit, and my arms ache from the struggle with the heavy ailerons. I do my best to look as carefree as possible, knowing that the others in the top places are just as tired and knowing how demoralizing it will be for them if I look cheerful and ready for more. The task is Sierra Blanca, Ardoin and return, 275 miles of rough country. I look over at Hans-Werner. He doesn't look happy. I know he hates the many miles of unlandable terrain.

I start at 1251--about 10 minutes after Wally, so he can keep me informed of what lies ahead. The first problem comes 60 miles out, when we see a big hole heading all the way to Sierra Blanca. Wally deviates south 10 miles to follow the clouds, and I decide to take the direct route. Mine works, and we meet each other over the first turn. Far below, I see another ship, which turns out later to have been Hans-Werner. The 50-mile second leg has conditions the Nimbus likes, and I gain five minutes on Wally. On the way home, the lift drops off to 400 fpm for no reason, and I keep Wally posted through our private code. I get down to 2,500 feet at Lobo and have trouble finding a good thermal. Finally, I hit a boomer to 6,000 and start for home. One more thermal over Valentine does the trick and from there on, it's a 40-mile ride along a cloud street at placard speed. I drop the gear 15 miles out to increase the sink, but even then have to resort to the tail chute to get across the finish. I radio the gate, "Double X, one mile out," and get a cheerful "Welcome back, World Champion," for a reply. I have won the day and the contest.

Footnote--The Nimbus at Marfa, 1970

The first hint that there might be some possibility of my flying the Nimbus in the Internationals at Marfa came just after the 1969 Nationals when my crew chief, Ralph Boehm, asked Klaus Holighaus (designer, builder, and owner) what the chances were. Klaus said that he would have to offer the ship to the German team first, but if they turned it down, it



UVEGES

"Welcome back, World Champion"

was mine to fly. There was a long silence from the east during which time Hans-Werner Grosse and Walter Neubert tried the Nimbus and decided not to take it. Hans-Werner decided not to because he didn't want to try so exotic a ship in the desert; Walter turned the offer down because he had already arranged for a 22-meter version of the Kestrel.

Late in October of '69 I got a letter from Klaus, formally offering to lend me the ship provided I could get it over and back by air. Little did I know at the time that the letter was to be the start of a pile of correspondence concerning the Nimbus, that eventually grew to be almost a foot high. The winter passed rapidly in a rain of letters from me, Bill Ivans, and B.S. Smith to practically every military agency known to man, begging transportation for the bird. Unfortunately, all of that effort got us exactly nowhere, and by mid-March I was getting ready to write Klaus and tell him that I wouldn't be able to fly the ship so he could give it to one of the other teams with more liberal budgets.

Final Scores, World Soaring Championships
Marfa, Texas, June 22-July 3, 1970

1.	Moffat (USA)	Nimbus	8323
2.	Grosse (W. Germany)	ASW-12	8036
3.	Mercier (France)	ASW-12	7811
4.	Burton (Great Britain)	Kestrel 19	7746
5.	Makula (Poland)	Kobra 17	7687
6.	Neubert (W. Germany)	Kestrel 22	7682
7.	Delafield (Great Britain)	ASW-12	7672
8.	Labar (France)	ASW-12	7616
9.	Scott (USA)	ASW-12	7352
10.	Wiitanen (Finland)	Phoebus C	7332

The whole impasse resolved itself one evening at Bill Holbrook's annual Soaring Symposium, where I was a speaker. Joe Lincoln, whom I had never met before except through his books, came up, asked a few questions, and quietly stated that he would pay for bringing the Nimbus over and returning it after the contest. The relief was so great that I felt as if the contest were three quarters won already. Joe's generosity made it possible to start really concentrating on the ship itself and how to get the most out of it.

As it happened, the letter writing and endless phone calls were far from over. The Nimbus was not free to be shipped from Germany until May 10. We had assumed that once we had the money to pay for shipping our troubles would be over. Not so. Now it appeared that no airline would agree to handle the Nimbus at any price due to its size. At the last moment Klaus managed to dig up a container ship that could bring the Nimbus, with arrival scheduled for the 24th. We began to resume breathing.

Unfortunately, respiration proved premature. May 24th came and went. So did the 28th. So did the 30th. Still no news. Calls to the shipping company were of little help. The ship seemed to be taking the scenic route. Finally on June 2, as I was busy administering final exams at school, the ship actually ambled in. There ensued a three-day battle with the Customs people who said that, due to a technicality in the wording of the shipping document, full duty would have to be paid regardless of the fact that the Nimbus was only to be here for a month. Since the duty would come to about three months salary, I found a broker and together we pored over giant books of customs regulations. Finally, after many fruitless efforts, I found a clause which would allow the Nimbus temporary importation on a duty-free basis.

After all that, it seemed anti-climactic just to drive up with the car the next day and tow the Nimbus off to Wurtsboro, New York. Needless to say, once there we lost no time in converting the instruments from my Standard Cirrus. I soon discovered that I had to make rudder pedal extensions in order to get in the cockpit and that the only place for the oxygen bottle was in my lap. Details . . . details . . .

Finally I was airborne. Flying the Nimbus proved very enjoyable—and also different. Put simply, the Nimbus wanted to continue doing whatever it happened to be doing at the moment—especially in yaw. The heavy and ultra-long wings made for a curious sort of delayed action response to the rudder. I soon discovered that the Nimbus, like my old HP-8, seemed just as happy flying along sideways as straight. I also discovered performance. The weather for the few remaining practice days continued to be weak; the best thermal I saw was about 200 fpm, but the Nimbus flew and flew. On two

days it was the only ship at the field that could stay in the air. I would circle endlessly at the top of the only thermal—at 900 feet—and watch ship after ship join in at my altitude only to sink rapidly away and land.

The long drive down to Marfa proved uneventful; I looked forward to getting some real practice in Marfa conditions to add to my 12 hours of wafting around Wurtsboro in nothing-type thermals. Actually, the practice days proved pretty frustrating due to instrument problems. My total-energy system, which had been working perfectly all spring in my Standard Cirrus, refused to work at all in the Nimbus. We tried fixing it day after day but nothing seemed to work. Finally, two days before the contest, we took my panel out entirely and put Klaus's panel back in (he had brought it for record flying after the meet). That was a marked improvement, although the altitude caused problems. We never did get more than about 80% compensation. My outlook was slightly improved by learning that Walter Neubert in the big Kestrel 22 was having similar problems. Our compensation systems just weren't designed for ships that enter thermals at 125 mph and gain 900 feet and more on the pull up.

The low-point department in that contest was pretty well cornered by the first day. It was without question the most nightmarish flight I have ever made. The best altitude of the day was 3300 feet and the whole last two hours was below 2000, much of the time over unlandable terrain. After a very scary flight to the first turn at Ardoin, Wally Scott and I were forced to wait well over an hour for conditions to improve so we could get over the mountains to Carlsbad. In the meantime all the other Open ships caught up with us. Finally we decided to turn back to the southeast, only to be shot down by the blow-off of some big thunderstorms.

The German team, arriving just after we left Ardoin, found better conditions and managed to get through the mountains at 500 feet above the terrain. Hans-Werner Grosse told me later that they never would have tried it if they had known what the terrain was like. Many pilots, among them Neubert and 1968 World Champion Wodl, gave up many points by charging into unlandable and unretrievable country with too

little thought as to the difficulties of being ready to fly the next day. The U.S. team all gave up valuable distance on this day to stay near main roads and ensure retrieves in time for the next day's flight.

The third, fourth, and fifth days finally brought some decent weather with only a few thunderstorms. This allowed me to get some idea of how the Nimbus was going. When flying with the Kestrel 22, I found little to choose in performance between the two ships. I thought perhaps the Nimbus climbed a bit better, but it was difficult to tell. I out-performed the ASW-12 when lift was 700 fpm or better due to my higher cruise speed. (Flying with Wally Scott on one 50-mile leg, I gained 2000 feet by the time we both reached the turn). In weak lift of 200-fpm and less, the Nimbus was again better by about the same margin due to my better climb when light.

The surprise came in the medium lift range of 300-500 fpm. In that range, the Nimbus functioned much like Wally's ASW-12. I would gain between thermals, but he always seemed right there when we came together again. On the second cat's-cradle day we flew for over 400 miles, mostly in sight of each other, in 300-400 fpm lift. I was able to gain only at the end, when the thermals fell away to under 100 fpm (and then had to throw away my hard-won 2000 extra feet when I couldn't clear a last mountain range and had to turn back to land beside Wally in the last field).

That phenomenon puzzled me very much throughout the contest, since our weather was usually in the medium lift range. After the contest I finally decided that the ASW-12 was much more maneuverable and easier to center in thermals than was the Nimbus. While the Nimbus has an excellent rate of roll in still air (about 5½ seconds), I soon found that if a strong thermal core was under one wing it was nearly impossible to roll into the thermal until I had gone by. That delay in centering seemed to be costing me just about what my extra performance was gaining between thermals. The effect was especially noticeable due to the low ceilings in Texas that year (seldom over 5000 feet above the terrain) and the consequent need to use many thermals. In strong conditions with less thermals used, the effect was reduced, and in weaker thermals controlability was seldom a problem.

I feel in retrospect that had I had more time in the Nimbus I might have learned techniques to cope with the problem. I would put 150 hours as the minimum for really getting the most out of this ship. I think that Klaus has been very wise in the Nimbus II production ship in going to a slightly shorter span. The Nimbus seems a little over the optimum span for average conditions.

The other peculiarity of the Nimbus that I never became used to was the difficulty in judging final glides. In seven speed days I did not once make a decently low finish, and three times had to use the drag chute to get below 1000 feet! I don't recall ever finishing much above ten feet high in my other gliders.

The difficulty lay in the fact that with lift of 3 meters per second the final-glide calculator called for an approach glide-angle of 24 to 1. This meant 130 mph when fully ballasted. Placard speed was 137 mph, and at 140 the flaps began to flutter in the rough air. The result was that if any lift at all were encountered on final glide of, say, 40 miles, I ended up embarrassingly high at the finish gate. (Klaus was rightly very critical of my sloppy flying and calculated that it cost me 5 minutes or so over the contest. Thus I was extraordinarily pleased to see him return from his first World Record 100-km speed triangle after the meet, very high, with full dive flaps extended. He had been on final glide since halfway down the second leg trying to get the reluctant Nimbus down!)

