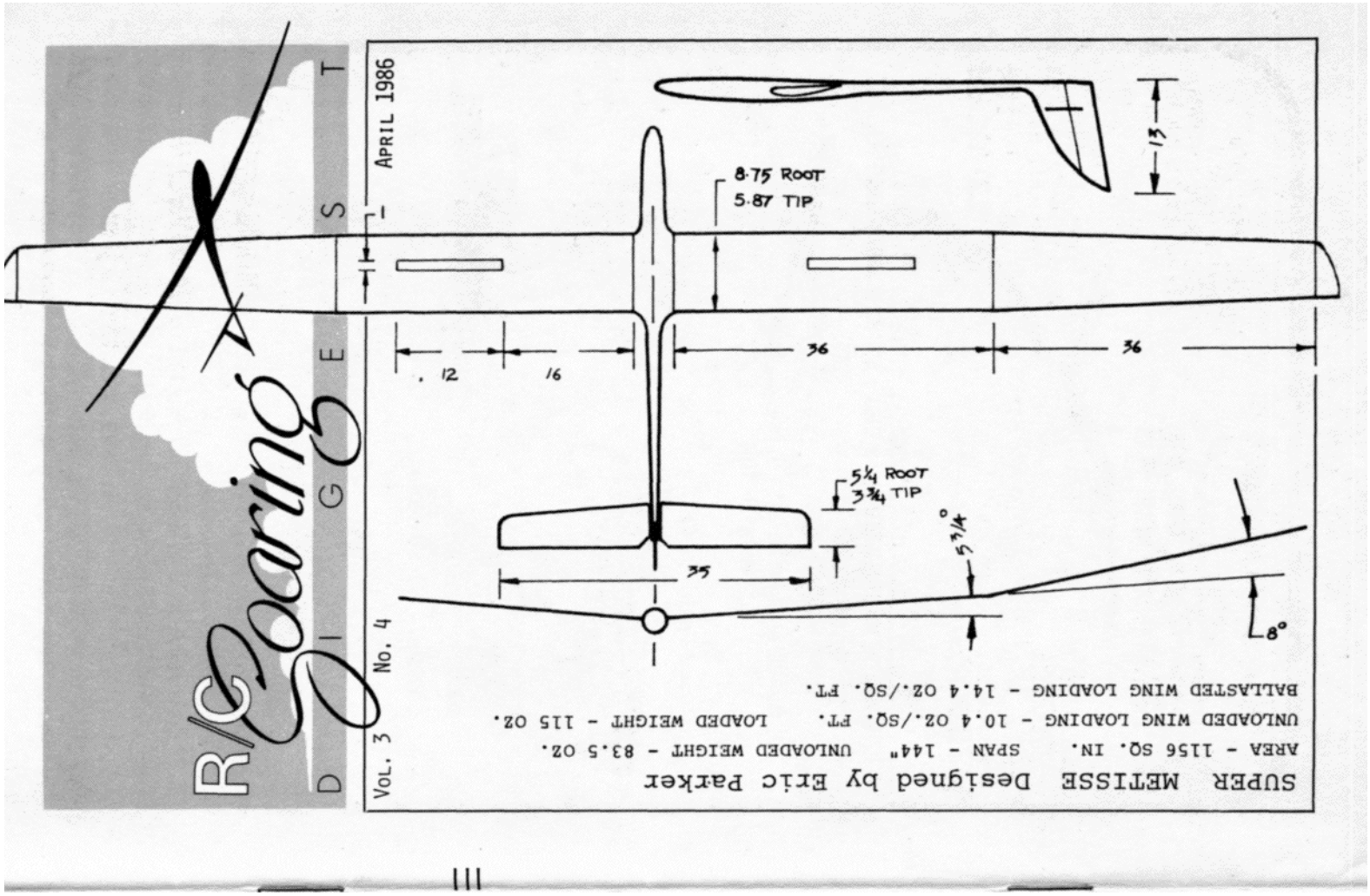

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Hi Start

IT'S "APRIL" ALREADY, YET I WRITE THIS IN MARCH. WINTER IN NEW HAMPSHIRE HASN'T BEEN SO BAD THIS YEAR, AND THE WORST OF IT HAS BEEN BROKEN UP INTO SPELLS OF DESIGNING, BUILDING, EXPERIMENTING, AND - YES - FLYING...FROM THE SURFACE OF A FROZEN LAKE! GREAT FUN IN CASE YOU HAVEN'T TRIED IT.

BY NOW, I'M SURE YOU'VE ALL HEARD THAT LARRY JOLLY WON THE CROSS-COUNTRY CONTEST IN SOUTH AFRICA, USING HIS COMET SAILPLANE (RUDDER/ELEVATOR AND - GASP! - POLYHEDRAL). JOHN LIGHTFOOT, WHO WAS THERE AS A CONTESTANT HAS WRITTEN ABOUT IT FOR US FURTHER ON IN THIS ISSUE. I ALSO GOT A REPORT FROM THE SOLE ENGLISH ENTRANT, PETER STEVENS, WHO SAYS THAT THIS WAS THE SINGLE MOST INTERESTING EVENT HE HAS EVER ENTERED. IT LOOKS LIKE F3H (AS CROSS-COUNTRY IS DUBBED BY THE FAI) IS HERE TO STAY.

SEEING AS HOW THIS WILL BE THE APRIL ISSUE, AND APRIL FOOL'S DAY IS ONLY A MONTH AWAY, I'LL STICK MY NECK OUT A MILE AND MAKE SOME PREDICTIONS THAT YOU CAN ACCEPT OR LAUGH AT, WHICHEVER PLEASES YOU MOST...MAYBE BOTH?

THIS WILL BE THE YEAR IN WHICH CROSS-COUNTRY SOARING WILL BEGIN TO ERODE THE POPULARITY OF THERMAL DURATION CONTESTS, AND YOU'LL FIND CD'S BUSILY AT WORK WITH THEIR LOCAL ROAD MAPS FIGURING OUT SOME DECENT ROUTES. SCALE SAILPLANES ARE QUIETLY OUT THERE FLYING, AND MAYBE YOU'LL SEE MORE AND MORE OF THEM COMPETING IN CROSS-COUNTRY RACES. ONE REASON IS LARGE SPAN, GOOD PENETRATION, AND FLAT GLIDE RATIOS; BESIDES WHICH THEY LOOK A LOT LIKE THE REAL THING.