One thing about that stint at Marfa that stands out most in my mind was the pleasure of team flying with Wally Scott. It would be impossible to imagine a better teammate. I feel sure that both our scores were improved by several hundred points by the help we were able to give one another. Our system was to fly loosely together, say within 5-10 miles of each other, and trade information back and forth via a shorthand code. Whichever of us happened to be in the lead would report on conditions ahead, and we would frequently discuss the strategies of dealing with a problem. We made no effort to hold back at any time to stay together and on some days would get separated by 20-30 miles.

On the last day Wally started about ten minutes ahead of me so as to be able to report en route conditions and marked a thermal for me at the tricky first turn so that I could make a long, fast glide in despite the dead-looking air. One hundred miles later I was able to report a large hole in the Van Horn area which he was able to avoid. We came together again on the final glide to finish less than a minute apart. I thought Wally was much the best ASW-12 pilot at Marfa that year, and only a once-in-a-thousand piece of bad luck on the third day kept him out of the top three.

What did our experience that year at Marfa show? In the Open Class the two 22-meter ships and the ASW-12s were in a class by themselves. Had any of the ASW-12s been equipped with ballast, they would have been very hard to beat. Still, there is no question that the 22s had a performance edge, as appears clearly from the fact that they won on every day that was not totally luck dominated. I thought the Nimbus clearly the better of the two ships due to ease of rigging and relatively light weight of the parts. We often rigged and derigged with just Ralph, Suzanne and me, as opposed to the small army needed for the Kestrel. In performance there was little to choose. The things I observed suggested to me that spans in the 67-foot range will prove optimum for contest work, unless far more effective controls are developed. Studying Akaflieg Braunschweig's 100-foot sailplane design) will show whether my theory is just wishful thinking. I would like to see the CVSM put an arbitrary span limit on all gliders used for contests of 15 meters as of 1976 and allow a flat-out Racing Class and a fairly simple Standard Class within this limitation. How's that for a pipe dream?

20 BAD DAY AT VRSAČ

The 1972 Worlds in Yugoslavia

It was the 13th World Gliding Championships, and it was enough to make you believe in black cats and magic numbers. Few of the 89 pilots who descended on Vrsac ("Four shots"), Yugoslavia, for the meet would admit to any superstitions before it began. But a soggy, stormy week, two deaths and several wrecked sailplanes later, you might have found some believers in evil omens. It was that kind of week.

At first, pilots had been hopeful. Vrsac, the major gliding center of Yugoslavia, had a reputation for outstanding soaring weather. Yugoslav officials confidently predicted Texas-sized thermals to 7,000 feet and above. Competitors buzzed about how much water ballast various ships would carry to wring the last bit of speed from the expected high-lift conditions.

On the darker side, many grumbled about the decision to allow cloud flying, which since 1965 had been barred from championship meets in the interest of safety (except in England and the Eastern European countries). Despite strong protests by all the Western Europeans and the Americans, soaring on the gauges would be allowed, "to give an evaluation of a greater spectrum of pilot attributes which should be tested to determine a champion." Most pilots felt the pressure of World-class competition would force pilots into already crowded clouds, and that midair collisions would result.

During the practice week, we used the not-too-spectacular weather to practice navigation over the flat and featureless landscape, to compare performance with other glider pilots—and to practice cloud flying. Like so many other Western pilots, I had not been on instruments since the last contest in Poland in 1968. A long afternoon in the soup proved that the instrument flying I had taught myself by trial and error 10 years before was still usable, if a bit rusty. Passing from cloud to cloud, I would occasionally see other sailplanes, and I'd try not to wonder how full the cloud ahead might be.

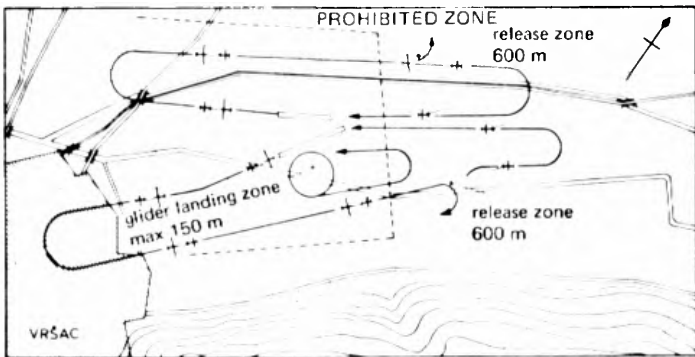
A World Championship is divided into two classes of sailplanes. In the Open Class anything goes, and most of the probable leaders were flying the new 20-meter (67-foot) ships. The Italians had brought along a monster with a 23-meter span, the Caproni A-15, soon nicknamed "The Spaghetti Wagon." Several ex-World Champions were flying in the Open Class, including A. J. Smith of the U.S. The Germans were a threat with Klaus Holighaus, designer of the Cirrus and Nimbus, winners of the last two Open Class championships. The Standard Class was even more competitive, with 52 pilots entered. Standard Class ships are limited to a span of 15 meters (49 feet) and have other restrictions to keep their cost down. The performance of the Standard Class ships has been so highly developed that practically all the entries have similar designs, so winning depends more on pilot ability than on the hardware.

Precontest favorites in this class were Helmut Reichmann of West Germany, who won the last Internationals in Texas by placing first in five out of eight tasks in the Standard Class in his LS-1; and myself, with an identical record in Texas in the Open Class. Reichmann and I had never competed head-to-head, and we looked forward to the clash. Nipping at our heels would likely be Jan Wroblewski of Poland, who had placed second in 1970 in an outdated ship and had won the World Open Class Championship in England in 1965.

The first day featured Olympic-style opening ceremonies, with much raising of flags, multilingual speeches, enthusiastic handclapping and other fanfare. The thousands of spectators showed clearly how popular soaring is in the Eastern

countries. The spectacle was topped off with a two-hour air show featuring airplane and glider aerobatics, parachutists, a simulated attack on the field by 100 paratroopers, jets firing live ordnance (shell fragments were found less than 100 yards from the crowd) and finally a low pass by a formation of MiG-23s. You get a good view at Yugoslav air shows—none of that wishy-washy FAA safety-rule stuff.

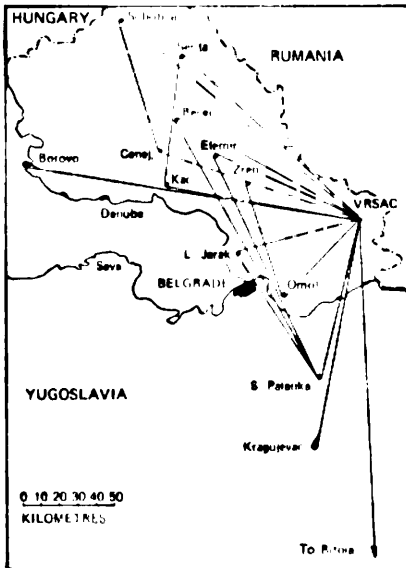
The contest proper kicked off the following day with a pilots' meeting to announce the task for the day. Briefings were held first in Yugoslavian and then in English, but few of us could understand a word of the translation. The task was to be a 200-mile triangle, with weather predictions calling for moderate thermals. By 1030, takeoffs were under way behind the fleet of 30 towplanes—as usual, downwind on a short runway. My Standard Cirrus, with 170 pounds of water aboard, just made it over the fence. We were towed right over the middle of beautiful down-town Vrsac—with no place to land but the city streets if the rope broke (the Yugoslavs have a rather casual attitude toward safety).



Vrsac patterns (see also page 68)

After release, Ben Greene, my teammate, and I circled around for an hour waiting for the thermals to get up to strength before diving across the starting line at 3,300 feet. In contest soaring, the idea is to guess how long the task will take and then time your start so that you're flying during the very peak weather of the day. All of us had observed that thermals dropped off sharply at around 1600 in this area, so Ben and I dived over the start at 1130.

The day went easily except for some weak areas on the second leg, and I crossed the finish line a bit over redline with three feet of altitude. Ben was only minutes behind. More than 85 percent of the contestants got home. One who didn't was Harro Wodl of Austria, 1968 World Champion, who went down in the weak area of the second leg—the first taste of the bad luck that dogged some of the favorites throughout the contest. When the scores were posted the next morning, I found I had won by a good margin with Ben second, Richmann third and Rudensky of Russia fourth. Rudensky was a surprise—the Russians have always been well down the list in the past (the winner of each task gets 1,000 points and the others fewer, according to speed or distance flown). I had 80 points on Richmann. In the Open Class, Goran Ax of Sweden was first, A. J. second and Dick Johnson, our other entry, eighth. The day's weather was honest and straightforward, and the Americans felt pretty good.



*Vrsac tasks and turnpoints
(see also page 66)*

Next morning the task was a goal race to Bitola, some 300 miles south, on the Greek border. There was a shocked silence among the pilots: the task would take us over desolate 8,000-foot mountain ranges. Thunderstorms were predicted for the

last quarter of the task—the part over the highest mountains, of course.

Weather at the field was poor at takeoff time with seven-eighths cloud at 1,500 to 2,000 feet. The thermals were so crowded that few dared to venture into cloud, and fleets of sailplanes followed each other from one weak thermal to the next. A pilot had only to miss one thermal to go down and lose all chance of winning the contest. Fifty miles out, the weather got better, with fewer and slightly stronger clouds. A hundred miles out, the high mountains began. I was blocked by a 5,000-foot range, then found a low spot and skimmed over into the next valley with 50 feet to spare. To the south lay an ominously quiet blue hole. A. J., ahead a few miles, told me there was weak lift, widely spaced. Nietlispach, the Swiss national champion, missed a thermal and went down. Finally, over the peak of the next range, I found a thermal that took me slowly to 8,000 feet. I headed south over a deserted, unlandable moonscape. After 30 miles, I just skinned over the last barrier ridge and into a valley. Slowly, over a town, I circled back up. Behind me, Ben reported that he could not clear the ridge. He was in trouble and did not know his exact position. He called that he was going down and went off the air. I got high enough to cross the next ridge but was blocked at Kopje by a thunderstorm and rain. Trying to skirt the eastern edge of the storm, I got caught in the rain and went down in a tiny field.

All the next day pilots straggled home, some after being detained by the police. Several ships had been damaged in landing, including Ben's and A.J.'s. Ben had to land in a field full of baled hay and tore a wing off.

Finally, two days later, we gradually got the scores. About 20 ships from each class landed at Skopje rather than fly into the mountains beyond in low ceilings with poor visibility. I scored 20th for the day, having lost more points for landing off course than I gained in added distance. I scored well in points, however, and still led overall. Dick Johnson was first and A.J. second in the Open class.

The days that followed were pure frustration. It rained. Occasionally the rain stopped long enough for the organizers

to try to set a task, but often the rain began again as the ships were being launched. Sometimes the pilots got a few miles before landing in a field, to be brought back by mud-caked and weary crews (for an official contest day, ten ships have to cover 60 miles or more). The days were exhausting for pilots, because we faced all the tension of a regular contest day—the task announcement, the waiting for takeoff, the critical choice of start time—even if nothing ever came of it.

Finally, five days after the second task, we got a break—a 220-mile task with weak thermals and no cloud predicted. Most sought an early start. Unfortunately, while a freak cloud lifted us to 9,000 feet over Vrsac, there was nothing out on course. The leaders, aware that the day would end early, began to move out. The tailenders waited, hoping conditions would improve. Ben (his ship repaired), Rudensky, Reichmann and I started within a few minutes of each other, climbed to 9,000 feet under the local cloud, and moved out as slowly as possible, conserving every scrap of altitude. After a few miles we began to see ships on the ground. After 50 miles, we had hit no lift at all and were struggling along below 1,000 feet. Suddenly, for the first time in more than half an hour, I felt a nibble of turbulence. I started to circle and got nothing. Down to 500 feet. Three hundred yards away another ship began to circle. I slid in under him at 300 feet and very slowly began to climb. It seemed a long time since I last breathed. We got to 2,000 feet before the thermal quit. Several ships joined us and we fanned out across the sky. When one ship found lift, the others wheeled in to join him. Often the bottom ship was too low, and had to land.

This went on for miles, until we had 15 ships in a gaggle, seldom higher than 2,000 feet. Near the first turn a band of high clouds cut off the sun's heating and the thermals. I turned north from the gaggle of ships to try to cross the clouded area into the sun.

The others headed out on course. Gradually I got lower and lower, still over the clouded area. At 300 feet I broke into the sun, but was too low to catch a thermal, and slid to a stop in a plowed field. Ben reported landing with Reichmann and Rudensky. My crew arrived and we trailed slowly

home, quiet and discouraged. The cloud had cleared away and we watched the late starters moving high and fast.

The score sheet was a shambles. Almost all the leaders started early and went down by the first turn. The tailenders, starting later, had a fairly easy flight and most got past the second turn and part of the way home. Of the top contenders, only Wroblewski had done well. Only one pilot in either class made it home. Tabart of Australia just squeaked in after climbing to 13,000 in a shortlived cu-nim over the second turn. Dick and A.J. got to the cloud just too late and went down.

The task for the fourth day was a shorter triangle with weak weather and afternoon cu-nims to 35,000 predicted. The first leg found most pilots scratching along at 1,500 to 2,000 feet, barely able to stay up. By the first turn things improved, and we climbed to 5,000 to set off cautiously into a hazy blue hole over the wet ground to the south. Pilots ahead seemed to be in trouble so I carefully changed course to fly over each nearby town in search of lift off the hot buildings. Town after town passed with no luck. Gradually the altitude ran out. Ben reported he had a small thermal very low, his first in many miles. I was too low to get there. Finally I landed with the dead feeling that any chance of winning was gone.

Ahead, Ben flew into a heavy thunderstorm. Afterwards he told me he had never had a worse experience in an airplane in 30 years of flying. In the same thunderstorm one of the Hungarian pilots lost control and was killed. His teammate landed safely, but had holes from hailstones all over his ship—one, just behind the wing, was grapefruit-sized. The ship was unflyable. In the Standard Class, 19 ships finished in heavy rain. Nietlispach of Switzerland won, Ben was fifth after his climb in the storm.

The fifth task was another short triangle for the Standard Class and a longer one for the Open Class. Weather was unchanged, except for an even greater likelihood of strong thunderstorms. Ben and I left early in marginal conditions. I detoured into Romania to a likely looking cu-nim, found nothing but rain, and could barely stay up. Nearing the first

turn behind Ben, I found it covered by a huge thunderstorm with heavy rain. Several ships went in with me amid lightning and near zero visibility. Luckily, there was a slight clearing as I took the identifying pictures of the checkpoint. I re-entered the storm, trying to get back to an enormous grass fire 10 miles back. With a lot of luck I got there at 300 feet, climbed to 7,500 in cloud and glided almost to the second turn. Unfortunately, I got only halfway home, battered by high winds and turbulence, before being forced down in heavy rain. Reichmann and Ben got into the storm and flew for 30 miles on instruments before breaking out near Vrsac. I came third for the day.

But there was a catch—Wroblewski's identifying pictures of the first checkpoint did not come out because of the rain, and he was disqualified. This meant that only nine pilots had gone the required 100 kilometers—and it didn't count for a contest day. We might as well have stayed in bed. Had the Spanish pilot made seven more kilometers, the day would have been official. Ben, Reichmann and I would have moved up many places, and Wroblewski would have dropped from first to fourth in the final standings. One of the British journalists called the contest "The Lottery"—we were inclined to agree. In the Open Class there were only four finishers, but the day was official. Ax of Sweden, Witanen of Finland and Kluk of Poland led, but Nick Goodhart of England was moving up after being the only finisher in the fourth day's task. He climbed to 29,000 feet in cloud halfway down the second leg and coasted the 100 miles home, despite encountering heavy ice and losing his electronics to lightning strikes.

The next day provided a good out-and-return task to the south for the Standard Class and a very hard one to the west for pilots in the Open Class. The majority of the Standards made it back in good time. It was the first honest speed flying since the first day. Wroblewski won after taking a long chance on a late start, Rudensky of Russia was second and I was third. All of us used a few good climbs in towering cumulus to make good time. In the Open Class only Witanen made it home. He took a 200-point lead with only one day left to fly.

Last day. The same mass of moist, unstable air was still hanging around. The task was a 150-mile triangle for both classes. Weather called for low bases, bad visibility and dangerous cu-nims by 1230. Everyone would obviously have to do a lot of cloud flying, and pilots wondered aloud why the organizers have sent both classes on the same short task, to a checkpoint only a few miles from Belgrade International Airport. Scores of gliders and jetliners would be a wandering around in the same clouds. No one seemed to have learned anything from the death of the Hungarian pilot in similar conditions a few days before. We were sobered even more to learn that Wolf Mix of Canada died that morning as a result of a landing accident two days before.

Already as we crossed the start the weather was bad. A few miles out I circled up in a gaggle under A.J. and watched him go into cloud. A couple of ships between us peeled off on course, and I entered the murk, reporting my altitude to A.J. over the radio. Every couple of circles we compared altitude, keeping a few hundred feet apart. At 5,000 feet he began to climb rapidly but reported heavy rain, and a little later I could hear his voice jar from the turbulence. I headed out on course at 5,000 feet to avoid the rain and flew for many minutes in cloud, wondering how many of the 87 remaining ships were nearby. I broke out near the first turn, climbed briefly, took pictures and headed south, looking for another good cloud to climb. Each one had too many ships entering above me, and I pressed on in one-mile visibility.

Suddenly a Mayday cut through the radio chatter. A pilot reported two chutes and several pieces of sailplanes coming out of a cloud--Pettersson and Innes had had a midair. Both landed safely, but Innes broke his leg.

A few miles south of Belgrade the overcast became solid and dead. Within minutes several of us were down in a small field. Ben had climbed to 6,000 and got a little farther. Pilots who found a good cell in the big cu-nim at the first turn climbed to as high as 17,000 feet, taking a chance that the second turn would be clear for photographs, and got over halfway back to Vrsac. Others, afraid of missing the turn in cloud, stayed low and were forced down. Witanen was one of

the latter and lost his Open Class lead to Ax by 35 points out of 5,816. Kluk of Poland was only 19 points further back. If Witanen had managed to glide five more miles he would have won the Championship. Kluk needed about nine more miles.

A.J. totalled his Nimbus II landing in heavy rain, and then had his turnpoint cameras stolen, giving him zero points for the day. This dropped his overall standing from 6th to 16th. Johnson ended up 5th for the meet in the ASW-17.

In the Standard Class, Wroblewski placed second for the day to win the championship by more than 300 points. Rudensky showed that the Russians have become a soaring threat by taking second overall, followed by Kepka, the other Pole, in third.

The meet was a Polish triumph, with a first and third in the Standard Class and a third and eighth in the Open. They, along with the other leaders, flew a beautifully consistent series, managing to avoid the bad breaks that dogged so many of the other pilots. Many of the favorites finished well down the list despite excellent showings on days less dominated by luck.

The Moffat-Reichmann confrontation ended rather ridiculously—I was 19th and he was 23rd. Other former World champions finished 18th, 33rd and 36th. Many other well-known pilots who finished in the tank must have thought of Neil Armstrong's words: "We don't ask for good luck, just avoidance of the bad."

The closing ceremonies ended appropriately the next day with a magnificent farewell dinner in roofed-over outdoor enclosures while a driving rainstorm beat upon the roof. The orchestra played one of Bach's fugues at top volume so that it would be heard over the downpour.

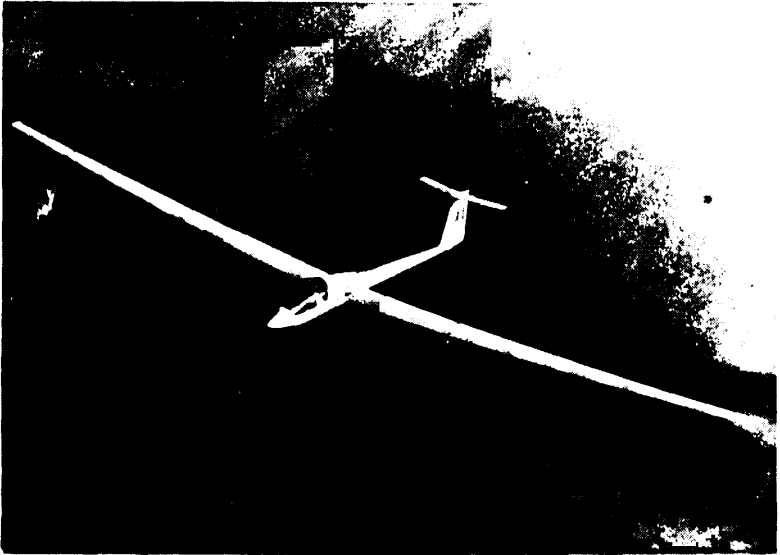
21

WINNING ON THE WIND

Contest flying as an Idea – Liberal and Waikerie

By 1971-2 I felt I had reached a limit to some seven or eight years worth of an approach to contest flying. I found it increasingly hard, after having won the Nationals' in 1969 and 1970 and the World's in 1970, to crank up serious interest in the tactical side of flying. It was something I felt I could do well, but something that several of the world's ranking pilots had pushed to the limits of possibility. The whole process was becoming dull—or at any rate dulled. The intellectual challenge was gone. In both years I did badly . . . and wondered if I had not lost the will to win. I found myself thinking fairly often . . . who cares?