THERMAL DURATION WILL CONTINUE AS THE NUMERO UNO INTEREST OF MOST FLIERS, AND -YES- YOU'VE GUESSED IT, RUDDER/ELEVATOR/SPOILERS FOR CONTROL. HOWEVER, THE DIE-HARD F3B TYPES WILL BE BUSILY ENGAGED IN GETTING READY FOR THE NEXT WORLD CHAMPIONSHIPS AND TRYING TO FIGURE OUT WHICH DESIGN(S) WILL BE BEST.

MICHAEL SELIG'S AIRFOILS ARE NOW BEGINNING TO SHOW UP HERE AND THERE WITH EXCELLENT RESULTS REPORTED BY THOSE WHO HAVE USED THEM. IN FACT, YOU CAN USE EITHER A SELIG ORIGINAL...OR, IF YOU DON'T WANT TO STICK YOUR NECK OUT QUITE THAT FAR, YOU CAN USE HIS IMPROVED EPPLER 'FOILS OR MAYBE EVEN HIS IMPROVED AQUILA AIRFOIL - JUST TO PICK AN EXAMPLE.

I PREDICT THE NATS WILL BE HOT AND HUMID (LOUISIANA IN JULY...UGH!) BUT THE FOOD, FUN, AND FLYING WILL MORE THAN MAKE UP FOR THE WEATHER. SAILPLANES, AS USUAL, WILL DOMINATE THE ENTRIES, AND IT IS RUMORED THAT JEFF TROY WILL BE CD AS HE WAS LAST YEAR IN SPRINGFIELD.

THIS WILL BE THE YEAR OF THE AUTOPILOT, MADE POPULAR BY HELMUT LELKE AND HEIDI. THERE WILL BE SEVERAL MANUFACTURERS ON THE MARKET WITH THEM (SEE AD THIS ISSUE), AND YOU WILL ALSO SEE A LOT OF THERMAL SNIFFERS IN USE.

AT LEAST ONE RADIO MANUFACTURER WILL INTRODUCE A COMPLETELY PROGRAMMED TRANSMITTER HAVING A THERMAL DURATION MODE AND AN F3B MODE OF OPERATION, WHEREBY AN ENTIRE FLIGHT FROM LAUNCH TO LANDING CAN BE DONE WITH A SERIES OF BUTTON PUSHES...AND YOU'LL BE ABLE TO SWITCH BACK TO NORMAL MODE FROM ANYWHERE IN THE PROGRAM AS A MANUAL OVERRIDE. THE PROGRAM FOR TURNS WILL BE THE BIGGEST HELP IN F3B, AND TIMES UNDER 19 SECONDS WILL BECOME THE 'NORM'. DURING THE YEAR, SOMEONE WILL PUT THE THERMAL SNIFFER AND AUTOPILOT TOGETHER SO THE AUTOPILOT CAN 'LOCK' INTO A THERMAL FOR YOU, CORING THE LIFT BETTER THAN YOU CAN.

THERE YOU HAVE IT FOLKS...AND IF IT DOESN'T COME TO PASS, YOU CAN BLAME THE COMPUTER! APRIL FOOL AND... HAPPY SOARING,

SUPER METISSE by ERIC PARKER - 8 Clifton Ave., West Town, Peterborough PE3 6AY U.K.

FUSELAGE: OLYMPIG by Steve Mettam

WINGS: Mike Smart 2-meter inner panels, built-up outer panels with 3/8" x 1/8" spruce spars at 30% chord; 5/8" x 12" ballast tube. Covering is epoxy-glass on the inner panels and Solartex on the outer panels. Airfoil E193, with no washout at the tips. Tip panels consist of 17 ribs each, on 54mm. centers. The bottom spar is 1/4" x 1/4" balsa. The top spar is 1/4" x 1/8" spruce. Shear webbing is 1/16" vertical grain on first 7 bays, and alternating every other bay to the tip. The D-tube is made by skinning with 1/16" light balsa.

WING JOINER:

3/8" dia. by 6" long silver steel, heated to cherry red and bent to desired angle; re-heated to cherry red after bending and allowed to air cool. The joiner is fitted with a 3"-long aluminum rod drilled to accept the silver steel joiner, and turned in a lathe so its O.D. will be a +.002" to .004" fit in the ballast tube. The rear incidence peg is #6 SWG x 4" long.

TOW HOOK: Placed 2-7/8" from leading edge with C.G. at 30% chord.

TAILPLANE: Made from 1/2" sheet balsa to a 1/3 - 2/3 symmetrical section, run inverted.

"My first METISSE was built of assorted bits and pieces, hence the name METISSE, which is French for mongrel. A group of soaring enthusiasts formed a club in October 1984, running competitions throughout the winter. My own approach was light-hearted in the beginning, and then the 'bug' bit me! I found I liked the challenge of winning, but the models I had were not capable of doing so.

I was in my modelling room (workshop) wondering what to build: HI PHASES, WILDFLECKENS, ALGEBRA 3M'S...all passed through my mind, but I would have to send for them through the post (mail). Being of an impatient nature, I looked through my bits and came up with a set of Mike Smart 2M wing panels and anold, broken set of ALPHA H panels. The Mike Smart wings were suitably sparred and made into main panels, with the ALPHA 'H' chopped and fitted to give a polyhedral wing. A pod-and-boom fuselage was made up and the whole dimension scheme was that the glider should 'look right'. That's how METISSE was made, and it won its first competiton at club level.

March 1985 saw me pick up and use my first thermal; that's how new I was - and still am - to thermal soaring. A few comps were entered with METISSE (and an Algebra 3M for backup) but I was not really satisfied. I like a fair chance of winning, but all the better models I was flying against were bigger, and it's said that 'A good big'un will always beat a good little'un.' I decided I wanted to build a glider out of commercially available parts, so I stuck with Smart's RAVEN 2-meter panels. After a bit of asking around, I found a guy named Steve Mettam who produces excellent fuselages, so I decided to use his OLYMPIG fuz - it being the right size to suit the wings I wanted to build. So there we have it: SUPER METISSE, built as the drawing shows.

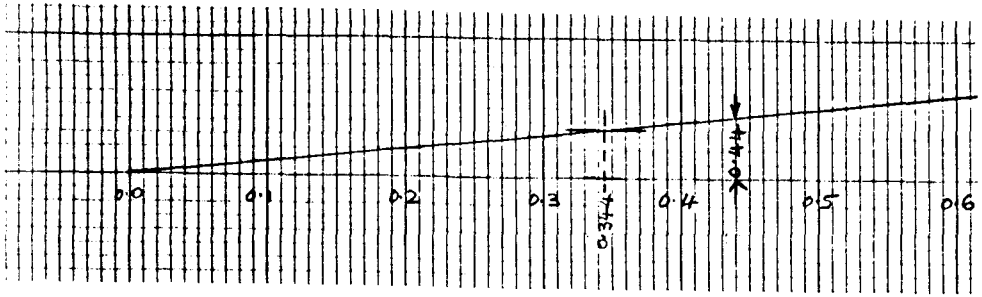
Its first competition was the Coventry Open, having only been trimmed and flown a couple of times beforehand. METISSE Made the fly off and finished 4th overall. Much to my surprise, fly-offs were achieved in the next two competitions I entered, but a win at the Bedford Open was denied by my own piloting inexperience. All in all, not a bad introduction to competetive thermal soaring, so thanks to the M.O.R.S.A members for providing such stiff opposition, and thanks to Ian 'Boffin' Middlemiss for his technical assistance for guiding my ideas. Mike Smart now makes up tip panels according to the same specs as the built-up ones, and can supply them with the RAVEN main panels. Anyone may write to me, enclosing an International Reply Coupon."

TINKER TOY - AIRFOIL PLOTTING WITH GREATER ACCURACY.....Neil Tinker

Neil Tinker, 35 Cairnside Crescent, Willowdale, Ontario, M2J 3M9, Canada, sends us his recommendations for increasing accurace when hand-plotting airfoils from co-ordinates. Neil also has some things to say about cross-country flying (which he dearly loves):

"We have been fairly fortunate to date with no accidents in cross-country flying, but we are getting nervous about it. IT IS VERY DIFFICULT FOR THE DRIVER NOT TO START WATCHING THE MODEL AND END UP IN THE DITCH, OR WORSE - INTO AN ON-COMING CAR! CAUTION.

Neil would like someone (me) to do a more comprehensive article about airfoils, and what happens when thickness is increased or decreased (percent thickness, not total thickness); how to understand the performance graph; etc. He also wants information about co-ordinates for the Wortmann sections (used chiefly on full-scale sailplanes)for possible use on scale sailplanes. Note: these have root chord thickness of approximately 17% or so. Neil also recommends the CALYPSO by Stu Blanchard for anyone getting into F3b. It's built on the same principle as the MIRAGE, GEMINI, etc. (according to Neil) and Stu's average time for the six speed runs (in Waikerie at the World Champs) was 20.83 seconds...the best average of all contestants. Consistency. Very little publication was given to Dyer's perfect round of 3,000 points - the first ever in a World Championship! "Don't get me wound up about W/C's - it's very exciting but bloody hard work. For a solid week our turnaround man trudged 30 Km in six days hauling the lines out and back in! Best wishes, Neil"



There have been many articles written on how to plot airfoil sections but very few on how to measure those co-ordinates easily and accurately.
Here are two methods:

Go buy a set of caliphers and learn to read a vernier. Select a set which has fine points on the internal measuring arms so they can be used as dividers, then simply set the vernier at the Y co-ordinate value and set it at the appropriate X co-ordinate on the base line...

For those of you who only have a set of dividers of respectable quality here is the method I use. Firstly you will have to get yourself some graph paper from a drafting supply store or art store. As these instructions are for inches then the graph paper should have 1" and 1/10th.squares. This paper is available in either individual sheets or in rolls of infinate length, if you get the roll you can use it to draw up that super special contest ship....

Now to create a scale so you can measure to one thounsandth of an inch all you do is to set a base line 10" long and then from a point 1" above the 10"mark draw a diagonal line to the 0 point on the base line, hey its easier to look at the sketch than read this.

This diagonal line now rises 100th. of an inch for each 1/10th. of an inch on the base line. To set your dividers at say 0.44" simply locate the grid line 4.4" along the base line and set the dividers from the base line to the sloping line and there you have your X co-ordinate of 0.44". Now if you really want to get fancy you can guesstimate 1/10 of the 1/10" grid on the base line then you now can set the dividers to 1/1000th of an inch. The example shows 0.344. Confused, so am I, but my 7th grade teacher told me it was so, and I am not telling how long ago that was.

SOAR-CES

Aircraft Spruce and Specialty Company, P.O. Box 424, Fullerton, California 92632 (Tel. No. (714) 870-7551 has been a supplier of quality materials to home builders and the aircraft industry for over 20 years...and their quality and service is TOPS! You can get wood and foam, PLUS SAFE-T-POXY, the new epoxy that is non-toxic* Jim Tyrie here in New hampshire has used it, and swears by it. There have been reports in Sport Aviation, the EAA magazine about it...and, from what we have been able to learn, it does not cause the skin rashes or breathing problems caused by some other epoxy materials. If you wish to call AS&S toll-free (outside CA): 800-824-1930. Please mention RC Soaring Digest if you call. Their 300-page catalog costs $5.00.

* Apparently there is no epoxy-hardener system that is non toxic; all of them have a degree of toxicity to humans, and must be used with care. Epoxy resins are considered to be moderately dangerous to use, but SAFE-T-POXY apparently is much less so thatn previous systems.

Into the Wind, 2047 Broadway, Boulder, CO 80302 supply kites of all kinds PLUS string, reels, and other accessories. THEY ALSO SUPPLY KEVLAR LINE in lengths that would have to be knotted for our use as winch or hi-start lines...BUT, if you call them they may be able to tell you how and where to purchase it in bulk lengths. Thanks to Sandy More RCSD #288, for this information. He says the I-T-W catalog for $1.00 is a real bargain. Mention RCSD when you write.

WING TIPS

Jim Tyrie has used epoxy directly over foam by thinning the SAFE-T-POXY with 91% Isopropyl (rubbing) alcohol after mixing with the recommended amount of hardener. This flows like paint, and will adhere light cloth (0.5 oz./sq.yd) to the foam without in any way harming the foam...unlike some of the epoxy thinners which will attack the foam. Incidentally, you can also use the alcohol to wash your hands and brushes after using epoxy...followed, of course, by a thorough cleaning with soap and water for the hands, and solvent for the brushes.Thanks, Jim, for the information. By the way, Jim lightly scuffs the first coat with 400 wet-or-dry paper, used dry, and then applies a second coat of the thinned mixture - or, regular epoxy paint, for a SUPER finish that is light and tough. Obviously, you can use the same technique with glass cloth over wood, but in many cases using it on foam will provide adequate strength and excellent results.