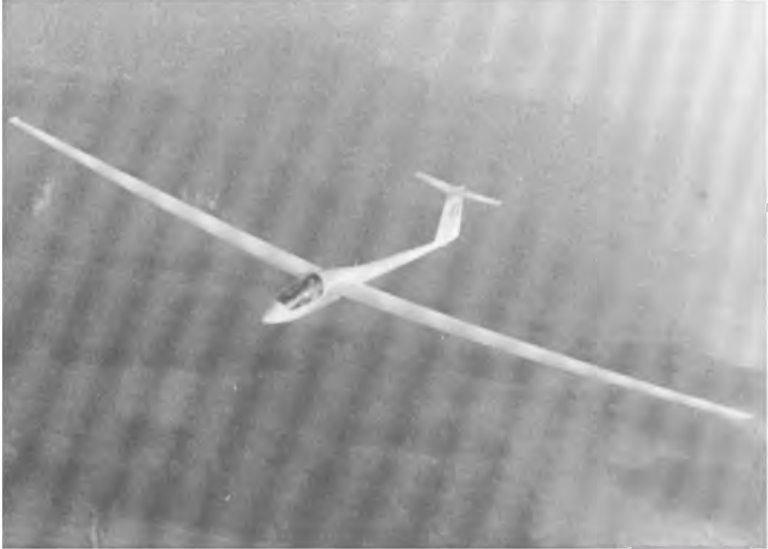
The summer of 1973 saw the beginnings of a new approach to contest flying on my part. It was not arrived at consciously, not even present in my mind during the Standard Class Nationals in June—but something new was stirring, signaled by a revitalized interest in competitive soaring. The technology—the winning-by-not-losing idea—seemed to diminish in importance. It had become a factor I could rely on without thinking about. The new idea, first realized consciously at Liberal, was based on a simple thesis: in the 1970s, thanks to interchange of information, similarly high performance ships, and extensive competition, there were, among the top ten pilots in the world and perhaps three or four in the United States, no real advantages in skill, equipment or knowledge. This meant that only two or three factors could decide a winner—luck, psychology or



Nimbus II at Hahnweide

use of a pilot's personal energy. Luck could be dismissed as a constant, varying with weather from day to day but tending to self cancel in longer meets. Psychology, then, or perhaps a psychologically oriented use of energy, seemed to have dominant potential. Could it become a basic controllable factor that could give one an edge? I believed it could. This realized, psychological rather than tactical planning seemed the potential key to success. A whole new interest and enthusiasm sprang into life, and soaring seemed immediately more human, less a matter of the sum being only the simple addition of the technological parts.

The psychological interest was an old one for me, left over from my days of international level sailing before I took up soaring. One of the factors I had most enjoyed in sailing, and missed in soaring, was the interplay between individual personalities possible with boats only a few yards apart. But this factor seemed difficult to apply to flying. With a long contest in prospect at Liberal, with up to ten likely flying days, and with long tasks and good conditions tending to



Nimbus II at Hahnweide

use of a pilot's personal energy. Luck could be dismissed as a constant, varying with weather from day to day but tending to self cancel in longer meets. Psychology, then, or perhaps a psychologically oriented use of energy, seemed to have dominant potential. Could it become a basic controllable factor that could give one an edge? I believed it could. This realized, psychological rather than tactical planning seemed the potential key to success. A whole new interest and enthusiasm sprang into life, and soaring seemed immediately more human, less a matter of the sum being only the simple addition of the technological parts.

The psychological interest was an old one for me, left over from my days of international level sailing before I took up soaring. One of the factors I had most enjoyed in sailing, and missed in soaring, was the interplay between individual personalities possible with boats only a few yards apart. But this factor seemed difficult to apply to flying. With a long contest in prospect at Liberal, with up to ten likely flying days, and with long tasks and good conditions tending to

consistently but seldom finishing better than third or fourth, or flying brilliantly for several days and then 'blowing it' from sheer nervous tension. My own disabilities I appraised as a tendency to push too hard to make points in uncertain weather and an inclination to expend too much energy in the first two thirds of the contest.

Success at Liberal

With all these thoughts in mind, I decided that a moderately strong start, with the hope of being in top place by the sixth or seventh day, would be the right plan to follow at Liberal. Winning a day or two in the first five is a good idea whenever possible, because of the psychological pressure it puts on competitors. Personally I find it much easier not to be in first place for the first few days as the pressure of being everyone's target is very great. There is also a dangerous tendency to start feeling a little sorry for oneself around the fifth or sixth day—a sort of "how long do I have to keep this up?" feeling.

As luck had it, the first day at Liberal was a relative 'wipe out' when a big thunderstorm downed all but three pilots near the second turn. Of the real threats, Scott fared best with 661 points, I was comfortable with 625 and Smith low with 539. The second day was a 200-mile triangle in rather good weather. I flew fairly hard to finish second and move up to fourth over all. A.J. had another bad day, and I had a comfortable speed margin on Johnson, Scott and Green. Ray Gimney lived up to his reputation with a strong third. The third day sounded good in the forecast but looked tricky. I decided to be conservative and start early—and was rewarded by winning the day when a thunderstorm cut off the route home to later starters. Smith, Scott and Gimney all got caught out, and I moved up to second behind one of the three ships that had finished on the first day.

On day four I moved into a comfortable 200-point lead with a third place and extended that to 300 points on day five. Day six was a disaster for me, with nothing going right on a multiple-choice turnpoint option (not my favorite task!). Dick won with an excellent flight and showed that he was a factor to be reckoned with now that he had a ship

suitable for speed tasks. I still had more than 200 points of lead and recognized that I could afford to relax a bit on the three remaining days. A second on the seventh day advanced my lead back to three hundred points, and I realized that I was in the ideal position. Dick and Ben, my two closest competitors, would really have to turn it on to catch me—after seven days of long and hard flying. A.J. was 400 points down as a result of the first three days when his flying had been poor, possibly due to lack of practice in or familiarity with his newly and very effectively modified ship. Wally and Ray Gimmey were doing well and flying consistently but were losing points.

A fifth and a tenth on the final two days, flying as conservatively as possible while still keeping the pressure on, insured an easy victory with some 160 points over Dick.

Final Scores, U.S. National Championships, 1973 Liberal, Kansas, July 24-August 2, 1973			
1.	Moffat	ASW-17	8130
2.	Johnson	ASW-17	7970
3.	Greene	ASW-17	7872
4.	Scott	ASW-12	7697
5.	Brandes	604	7535
6.	Chase	Nimbus II	7467
7.	Peres	604	7452
8.	Ryan	Nimbus II	7448
9.	Linke	Kestrel	7401
10.	Smith	ASW-12B	7370

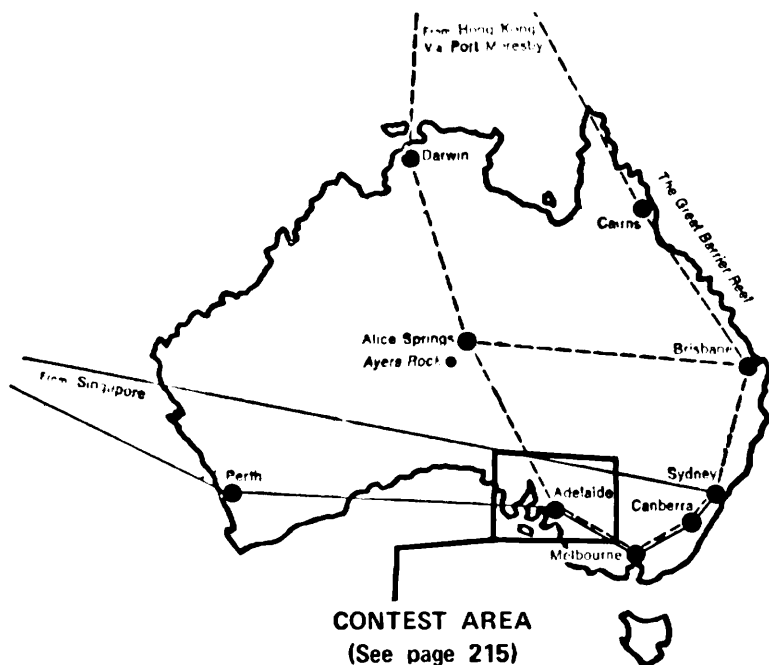
Preparations for Waikerie

For reasons never made clear, the SSA procrastinated over naming the US Team members until late August, 1973, giving us little time either to send out our own ships or arrange for other ships to fly in Australia the following January. Early estimates indicated that shipping out my Standard Cirrus would be prohibitively expensive, and no very good Standard ships seemed available for rent. Calls to Rudy Mozer of Schleicher and Klaus Holighaus of Schempp-Hirth resulted in a possible offer of an ASW-17 or a definite offer of a new

Nimbus delivered in Australia for very moderate rent. Needless to say, the bird in the bush—Australian Bush, that is—was the one to take, so I ended up flying in the Open Class rather than the Standard as I had originally planned.

Since my total experience in a Nimbus II at that time was around five hours, I cast about for some way to get some practice. Very generously, Kari Berg offered me the use of Lee's* Nimbus both for practice and for the contest if shipping turned out to be feasible. This would be an enormous advantage as the whole Fall could be used for working out 'go-fasts' and clean-up items for the ship, and I would have a Nimbus II fully equipped and instrumented for the contest.