EDITOR'S COMMENTS ABOUT THIS ISSUE:

So much material has been submitted for RCSD that we will not be able to include it all - even in several issues - unless we revert to smaller typeface. The other alternative, adding more pages, is not economically feasible right now. We have gone from 12 pages in 1984 (when the typeface was smaller) to 24 pages in 1985/86...double the number. Therefore, please bear with us for the time being, until we can clear the tremendous backlog of material in expeditious fashion before it becomes too old to be of interest. Not all articles will use the smaller type - but you'll notice that Soar-ces, letters, and tips are in smaller type this month.

This brings me to another point: I have some manuscripts which coulf not possibly be used in one issue, as they would fill several issues...yet, they are of extreme interest to the avid soaring pilot, designer and builder. Question: Would you like me to run these in serial fashion, say, in four or five parts? If so, let me know whenever you next call, write or renew. Just in case it's "yes", I'm going to start the first one in this issue by Dave Fraser.

Most of you tell me that you are quite pleased with RCSD, and that it's going along the way you want it. However, if there are some constructive criticisms you'd like to make for a better newsletter, PLEASE LET ME KNOW.

SOARING MAIL

Cal Breunig, Route 1, Box 170, Sauk City, WI 53583 writes: "I thought that maybe you would like to hear from one of the smallest clubs in the country: the SAUK-PRAIRIE SKY PILOTS from the small town of Sauk Prairie, Wisconsin. There are eight of us, but the club is still young and we're hoping for more members. The enclosed pictures were taken on a cold, but nice, January day. The temperature was up to 33 degrees F, which was a pleasant change, since most of the winter so far has been below zero degrees F. In the summertime we can drive all the way to the top of the hill; but, in the wintertime as you may already have guessed, we have to hike to the top. By the time you get there you are more than ready to fly. We had a real good turnout (three out of eight members is not too bAd) and the three of us each logged an hour of flight time...but then it was time to hike back down. Well, it's time to sign off. Please keep up the good work with RC Soaring Digest. Sincerely, Cal Breunig. P.S.: The swing is very comfortable- it just doesn't get any better than this!"

The Three Brave Sky Pilots (Left to Right)
Steve Patterson - Gentle Lady
Mike Olah - Coyote
Cal Breunig - Gentle Lady

ANNOUNCEMENT:

WESTERN UNITED STATES R/C SOARING CHAMPIONSHIPS II, June 21st and 22nd, Merwin Ranch, Courtland, CA. Nine rounds of 7-minute precision duration, except the first round each day will be five-minutes. Landing will be a 50-foot line, with 100 points if glider stops with nose on the line. Points diminish with distance away from line on both sides. Entry fee of $30 must be received by June 1, 1986. AMA license required. Checks payable to Kevin A. Webb, Western US R/C Soaring Championships, should be mailed to Kevin at 335 Shockley Road, Auburn, CA. (916)-823- 9458 after 6:00 PM, Pacific Standard Time.

(Help Wanted) Elliott J.W. Boulous, P.O. Box 430, Main Street, Morgantown, PA 19543 (Tel. No. 215-286-5129) needs plans for the OLYMPIC 99. He nearly totalled his in a bad crash, and needs plans for dimensions and reconstruction - particularly the wing. Anyone with plans for the OLY 99 (Not the OLY II) please get in touch with Elliott.

(Advertisers Praised) Mike Reed, 1055 N. Highland Avenue, Fullerton, CA 92635 belongs to the La Sierra Slope Soarers of Riverside, California, and writes: "The purpose of this letter is to reflect to you my feelings about two of your advertisers. In May 1985 I purchased a fiberglass fuselage and plan set from VIKING MODELS USA. I was not only pleased with the quality of product, but also the friendly service. Jerry Slates was willing to give any information I needed, and didn't seem to be annoyed by all the questions I asked about his merchandise. He seems to be the kind of guy who wants to please every one of his customers, no matter what. I will probably do more business with him in the future. The second company is SCALE MODEL RESEARCH. I have done a lot of business with these people, and have nothing but praise for their efforts. Bob Banka has been very easy to deal with, and most of the material I have purchased from him has been obtained at contests and fun fly's...the guy seems to be everywhere!Good trick! I guess what I am trying to say is that I am quite pleased with the two companies mentioned, and I'm happy that RCSD introduced them to me. RCSD is enjoyable because I get to hear from the 'little guy'. You don't get much of that from the major publications. I'm going to send you some information about the Selig S4233 airfoil which I first heard about in RCSD. That's all for now, and thank you for an excellent magazine."
NOTE: Later on in this issue, Mike's personal experiences with the Selig airfoil will appear, and I think you'll be interested in what he says about it. (JHG).

(New Design) Martin Simons, 13 Loch Street, Stepney, South Australia, 5069 writes: " Some time ago (1984 I'll have to admit) I built a little 1.55-meter hand launch glider which weighs ten ounces. It is called, naturally, the MARTINDALE, after a stately home near Adelaide. I flew it a few times on the slope in almost nil wind, which showed it to be very handy at turning in little puffs of liftand I kept it up for a half hour while all the other modellers were whistling for the sea breeze. When the wind did arrive, the MARTINDALE couldn't keep its position, so I got the bigger model out. Last weekend for the first time I tried it on the flat, but did not catch any thermals from hand launches because I cannot throw well enough. Then I tried launching with a four-yard length of FAI rubber and a length of fishing line... I think about 100 feet. On my first try with this, I picked up lift from about ten feet high after a little exploration of the field, and climbed away. I was coming in to lans when the model started climbing, and away it went. I had trouble getting it down after that, but brought it right back to my hand after about fifteen minutes.Once I had learned the trick, I was able to thermal this little ship away on most flights. It was, of course, a very good day with plenty of thermals and very little wind. I was very pleased with myself, as you can imagine. Yours as ever, Martin."

Note: Most of you know Martin from his excellent book Model Aircraft Aerodynamics and from the Tech Notes that he publishes. You may recall that he has been undergoing a legal battle with an Australian publication for the past two years, but now appears to have WON this fight. It seems that the publisher allegedly accepted Martin's manuscript but failed to pay for it - or return the materials! Now that is over, and Martin can expect to get all of his irreplaceable photos and drawings back soon. The book is about sailplanes - the big ones - from the early 1900s to the present. A valuable reference work which needs to be published. If anyone is interested, get in touch with Martin at the above address. (JHG)

THE "CO-PILOT" AN ELECTROSTATIC STABILIZATION SYSTEM .. Ben Thomas

The "co-pilot"is a flight stabilization control system available in three models: Mark I, Mark II, and Mark III. The Mark I is available in two modes: A & B.

Mark I is a pitch stabilizer in which attitude information is derived by a single free-air sense wire. Mode A is stabilization with nose high in sink; Mode B is stabilization nose low in sink. In Mode A, the glider will speed up in lift, and in Mode B the glider will speed up in sink. (Note: in full-scale machines, the glider is flown faster in sinking air and slower in rising air; i.e. in "Mode B." JHG)

Mark II is a wing leveler (roll) stabilizer in which attitude information is derived by two free-air sense wires. The unit can be turned on and off from the ground.

Mark III is a thermal sensor, in which information is derived from a single close-coupled wire. In essence, it is a gain-loss field detector coupled into the roll axis of the glider. Under normal conditions it will detect a climb rate of as little as 1/4 INCH /second! There is also an approximately one-second delay built in to allow the glider to penetrate into the thermal before a turn is initiated. This also prvents false turns due to bumps, stick input, etc. It will show climb in one of four ways:

A. Climb left, descend straight
B. Climb right, descend straight
C. Climb left, descend right
D. Climb right, descend left

Although I prefer setup A, that is the pilot's preference, and he can have whichever he prefers. There is also available a simple electronic switch to turn any of the above single-function units on and off. Its size is only 1/2" x 1" and has a cureent drain of 5 ma.

All "co pilots" will work with most modern positive-pulse servos and require NO EXTRA BATTERIES, servo or flight pack modification. The electronics are self limiting and cannot overdrive or 'jam' the servo. All "co-pilot" error corrections can be overridden by the pilot on the ground. Under normal conditions, OFF and ON are not required with this system, but provisions are made to do this with an optional servo-actuated electronic switch.

SPECIFICATIONS:

Size: 1/2" x 1/2" x 1/4"
Drain: 5 ma.
Sensor:
Mark I - Hi-"Z" wire
Mark II Hi-"Z" wires
Mark III Hi-"C" wire
Servo Driver - on board
Operating Voltage - 3.5 to 7.5 volts, DC
Weight - approximately 1/4 ounce

Ben Says: "I have been building testing and flying "co-pilots" in gliders since 1977."

PRICES:

Mark I, II, or III .....$59.95 each, postage included
Off/On electronic switch .....$29.95 , postage included

Send check or money order to Ben Thomas, 1740 Aberdeen Terrace, Winston-Salem, North Carolina 27103. Telephone: 1-(919)-723-0824

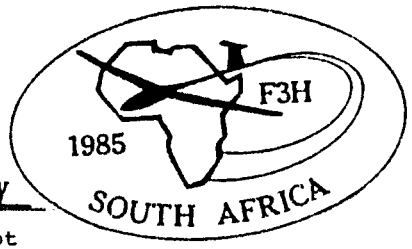
FUTURE DEVELOPMENTS:

Coming in May 1986 is a complete two-axis autopilot with Off/On switch and thermal sensor.....for $129.95

Coming in July, I expect to have a new force-displacement stick for transmitters, utilizing the Signetics encoder. It is quite unique and gives the distinct feeling of being tied into the airframe.

Good lift, Ben Thomas

The First International Cross Country



John Lightfoot

In some ways this very promising event turned into a bit of an anti-climax, which was a great pity considering the amount of work put into it, the potential for a most enjoyable contest and, in retrospect, the amount of fun everyone who attended got out of it. Perhaps the fault lay in a shortage of publicity before the event --- I didn't see all that much, but there may have been more overseas and that was where it was needed! Of course the political situation took its toll too, but not all that much, I understand. Dan Pruss was booked to attend as was Scott Christensen but circumstances beyond their control prevented their travelling. But where were the rest?

Sadly it turned into a three-horse race, with the rest of the field either poorly prepared, not practised or not even seriously involved!

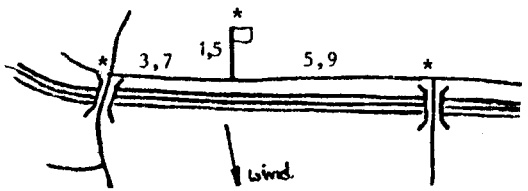
On advice from the experts, my ill-fated "SB-XC" was built with both polyhedral and ailerons and it seemed to have considerable promise. The Transvaal breed of machine had high aspect ratios and aileons while several were fitted with winglets on their tips. Tests, one wing with tip winglet and the other without, showed that there was no noticeable advantage to be gained at high speeds but when the time came to slow down for landing the tip without the winglet stalled long before the other. It would seem that the winglet controls the tip vortex, reducing the "round the tip" airflow at low airspeeds.

The odd aircraft out at the meeting was Larry Jolly's "Comet", which was a "back-to-basics" rudder-elevator-spoiler affair with a huge fin and rudder. This was clearly the way to go as it proved to be amazingly stable.

Andy Keil had suffered a mishap the week before the event and, testing his aircraft on the saturday, folded the outer wing panel soon after releasing the 'chute. Had it come right off

there might have been a chance of control but it stayed there flapping and destroyed any hope of recovery. That was Andy out of the event ... he became co-pilot for Larry Jolly.

SUNDAY (practice)



The course set was the shortest of the selection available (20km is the minimum for F3H) ... up the approach road, right 3,7km to the first turn (*), about turn and 9,6km to the second turn (*) and back to the start. Larry Jolly completed the circuit, as did Charles Rudnick, thus setting the pattern for the rest of the meeting.

At the end of the day it was discovered that one of the sights used for "rounding the mark" had been nicked! Some people will steal anything! From then on we used the multitude of power- and telephone-lines and the occasional notice-board ... they all made perfectly good "sights".

MONDAY First Task 20,7 km (same task as for practice)

The whole week we were offered very little of the traditional Transvaal summer weather ... instead of the usual strong thermals with nasty sink in between, we were treated to a lot of the rather nondescript, weak, widely scattered lift we are used to down in the Cape! The first official day was one of these, and the best distance was 7 km.