Unfortunately, the best laid plans followed their usual course. First the Air Force decided that it could not assist in shipping. Next the airlines, which had originally quoted a



Australia - '74 Worlds venue (with contest area)

*The late Quentin Berg

very attractive estimate for air freight on initial inquiry, came up with a final quote of \$9000 round trip.

Since such a cost was obviously prohibitive, we decided on the next best course. During the Fall I flew Ice's ship for some thirty hours while simultaneously working out various 'go-fasts' that we could take with us, along with a ready-to-go instrument panel made up of a combination of the best of my instruments and Ice's.

At the same time I started an extensive correspondence with Klaus about weak points in the ship and possible solutions to them. I agreed with A.J.'s estimate that the Nimbus suffered severe wing-root airflow separation at lower speeds and so started an extensive tuft study with the help of Dr. 'Put' Putnam of the Forrestal Aeronautical Laboratory in Princeton. Early flight tests showed separation beginning at over 10 mph above level-flight stall speed, as compared with the same condition at three miles over stall speed in the Standard Cirrus with its well faired root junction. The next month and a half were spent in creating fiberglass root fairings that would allow full flap movement. It was a formidable job, but tests showed very favorable effects on flow and stall speed. Final models were produced with the help of Arthur Zimmerman in his shop. The whole project took well over 150 hours to produce the two fairings. However, not only did the fairings improve the ship's low-speed performance somewhat, but we also counted on their having a devastating psychological effect on the other Nimbus II pilots in Australia!

Meanwhile, other projects were on the fire. Early test flying with full ballast against Art Hurst as a guinea pig showed that the Nimbus lost very little in climb at full gross weight. We knew that several of the ships going to Australia would have special, extra-large factory tanks, allowing an additional 150 lbs of ballast, to bring wing loading to 9.3 as opposed to the normal 8.5 lbs maximum. A plan was evolved to stretch the standard Nimbus tanks, checked with Klaus for feasibility, and tooling made to accomplish the change at the contest site in Australia.

Experiments against Art Hurst in his beautifully flown Standard Cirrus indicated that better climb could be

achieved. We began experimenting with flap settings and finally found ones that produced marked performance improvements at critical air speeds over the factory recommended settings. About the same time Klaus very generously sent corroborative reports from Zacher's flight tests of the Nimbus II, showing that the factory recommended flap settings were indeed completely wrong. We set about cutting additional flap notches to get the right settings. At the same time we made a complete set of seals for all control rods and surfaces, testing the fit on Ice's ship, and packed them, ready to ship to Australia. Extensive manometer tests were made to discover the best location for an exit vent to get rid of cockpit ventilation air.

In short, while we planned a primary advantage on the psychological side, we left nothing to chance in technological matters. Having a perfectly prepared ship not only devastates less nit-picking competitors, it also psyches up the pilot and gives him confidence that nothing that could make a difference has been overlooked.

Arriving in Australia on December 29, we immediately headed for Waikerie where our ship, owned by many-time Australian champion Malcolm Jinks, was based. An attempt to fly to Renmark (our training site until competitors were officially allowed at Waikerie) was foiled by rain. After about an hour of local flying, trying unsuccessfully to break out, I landed back, to disassemble in a downpour and drive the fifty miles. The result of the long drive in wet clothes was a cold that rapidly turned into a persistent form of bronchitis that was to trouble me through the meet despite copious dosages of penicillin.

During practice at Renmark, we gradually applied our various 'go-fasts' to the ship, stirring up lively curiosity among the other pilots there. We purposely saved the root fairings and increased ballast capacity until two days before the contest, to deliver maximum psychological effect without giving others the chance to copy them. Weather was mundane, to say the least—no bases over 6000' and few thermals above 500 fpm in cloudless skies. For this we had come 12,000 miles?



UVEGES

Concentrating at the task briefing

Gradually, as I got sicker, the ship got more and more ready, thanks to much work on the part of Ralph Boehm, my crew for ten years, and newcomer Doug Gaines who owned the ASW-17 I had flown at Liberal. The whole period sticks in my recollection as a hazy remembrance of pills, radio problems, and occasional flights in not very remarkable weather.

As the contest itself grew closer, I began to think more and more about basic strategy. I had already made a list a month earlier of likely winners and tried to assess their strengths and weaknesses versus my own plans. From past experience, I thought the winner might well be Ax (Sweden, winner in 1972), Zegels, (Belgium, young and improving rapidly), Grosse (Germany, one of the very best), Holighaus (Germany, with attitudes very like my own) or Dick Johnson. As a result of the practice period, I soon added to my list the relatively unknown Frenchman Ragot, a brilliant and daring pilot in a very good ASW-17. Wiitanen of Finland, runner-up in 1972, seemed out of contention due to flying a 19-meter ship against the big '17s and Nimbuses. The Poles were potent but their Jantars had only 19-meter spans.

Of the list of likely winners, Ax and Zegels seemed to me the most dangerous, because both are very calm pilots with excellent records. I thought Zegels' youth might be a factor against him as would the fact that his teammate seemed far inferior to him in ability, making effective team flying difficult. The same was true of Ax. Hans-Werner Grosse is as fine a pilot as I have ever known, but very nervous. I felt a long contest would be very hard on his nerves, as it obviously had been in Marfa in 1970. Furthermore he is notorious for his inability to cooperate with teammates, and I thought that intra-team tension would detract both from his performance and Klaus'.

Klaus, despite being a very good friend, was largely an unknown in terms of competition. However, I knew that the strain of running a large and successful glider factory and the great financial importance of having his design win were burdens that I was most happy not to have to share. My teammate Dick Johnson had competed in International Championships since 1952 without finishing better than

THE CONTEST SETTING

The Murray River, draining the interior side of the Great Dividing Range along the east and southeast coast of Australia, flows slowly west through Waikerie between 70-foot limestone bluffs. The Murray has been extensively exploited to pump irrigation water for citrus, stone fruit, and grape cultivation in narrow bands along its banks from Morgan, where it turns south to the sea, to Mildura, near the confluence of its major tributary, the Darling River.

North of this east-west reach of the Murray an unlandable scrub mallee reaches into the desert interior. Significant areas of scrub and even sandy ridges lie south of the Murray in the contest zone, but with cleared paddocks and wheat stubble fairly frequent. Forty miles west of the river bend at Morgan, the Lofty Range lies north-south with tops between 2200 to 3000 feet. Several turnpoints were also located along this series of ridges.

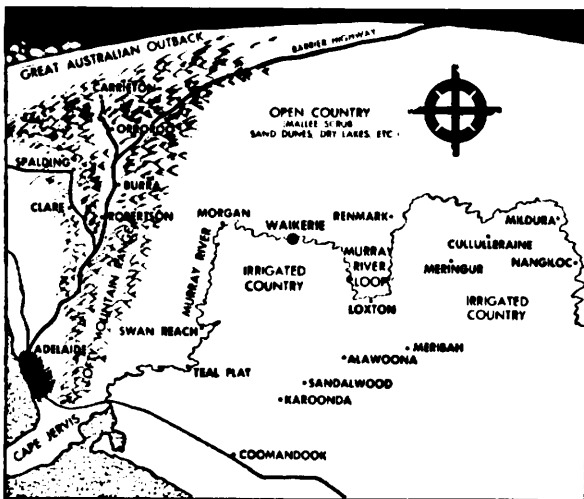
The land is not actually hostile, but normally quite dry, receiving less than ten inches of mean annual rainfall. Pilots were warned to carry plenty of drinking water and to stay by their ships unless they were

certain of the direction of an inhabited place.

Bush fires are a constant threat. Total fire bans extend even to smoking in the bush. The hot exhaust pipe of a car stuck in sandy wheat stubble could ignite an inescapable fire.

Summer temperatures can reach over 100°F, which, coupled with night time radiational cooling to nearly 60°F, generates strong convection to over 10,000 feet, sometimes unmarked by cumulus tops. On the other hand, as the forecasters invariably hasten to say, vulnerability of this small continent to intrusions by marine air can narrow the daily range so that any convection which does occur will be late, weak, and prone to overdevelopment within 5000 feet or less of the surface. In the contest period more of the latter than the former was experienced and the "unusual" pattern provided an even greater test, it might be said, of task-setters' skill. The net outcome, although short of the advertised ideal, proved a rich variety of tests of pilot skill.

Beginning with the day of closing ceremonies, rain and low clouds provided six successive days of totally unflyable weather at Waikerie. Lucky, eh?



third. I could see no reason to expect the pattern to change, despite his unprecedented record of eight wins in the US National Soaring Championships. The most important single factor in winning is believing that one is going to win. I just didn't sense that belief in Dick.

An unknown factor for the United States team was the degree to which team flying would be used. Only once in my memory had it worked at all between Wally Scott and me in 1970 - and then it had been extremely beneficial. In other contests, personality conflicts and lack of trust between pilots had prevented more than spasmodic attempts. The essence of team flying, as Wally and I had worked it out, is fairly constant exchange of thermal strengths, cloud base heights and other useful information over the radio. Ideally, it gives each pilot four sets of experiences with the weather in an area rather than one.

The catch lies in the fact that each of the four pilots has come to win and is apt to think twice about giving away valuable information about good areas, holes, etc. Furthermore, whichever pilot is in the lead geographically at a given moment tends to give more than he receives, so that pilots have to be willing to take turns flying 'point.' Naturally if one pilot feels he is giving a good deal more than he is getting, he begins to keep things to himself and very soon the whole effort breaks down.

Since all four of our team pilots are highly individualistic, I wasn't sure how well the idea would work. I discussed the idea a good deal with Dick, Tommy (Beltz) and Ben before the contest, and we did some trial work during the practice period (except for Dick, whose ship had not yet arrived). During the first four days of the contest proper, I leaned over backwards to be as helpful with information as possible with the others, especially Dick, and took the lead on most days. My hope was to build up enough confidence in the team, as a team, so that the information would still flow when things got tight at the end. I hoped that by being willing to fly lead for Dick frequently in the early days I would build up a sense of trust.

Whether or not it was the result of this psychology, the

strategy worked superbly. On at least one occasion a timely message from Ben gave me a first place for the day. On another day, during a dicey final glide, I was able to find Dick a last thermal that got him home. He in turn was immensely helpful on the 440-mile day when we ran into the weak weather to the East. Needless to say during the contest I gave great credit to our team flying for my good showings, knowing the psychological effect it would have on Ax, Zegels, Grosse and Holighaus, none of whom was having much luck getting help from team mates.