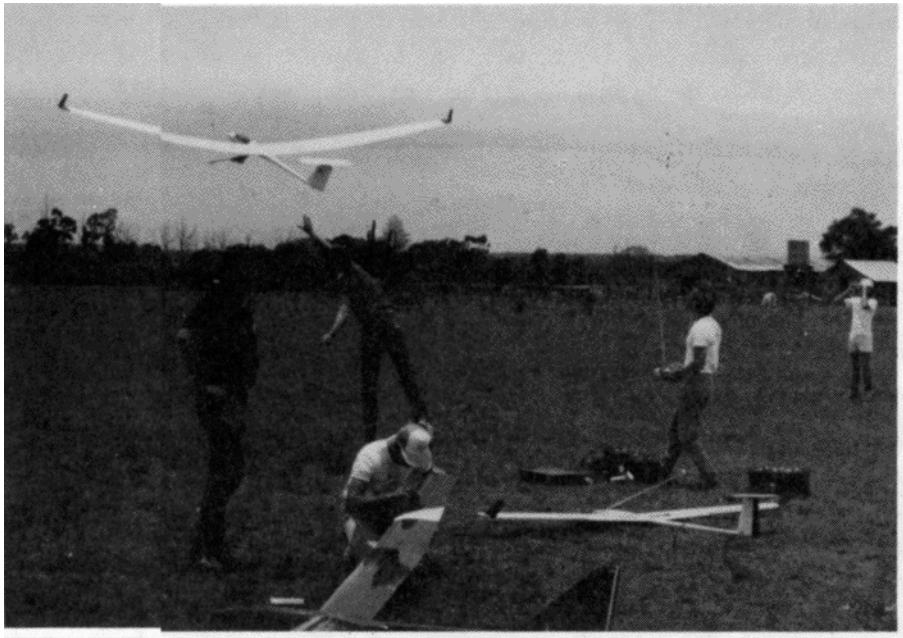
We had to retire to the workshop to repair the result of an encounter with the telephone wires before the start gate had even opened!

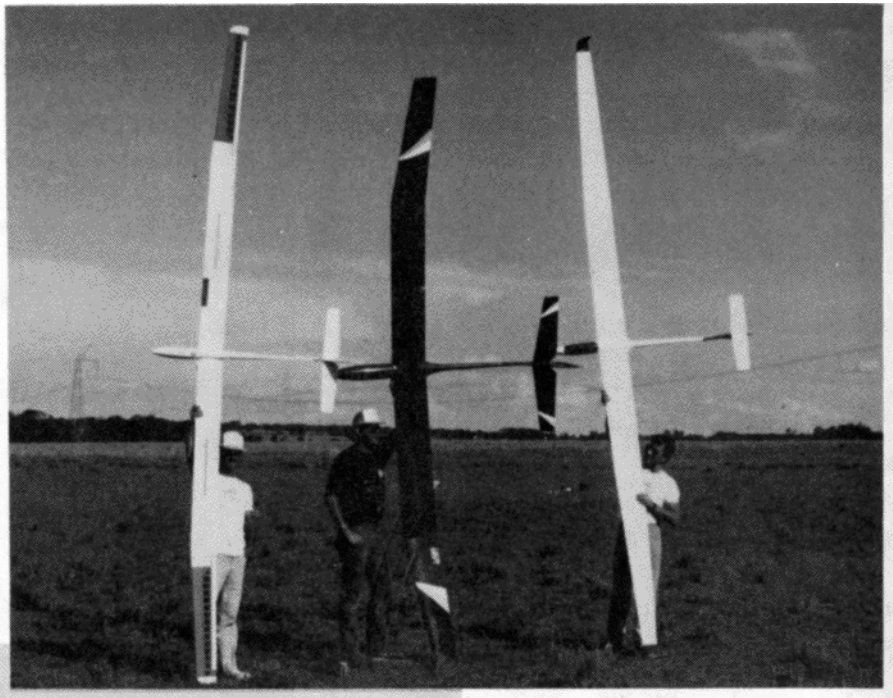
We arrived back at the field, to everyone's surprise, and put a distance of 2,2 km on the scoreboard, just to show we weren't beaten yet, using the Sagitta!

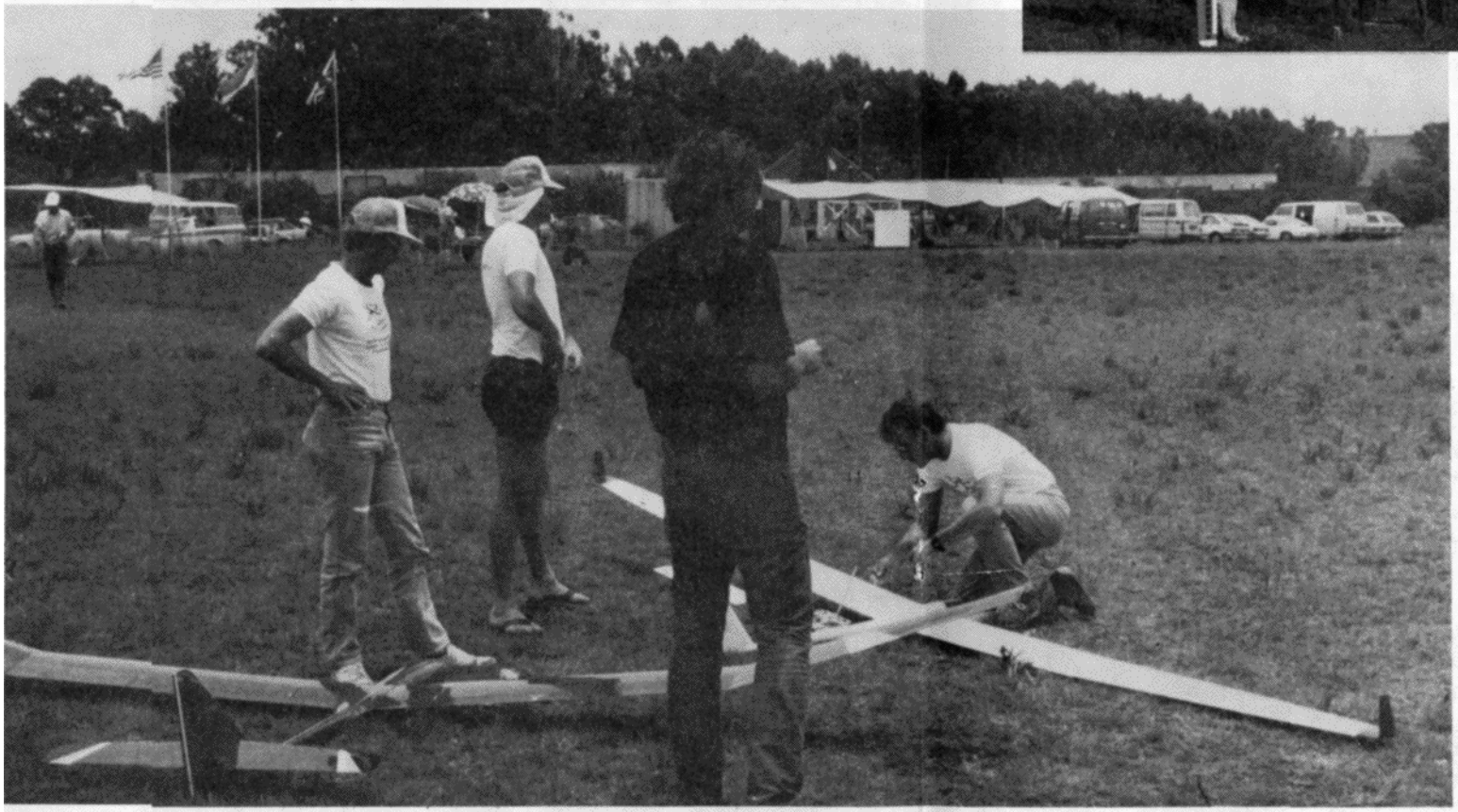
Larry Jolly	7,0 km	28'48"	Peter Stevens	2,5 km	2'56"
Charles Rudnick	5,8 km	21'49"	John Lightfoot	2,2 km	4'10"
Frikkie Roos	5,1 km	21'32"	Paul Beatty	0,9 km	3'35"
Arnold Paikin	4,7 km	19'47"			