Three days before the contest, we pulled the ship into the repair shop and spent a day modifying the ballast tanks. Needless to say all other Nimbus owners and ASW-17 drivers watched with interest as Freddy (Jiran) made the modifications with equipment brought from the States. In the anticipated strong conditions the 3/4-lb wing loading advantage over ordinary Nimbus IIs and well over a pound more than the I7s would help greatly.

We hardly had the ship back together before one of the other teams complained to the Australian FAA that the ship would be over legal gross weight—as would almost all other ships in the contest if tanks were filled. Furor mounted for several days as I demonstrated that the ship climbed beautifully with the added weight and ran much better.

We also broke out our root fillets at about this time and immediately became the most photographed Nimbus on the field. The effect was immediately apparent, as many of the other Nimbuses quickly grew crude imitations. The problem of having a fillet and being able to actuate the flaps proved insurmountable to the others on short notice, however. It was very satisfactory to be able to outclimb the ASW-17s of Dick and Grosse fairly easily, despite Grosse's much touted long-wing modification. We seemed to have an edge on most of the Nimbus IIs as well. Only Ragot's ASW-17—an especially good one despite being straight out of the crate—seemed to go as well as mine. In short, the pre-contest strategy had been a success.

By this time I had my plan for how to fly the contest as a whole fairly clearly in mind. The factors influencing my

thinking were the likelihood of very long tasks (the owner of my ship was a member of the task committee and a handy source of local knowledge), a likely contest length of 12 days out of a possible 14 and plenty of hot weather. Terrain was much like West Texas, so home-like to Americans while rather desolate and forbidding to Europeans. In short, the proper use of personal energy seemed the fundamental factor in winning. My plan was based on starting at a moderate pace, trying to do very well between days three and seven, relaxing for three days if possible and then giving a real push at the end when others would be most exhausted.

Winning at Waikerie

The actual competition flying worked out roughly as I had planned but with some modifications due to weather and placing. First, two days of rain on days one and two reduced the possible number of flying days to 12. The first actual contest day, too, had abominable weather, with bases around 2-3000, much over convection and a very strong head wind on the first leg. This sixty-mile leg took the few that made it over three hours. One pilot took five! Obviously in such conditions survival was the key. Dick and I flew together most of the course, and the whole team was very cooperative in team flying. Most of the threats in the Open Class piled up near the second turn with negligible point spread. I tied for third with Grosse and Zegels.

The second day brought somewhat better weather but was still tricky. I was quite cautious and got my worst placing of the meet, a sixth. The third day was only a little better in weather, with bases up to 3500'—sometimes—but Dick and I team-flew very effectively with me first for the day and he right behind me. This one-two state of affairs was very helpful as people began to talk about the "marvelous American team flying." The legend continued when on the next day (day four) Dick and I finished within seconds of one another, he second, I third.

Day five saw the first really good weather—at least for the first two legs. Things went well as I pressed hard, flying a good deal with Ax. His Nimbus outran mine but mine outclimbed his markedly. Since I had full legal water (the

contest committee had ruled against being more than 10% over original manufacturer's gross), I gathered that the mysterious foam package over Ax's wing spar was lead. I beat him handily on the weak final leg due to my better climb, to win the day and move into overall first by 70 points over Gross, 99 over Ragot.

The sixth day promised genuine Australian weather for the first time—and the task committee celebrated with a skinny 440-mile triangle, the longest ever called in soaring competition. Launch time saw nothing very remarkable in thermals, so Dick started almost immediately at 2500', guessing it would be a distance day. I started twenty minutes later to let a few more markers get out into the desolate Morgan area. Two hours later things had picked up so much that we were back near Waikerie from the first turnpoint 170 miles out, having averaged 85 mph under 8000' bases with lift of 900 fpm and more.

Unfortunately the clouds ended fifty miles farther on. I was in the lead and pressed on into the blue, not expecting any significant change in conditions. As the altimeter unwound without a bump, I began to realize that we had entered a completely new air mass. The next four hours were hell, with low, ragged, infrequent thermals. Dick tried a detour South and got slightly better weather, and we arrived almost together at the second turn. On the way home he missed one of the widely spaced dry thermals and fell behind. Ragot and I flew together toward a dying bank of clouds 30 miles from home, but when we reached it the lift was weak and uncertain. Ragot left in hopes of better things, but I stuck with the weak lift until I had 30/1 on the field, not liking the look of the overcast ahead. Fifteen miles out I saw Ragot, impossibly low, heading for the field. We finally finished almost together, he first, I second, but I was happy with my conservative strategy as only ten ships finished at all and my lead on Grosse moved up to 106 points.

The seventh day proved a contest turning point. By now many pilots were obviously tired. Predicted weather called for good lift developing late. Not liking the look of things, I started fairly early and slowly. After 20 miles lift picked up

sharply, and I could hear Dick exulting in his late start. The second leg proved very weak and tricky, with bases down to 2500 feet at the second turn and little lift.

While circling at 2000' just out of reach of home, I got a call from Ben Greene, one thermal ahead, reporting good lift. I immediately headed out, to the great surprise of Klaus and others with whom I was circling. Arriving in Ben's excellent thermal at 1200 feet, I climbed rapidly and headed home to win the day. My ship was all tied down and put away when Klaus finally finished. He came over, saying "George, you fly risky!" When I told him about Ben's message, he was furious, since his team mate had been in the same thermal as Ben and had not mentioned it. Fortunately for me those who had believed the met and started late had either not finished at all (like Ragot and Johnson, among others) or had slow times (like Grosse in twentieth place). My lead was now 353 points with seven days flown and only three or four days remaining.

Needless to say I decided to drop back to 95% effort, be consistent and save energy. The last 5% of effort is enormously energy consuming. The task committee cooperated with a long call of 331 miles into the mountains to the West on day eight. I started early to be safe and had no real problems before the last turn. The final 70 miles into a strong wind and a dying sky proved tricky. Dick and I shared information and started a long final glide from 30 miles out, together with Ax. He, still, with his extra ballast, flew slowly away, while Dick encountered an area of subsidence and fell below glide path. Finally at eight miles out, just comfortably making the field, I hit a little lift. Quickly calling Dick, I did one circle to mark the spot for him and headed on in to take a conservative fourth.

The ninth and tenth days were made to order for me, with two 315-mile triangles in generally good weather. My third and second placings increased my lead over Grosse who became obviously much more concerned with Ax and Zegels moving up on him than with beating me. I endeavored to look calm, rested and ready for anything, although actually I was having trouble sleeping due to a heavy cough from the bronchitis. Doc Peter's pills and potions helped maintain the illusion of health, nevertheless.

The last day, the eleventh (making this the longest meet I had ever flown), gave promise of good weather. My lead was safe, so I continued at 95% energy level. The enormous strain on Ax, Grosse and Zegels, fighting it out for second place, was clearly apparent. Grosse looked exhausted and even the usually imperturbable Ax showed strain, a fact that may have contributed to his landing out at the first turn, one of the only non-finishers of the day. Zegels won the day, to take second for the meet; Klaus Holighaus, who had been flying better and better after the fifth day, took second to place fifth overall; I got third to win with 10,635 total points for the contest out of a possible 10,925 (the first day had been devalued) for an average of 974 points a day.

Final Scores, World Soaring Championships Waikerie, Australia, January 12-27, 1974			
1.	Moffat (USA)	Nimbus II	10635
2.	Zegels (Belgium)	Kestrel 604	10227
3.	Grosse (W. Germany)	ASW-17S	10059
4.	Cartry (France)	Nimbus II	9955
5.	Holighaus (W. Germany)	Nimbus II	9744
6.	Ragot (France)	ASW-17	9389
7.	Ax (Sweden)	Nimbus II	9245
8.	Johnson (USA)	ASW-17	9212
9.	Hämmerle (Austria)	Kestrel 19	9179
10.	Delafield (Gt. Britain)	Nimbus II	9121

For me Waikerie 1974 was my most satisfying and enjoyable meet, not just because I had become the first pilot ever to win the Open Class World Title twice, but because it was the successful culmination of a planned and systematic approach to a problem.

* * *

Some ten years ago I recall saying that winning consisted of 1/3 equipment, 1/3 skill and 1/3 luck. Today, however, the ship ingredient has diminished because superb sailplanes are available to all serious pilots. The skill ingredient has also assumed lower importance because the technological elements have become more widely known, thanks to

excellent books by pilots such as Heinz Huth and Symposia such as those run each year by Ed Byars and Bill Holbrook.

Luck remains a constant. No pilot can look back on a contest without remembering the times when a fortunate thermal at low altitude made all the difference between being a hero and an also-ran. Although planning was, to my mind, a big part in my success in Liberal and Australia, so was the absence of bad luck. I cannot fly without remembering Neil Armstrong's words, "We don't wish for good luck, only the absence of the bad," and recalling Vrsac in 1972!

Since ship choice and skills are less of a factor, what then prevents a contest from being won mostly by luck? My feeling is that basic competitiveness and ability to treat personal energy as an apportionable and expendible resource, rather like altitude, largely supplants ship choice as the second major factor in an era when most competitors are flying similar ships. Finally, in a day when the top pilots have similar levels of skill, psychological assessment of the competition may well have supplanted technological skills as the third major winning factor.

INFAMOUS LAST WORDS

Competition

Flying Skill

Ships

Instruments

Crewing

Weather

Class and Rules

Light and Variable

Soaring is a fascinating sport, and has attracted some of the most unusual individuals in almost any area of human activity. It is the men and women of soaring that make it what it is—absorbing, frustrating, ecstatic, boring, exciting, a constant swirl of conflicting emotions and thoughts that are only really swept away the instant the tow rope snaps taught and the takeoff roll begins.

As a peripatetic observer of the scene, and perhaps its severest critic on occasions, it is with similarly conflicting emotions that I survey some of my dicta of the years, assembled here for the first time in this form. Yes, I did indeed utter them all at one time or another. In context, they often permitted me to suggest jokingly what I may really have felt more deeply at the time. Out of context, they hang frozen in space and time, like fossils in rock. They are offered merely as a collection of *leitmotifs* to which the reader can turn when other material in the book seems perhaps too ponderous. Under no circumstances should they be taken too seriously. . .

Competition

Just because you don't have somebody near you where you can see that he is beating you by a second a mile, doesn't mean he's not doing it.

Sailplane pilots often show a depressing similarity to sheep, in that they will do whatever they see some other pilot do. In the Internationals in 1960 Dick Schreder dashed to his ship, jumped in and launched into an obviously dead sky—and watched 60 of the world's best follow suit. He did it just for fun.

* * *

Soaring is made up of decisions, and decisions are relatively easy when there is little pressure. Unfortunately pressure is the essence of competition flying, and some people who do well in day-to-day flying tend to come apart under stress.

* * *

Consider the jolly old free-distance task, dearly beloved of Minamoa owners. I have won two out of nine major free-distance tries, by the way, in case you think the grapes are entirely sour.

* * *

Practice is obviously the key to improvement, whether a pilot has two hours or two thousand, but over the years I have seen a great many pilots who confuse practicing with just plain flying. Practice for competition must always be channeled toward specific improvement and specific problems.

* * *

I like to think back on all the dumb things I did, in contest flights particularly, and try to make sure that I won't do them over again.

* * *

Contests are frequently won or lost on weak days. It takes confidence and practice to do well in such weather.

* * *

A good pilot must be aware of the psychological state of competitors. Some people are all finished if they have one bad day, others never give up.

A cloak of invisibility would be very handy, if you have a prominent contest number on your tail.

* * *

Consistency when others are being inconsistent wins a lot of contests.

* * *

Contests are great fun. Bigger ones are greater fun. Doing well is still greater fun. One caution: it's easy to get hooked.

* * *

I would like to see us go to the European system of having all speed tasks, on the grounds that it would emphasize flying instead of driving. I would drive race cars if I liked to measure driving ability.

* * *

If you're going to compete I don't see how you could possibly do it for under about \$2,000 a year. I'd hate to add it up—it would shock me too much.

* * *

In Poland, particularly, there was a strong tendency to start way ahead of your planned time just because everybody else did. There you were, circling all by yourself, thinking "My Lord, I must be doing something terribly wrong."

* * *

I can recall contests I have flown in the last three or four years and I can't think of one in which I haven't had at least one spectacularly stupid day, and usually three or four.

* * *

Flashes of brilliance punctuated by periods of inattention never won anything in any sport.

Flying Skill

Too many pilots practice only on good days. *Anyone* can fly on good days with nice, regular, cloud-marked thermals. It's the bad days that separate the men from the boys.

* * *

If 'bad luck' always seems to haunt you under certain circumstances, it's more likely to be bad judgment.

* * *

Leaving thermals is also important. Too many people seem hypnotized by lift. Be the first kid in your gaggle to leave!

* * *

Arriving at the wrong spot for turnpoint photography, and having to correct is very expensive in time. Practice taking turnpoint photos without any wild gyrations. Spinning out while trying to get lined up is a stupid way to lose a couple of thousand feet—as I found out in Texas in 1970.

* * *

Many articles on contest flying seem to assume that no competent pilot would ever do anything so mundane as to get lost. Nothing could be further from the truth.

* * *

No amount of flying skill will enable you to win if you go to pieces under pressure.

* * *

You know there are people who can do very intelligent things in soaring, like Dick, Ben, A.J. and others. But there is another way to do the whole thing; there is the art of not making mistakes.

* * *

If you aren't flying cross country, you aren't practicing. There is almost no point at all to piling up hours within five miles of the airport.

It's not a bad idea at all after each flight to think over the many stupidities that you created in it. It sometimes seems a continual stream of stupidities.

* * *

Anybody can fly when it's easy.

Ships

In fiberglass ships, do not exceed red line speed. Glass ships are strong but flutter prone. Flutter at low altitudes is very bad news.

* * *

We need a one-design class, a good one-design class. Sorry Paul Schweizer: the 1-26 is a fine concept but it is a horrible one-design class for the very reasons Paul identifies. If I were flying a 1-26 in competition I would try to find ship number two, which weighs about 350 pounds. Anyone who ever competed against Bud Briggs, who weighs 140 pounds, flying at 29 mph in his 1-26 weighing 350 pounds, would realize why, especially on a weak day. He just sort of sits there and wafts slowly vertically up. You waft quite rapidly vertically down. Very interesting.

* * *

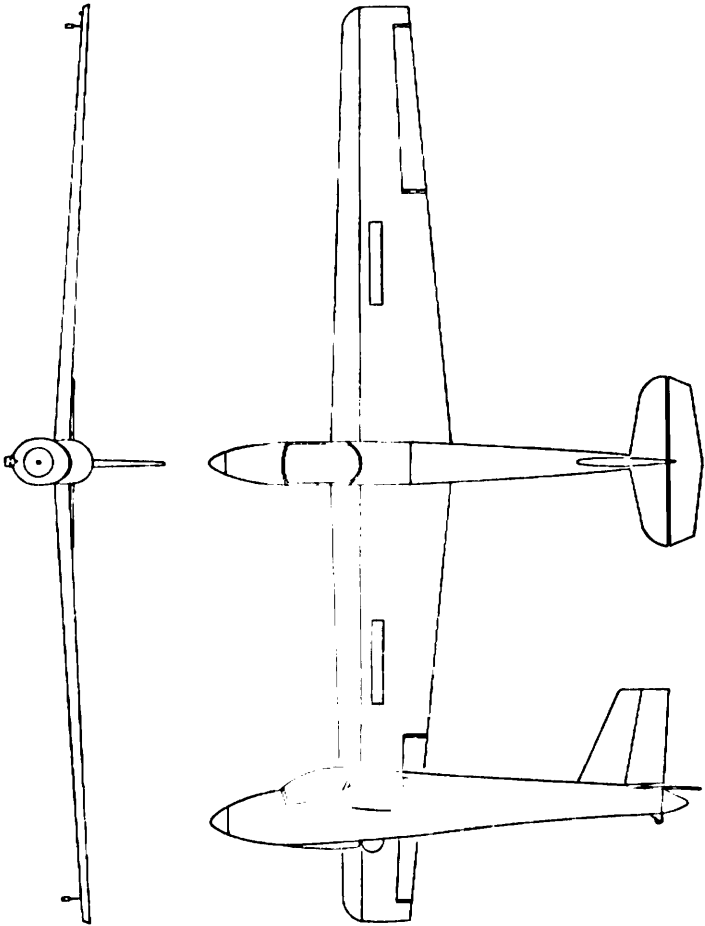
I am inclined to recommend very highly getting your glider imported in a container. People involved at the docks don't seem to care very much about crates, but containers cost a lot of money and dock workers aren't so likely to run a forklift through them—or their contents.

* * *

Think about the ship; what you can do about it; what you can do to make it better; and particularly to assign priorities for what things come first and what things come second. Do the important ones first.

* * *

It should be possible to design a very interesting 13-meter ship for a one-design class, but—let me get something straight at the beginning—you must have a very, very good rule.



Schweizer 1-26

Because if there is one thing we have learned from the sailing classes, it's that those with tight rules are the good ones and those with loose rules are hopeless.

* * *

How nice that some designers realize that even high-performance ships must land sometime.

* * *

If this one-design thing comes about it should be sponsored by the SSA. I further imagine that the SSA will find itself in a policing function. Some of the things they could do would be to have some rather simple checks that one can use at a contest site. For example, a profile of wing-section forms to make sure that the wing section is what it is supposed to be.

* * *

The big Cirrus and the Nimbus I were very moderate performance ships without ballast. The Nimbus was really nothing special at all until you had 240 lbs of water in it. So it is extremely important to carry water in these ships. I tried not carrying water one day, and—oh boy—did I regret it!

* * *

Some of you might not know about a ship built by Akafleig Stuttgart several years ago. It weighed 226 pounds empty, with 13-meter span, and had a glide ratio of just under 35. It placed eighth in the German Nationals Open Class.

* * *

Contrary to popular misconception, endless hours spent sanding and sealing a ship will not make any very significant difference. In general, wing sanding is a waste of time unless you are an expert and/or it is good for your soul (both true in the case of A. J. Smith).

* * *

Take off with all the water the ship will hold, with an exception of two. In the Standard class ships there seems

to be little point in carrying much over 110 to 120 lbs. under any but unusually strong conditions. I have tried up to 160 lbs. in my ship and it is quite clear to me that if you are not getting 500 feet per minute I mean a genuine 500 feet per minute on the barograph, and not the occasional 'thump' you see on the variometer—then it is not a good idea to carry over 115-120 lbs.

* * *

We all know, especially the Americans, that the 15-meter so-called Standard class will be infinitely safer and better when we all have 90° flaps for landing. Landing most of the unflapped Standard ships in a short field can be quite exciting.

* * *

Designers, when plied with enough drinks, will eventually admit that there are good ships and bad ships from the same molds.

* * *

I don't think maximum L/D is a very meaningful figure. It has been used for many years, but how many hours have you ever flown at maximum L/D? Out of my 1800 or so, I doubt if it's 40 hours.

* * *

Klaus (Holighaus) was most surprised to discover, when he got the upper-surface dive brake on and the lower-surface dive brake off, that he still had 80% of his braking effectiveness. In fact, he suggested to me that I take the lower dive brake off my big Cirrus before the Marfa contest in 1969. I made some experiments with it, and it was perfectly satisfactory for glide control. But it is a non-reversible modification, and I was afraid that I'd have trouble selling the ship if I did it, so I didn't.

* * *

The Standard class in my estimation just plain hasn't worked, and for a simple reason. When the pleasant and rather naive people started it some years ago they didn't think they

needed a very tight rule. They thought that, well, we'll all be good chaps together and somebody will develop a nice little Ka-6 and all will be well.

* * *

Designers are all stubborn as mules—they couldn't be designers if they were not able to have an almost pathological belief in themselves.

Instruments

Eight miles out on a low approach is no place to starting wondering whether your glide calculator really works.

* * *

There just isn't a variometer like another sailplane.

* * *

You may have noticed, if you listen to your radio very much, that you don't hear much of Dick Schreder or A. J. Smith or Ben Greene. Now, some might think that this is because they are nice chaps and have very good manners and things like that; but I think it's because talking on the radio takes concentration, and concentration is what makes you go faster. So don't waste it talking on the radio.

* * *

Scientific types are always trying to invent variors that will 'see' thermals five or ten miles ahead. But other ships are just such an invention.