TUESDAY Second Task 42,4 km

This looked like a more promising day and we were back in action with an SB-XC which looked little the worse for its repairs of yesterday. The course was double the length of the earlier







F3H
1985
SOUTH AFRICA

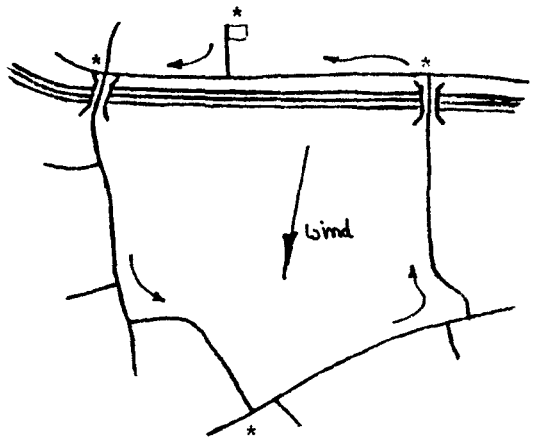
Theo Wolters launches for Charles Rudnick ... Larry Jolly, Andy Keil and "Comet" in foreground.

The Top Three ... (l-r)
FRIKKIE ROOS (3rd)
LARRY JOLLY (1st)
CHARLES RUDNICK (2nd)

Charles Rudnick prepares under watchful eyes of (from left) Andy Keil, Lawrence Rudnick and Larry Jolly whose "Comet" is in the foreground.

one and a loop right round behind the downwind ridge with a long upwind leg through what became known as "the valley of death".

Out on the course with some useful height, the SB-XC just disappeared! It was a combination of a bump in the road and a tail-on view, but all three of the team lost it. We couldn't even get the wings to flash so had to spin it in, eventually finding the pieces with the help of Frikkie Roos and his crew who had seen it go in.



There were commiserations all round when we returned but these were quickly submerged in the excitement associated with the duel between Charles and Larry. They had both landed out not more than two kilometres short in a bid to race each other to the line.

They were both out on the course again but Charles came back having landed out. Then the cry went up, "... here they come!" ... sure enough, the Findlay "tank" was seen tearing down the approach road with headlights on and the Comet was just crossing the power lines!

By now we were all following the Peter Stevens saga with interest. Peter was the sole UK representative but his aircraft was totally unsuitable --- it had long narrow wings which flapped rather like a manta ray, depending on whether he applied up or down elevator. Eventually he tried conclusions with a fence which proved more than a match so he was loaned a "Meteor" by Nord Gerneke, but I have never seen anyone find his way out of lift better or more quickly! He tried to fly the Meteor between a telephone pole and its guy-wire, so Nord spent the entire night rebuilding the plane!

Larry Jolly	42,4 km	74'11"	John Lightfoot	4,3 km	19'22"
Charles Rudnick	41,2 km	67'02"	Peter Stevens	2,8 km	11'22"
Arnold Paikin	19,0 km	37'30"	Craig Thompson	2,5 km	18'44"
Frikkie Roos	12,0 km	31'08"			

By now everyone was familiar with the rules and the scoring formulae, and an interesting anomaly had been spotted ... what if ...? But it was to happen next day ... continued next month...

TWO METER SOARING - AS IT'S DONE HERE (MAYBE).....Bruce Abell

My friend Bruce Abell from whom you've heard numerous times has just submitted the latest Australian proposals for that class. Note, as he says, these were proposed by the Northern Area Contest Aeromodellers (NACA) and pay particular attention to the "Pinkham Touch" that makes the last two flights precision duration for the expert, while leaving the beginner or newcomer to soaring competition five simple (?) 4-minute flight tasks. It looks as if two-meters is a good size for beginners because it is relatively uncomplicated, simple, and inexpensive. By keeping the two servo-operated control functions, simplicity is almost guaranteed. Certainly the 2 kilogram maximum weight could allow for sufficient ballast to be used to handle the strongest winds likely to be encountered, yet once you include ballast, you have to leave it in for the contest! THAT can separate the men from the boys in a hurry, and calls for good judgement at the very start about what conditions are likely to be.

1. 2-meter span measured from wingtip to wingtip in a straight line
2. 2 servo-operated control functions
3. 2 kilogram maximum weight
4. Initial weight not to be varied by addition or removal of ballast during the contest.
5. Five rounds of 6-minutes working time for the contestant to accumulate a total possible flight score of 1200 (one point for each second of flight time). For times over this allotted time of 30 minutes total, 2 points are deducted from the 1200 points for each second of such time over the total.
6. A landing bonus of 50 points is awarded for landing in a 50-meter diameter circle. Bonus points are separate and additional to the aforementioned 1200 flight points.
7. Landing bonus points are to be forefeited if the model is not stationary on the ground at the end of the six minutes; and all landing and flight points are forefeited if the model is not stationary on the ground at the end of 6½ minutes.
8. No pilot or assistant allowed in the landing circle at any time, other than for retrieval of the model in the quickest possible time.
9. Any accepted method of launching at the direction of the contest organizers.