* * *

I had an early Bayside that I bought in 1963 which was a magnificent radio. The only mistake I ever made with it was to sell it with the ship. I had, I think, two or three later Baysides, none of which ever worked properly despite many trips back to the factory—before it burned down.

* * *

I never trust factory-located static ports. They are often laughably far off. The Diamant was one very good case, and

the Elfe another. The Elfe had been around for 2½ years when A.J. and I flew it, and the location was absolutely absurd—about six inches under the wing. They couldn't understand why they weren't getting total energy!

Crewing

Like the pilot, the crew has to be able to handle pressure. Crew members who start running around like chickens with their heads cut off are worse than useless and very distracting to the pilot.

* * *

You had better use a little self control and not bite the crew's head off, because if you bite your crew's head off he (or she) will slack off on you a bit.

* * *

In crews, as in instruments—if I may quote Browning—"less is more". Take the minimum number that can do the job.

* * *

Frankly I think it's unwise of A.J. to use pickup crews. I think one should give a lot of time and thought to having a reliable crew, and I certainly feel that a lot of my success in past years has been due to having the same crew—Suzanne and Ralph (Boehm)—that I can count on absolutely.

* * *

I've built four or five trailers. I think that the cost of all materials, including paint and stuff like that, would have come to between \$250 and \$300, including a commercial 1500-lb axle. The weights seem to go around 1,000 pounds or a bit less. They trailed pretty well up to 107 mph, which was as fast as the car would go.

Weather

In Adrian, in 1965, it was supposed to be good to the west and raining in the south. One chap apparently got his

directions mixed, went south and won easily. Those of us who went west found the rain. The weatherman apparently got his directions mixed, too.

* * *

In Marfa, or more particularly in the Reno area, we have the really extreme thermal conditions. If you are below 5,000 feet you are in deep trouble—really deep trouble. I mean above the ground, since Reno is 5,000 feet or so MSL. You really should start thinking hard about where you're going to put it down. Actually you don't have to think very hard because there's hardly any place to put it.

* * *

Try to visualize in your mind, particularly on dry days, what the mass of thermals really looks like so as to make the best possible use of them.

* * *

If in ten miles you find no decent thermals, it may just be bad luck; but if in 25 miles you find none, then probably it is because there are no decent thermals.

* * *

Anybody can fly at 1000 fpm, or 500 fpm, or even 250 fpm. The time that it gets interesting is when the ceiling gets down about 2000 feet and you have maybe 50 feet per minute lift.

* * *

One of the things I am always looking for in cloud streets is a really super thermal—50% or even 100% better than average. Once I went down a street about 30° off course for 10 miles looking for the big one, because there was a lot of cumulus along the street. I finally found a real beauty, climbed on up to about 12,000 feet—just a lovely cloud—and then went all the way to the turnpoint. No problem. I flew along at maybe 60-65 knots below the street until I got the big thermal.

I remember very clearly one day in Germany in 1968 when we got towed off on what was obviously a pretty sick day. They launched about 67 ships in good order. There was one thermal over a little town about two miles from the airport, and it started at about 900 feet. You had to leave it by 300 feet to get back to the field. I tell you, that was a well populated thermal! And when it gave up—well, you just haven't lived till you try lining up with 67 ships on a single runway!

Class and Rules

We should consider giving no speed points to anyone whose speed is less than, say, 75 per cent or 66 per cent of the winner's. He would get distance points only, but no speed points. This would encourage pilots to take a few more chances and fly faster.

* * *

I oppose handicap systems because they require measurements of sailplanes for handicapping which we do not have and which Paul Bikle says we have no way of getting, and because it gives an unbeatable advantage to those who have been flying a lot of ships for a lot of years.

* * *

I would like to see speed points increased, perhaps geometrically, with the speed differential.

* * *

I would hope that if we get all speed days that, particularly in regional contests—but not, perhaps in all contests—that we outlaw all relights. If you outlaw relights you get away from all that high-speed driving, and you get away from large crews.

Light and Variable

Contrary to my reputation I don't believe in flying very fast. Usually I use one of two speeds, about 75 or 85 knots, for general cruising purposes. It takes a fair amount of persuasion for me to vary much one way or the other.

You just haven't lived until you have made a low final glide to an airport that you have never seen before, and (as some wag says) "don't see now." This was particularly amusing in Poland when they gave us a field altitude six hundred feet off. Funny you should ask—it turned out to be six hundred feet higher than they said.

* * *

I know some people who like to do one or two other things besides soar with their vacations. A lot of people's wives, for example.

* * *

I don't plan to do much more record flying unless it happens to be very convenient. The biggest necessity for record flying is a whole lot of time to spend in a likely spot. They have been doing this waiting thing in Odessa (Texas) for years now. They had one really great day, only it didn't actually look like a great day. Only Al Parker, whose wife wanted him back for church on Sunday, took off. That was when he made the World's distance record in the Sisu.

* * *

Paul Bikle is a lovely type. I don't know a nicer man. He always paints the nose of his ship a nice slinky red. You can spot it from four miles away, a really good trick for the opposition.

* * *

I've got about 1800 gliding hours in the last 15 years, and I think my log book shows about 48,000 cross country miles—I don't count anything under 50 miles. But I quite agree with A.J. that if you count your own time you'd find it absolutely prohibitive in cost, especially on a teacher's salary. I don't know about architects!

• * * *

I have taken off in sailplanes that were very casually assembled. I had my tug, one day at El Mirage, nose over on takeoff because the pilot was trying frantically to get his machine into position so that he could get me off one minute before the takeoff line closed. I was delighted to see

him nose over; it was one of the happiest days of my life, because it gave me five more minutes to tape. The HP-8 didn't fly very well untaped. It put the stall speed up about 10 mph, and the thermalling speed went from 67 to 77, or something like that.

* * *

School teachers are probably not going to fly in the Open class. I'm not. I have a sort of basic rule of thumb—I don't like to be flying more than one year's salary at a time.

APPENDIX I

Year	Hours, total	Hours soaring	Miles XC (soaring)*	Contest placing
1953	25:05	—	—	—
1954	71:05	—	—	—
1955	81:35	—	—	—
1956	91:15	—	—	—
1957	98:45	—	—	—
1958	111:00	—	—	—
1959	158:00	36:00	60	—
1960	167:05	39:00	—	—
1961	216:00	84:30	470	—
1962	350:00	232:00	3,650	Nationals, 12th
1963	496:00	336:48	5,974	Nationals, 5th
1964	686:20	504:50	10,881	Nationals, 25th
1965	915:30	632:15	14,740	Nationals, 3rd
1966	1155:00	786:33	19,860	Nationals, 2nd
1967	1321:00	915:58	22,512	Nationals, 4th
1968	1482:10	1068:00	24,650	Internationals, 4th
1969	1674:00	1260:29	28,780	Nationals, 1st (Open Class)
1970	1835:00	1440:54	33,975	Internationals, 1st (Open Class) U.S. Nationals, 1st (Standard Class)
1971	1969:00	1545:29	36,785	Nationals, 18th
1972	2141:00	1677:24	40,050	Internationals, 19th (Standard Class)
1973	2315:10	1835:15	44,820	U.S. Nationals, 2nd (Standard Class) U.S. Nationals, 1st (Open Class)
1974*	2400:25	1920:30	48,594	Internationals, 1st (Open Class)

*Not counting flights of under fifty miles.

**To May 1, 1974

APPENDIX II

Types of Sailplanes Flown in order of flights:

Pratt-Read
Schweizer 2-22
Caudron Epreuver 800
SA-104 Emouchet
AV-36 Aile Volante
Slingsby T-21b
Slingsby Skylark II
Nord 2000
Nord 1300
Briegleb BG-12-A
Schleicher Ka-6b
Wa-21 Javelot
Weihe
Schweizer 1-23D
Schleicher Ka-8
Airmate HP-8
Schleicher Ka-7
Schweizer 2-32
Schweizer 1-23G
L-Spatz
Schweizer 1-26
Foka 4
Austria S
Slingsby T-49
Slingsby Swallow
Eon 463
Elfe MN
Sisu 1A
Slingsby Skylark IV
Airmate HP-10
Airmate HP-11
Schleicher Ka-10
Slingsby Dart
Austria SH-1
Diamant 16.5
Pheobus A
Libelle 301
Libelle Standard
Cirrus
Elfe S-3
Glasflügel BS-1
Schleicher ASW-12
Schleicher ASW-15
Standard Cirrus
Schweizer 2-33
Nimbus I
Nimbus II
ASW-17

Types of Powered Aircraft flown in order of flights:

Aeronca Champ 65
Piper Supercruiser
Cessna 140
Piper J-3 seaplane
Piper J-3
Piper Tripacer
Luscombe 8A
Mooney Mite
Taylorcraft seaplane
Aeronca Chief 65
Aeronca Champ 90
Piper Colt
Piper Supercub
Stearman 450
Cessna 172
Cessna 150
Cessna L-19
Nesmith Cougar I
Whitman Tailwind
Mooney 21A
Cessna 195
EAA Biplane

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Bill Holbrook graciously permitted the reprinting from his and Ed Byars' outstanding Soaring Symposia of several major speeches of George's. *FLYING* and *AIR PROGRESS* approved the reproduction of articles that originally appeared in the respective publications. Doug Lamont of *SOARING* and Gillian Bryce-Smith of *SAILPLANE AND GLIDING* said that material from their periodicals could be reproduced, without acknowledgement, but that would be lacking in respect for their hard work in editing two of the world's finest soaring magazines.

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John Joss
Editor and Publisher
Los Altos, California, August 1974



George Moffat's new book, "Winning On the Wind", is widely regarded as some of the finest writing ever on the magnificent sport of soaring. It has received acclaim from successful athletes in many other sports. It is also praised by professionals whose goal is excellence, because its principles for success work effectively in the game of life itself.

Moffat (seen above with wife Suzanne in a joyous moment of victory) is one of the best known and most successful soaring pilots in the U. S. He turned to gliders in the late 'fifties after achieving an outstanding competition record in International 14' racing dinghies. Since starting competitive flying in 1960, he has won virtually every major class of soaring competition in the U. S. and abroad, including the U. S. Standard and Open Class national championships and the World Open Class championship, and has set several international speed records for sailplanes. He is the only pilot ever to have won the World Open Class title twice ('70 and '74).