These rules are based on the concept of encouraging beginners to compete against the more experienced fliers at a minmal financial outlay. They will also take into account the high degree of skill of the experienced fliers while still allowing the beginner a reasonable opportunity to win. The specifications have been left reasonably broad in order not to stifle imaginative design or innovation."

Note: As most of you are aware, I have been a strong champion of the two-meter class of sailplane from the very beginning, and despite many opinions to the contrary, I still firmly believe that a two-meter

sailplane has more advantages than disadvantages whether the purpose be fun flying or competition. While I favor simplicity over complexity, I cannot exclude the possibility of making further gains in performance by permitting flaps or other camber-changing devices, or even spoilers, in a two-meter design. While this does not comply with either the British or proposed Aussie rules, I feel it suits the US better...especially for the talented designer who wishes to extract the maximum possible performance from the two-meter concept.....Jim Gray.

TESTING THE SELIG S4233-136-84 ..... by Mike Reed

Part of this article appeared in Bill Forrey's column in MODEL BUILDER magazine, and the rest is contained in a letter to RCSD from Mike Reed. Here's Mike:

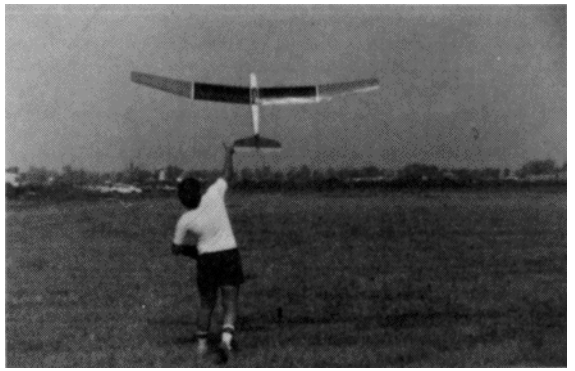
" ... Since buying a 1/8th scale fuselage of the SB-10 sailplane from Viking Models USA, I've been looking for a good airfoil for the wing. When I saw the article in MB describing the Selig S4233-136-84 I quickly scrambled for the foam cutter and started work on a test wing. I called on my friend Mike King to supply me with an old SOAR-BIRDY to use as atest bed.

"After arriving at our flying site we simply attached the wing, balanced it and flew it. After level trimmed flight was attained, the sailplane was put into a dive, and I was amazed at how fast it plummeted toward earth! The sailplane was recovered from the dive soon enough to realize that the main spar was strong enough. The wing did not experience flutter. Also, it appears that the airfoil has very little drag. In level flight the sailplane has a very flat glide path, and it flies faster than it did with the so-called 'Clark Y' wing, even though the Clark Y wing is thinner. We noticed on high-speed fly bys that the wing is virtually silent.

"The test wing's area is 645 square inches spread out over a wingspan of 96 inches, and the 38-ounce weight of the sailplane yields a wing loading of 7.7 ounces per square foot. The wing root chord is actually 7-3/8" and the tip chord is a relatively narrow 3½". With this configuration, the sailplane was able to turn tight circles without tip stall, and no washout was used. Stall characteristics seem very mild, and when stalling from level flight, the sailplane would seem to lose only about four feet of altitude before recovery.(This was predicted in the original article- WRF) Overall the sailplane was a joy to fly and Mike and I were pleased with the performance of the wing, so I will now use this airfoil on the SB-10 which has a root chord of seven inches and a span of 12 feet!(The aspect ratio will be phenomenal. No wonder Mike was worried about flutter and tip stall problems!)

"The test wing was made on a homemade foam cutter using .010" safety wire 40" long, strung in a bow. Mike uses a 12-volt automotive battery charger to supply three amps of current through the wire to cut the expanded-bead polystyrene foam of one-pound density. The core was cut leaving room for leading and trailing edge material. Stock TE balsa was used for the trailing edge and the leading edge was carved and sanded to shape from rectangular stock. The spar consisted of two 1/8" x 3/8" sprice caps, with no shear webbing except the foam itself. Of interest is the fact that no wing sheeting was used, either; the foam wing core was covered in Hobby Shack FliteCote - and Mike says he couldn't believe how strong the wing turned out.

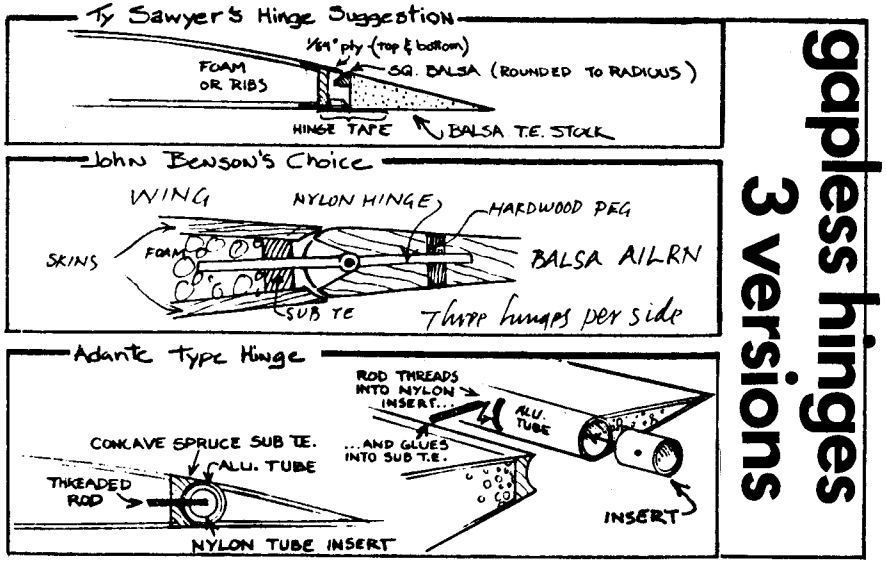
"On another test day the aircraft made a 2½-hour thermal flight on two big thermal cycles, and Mike was about to lose it from flying so high. He says the L/D is 'fantastic' and the flying speed is twice that of the stock SOAR-BIRDY.



The photograph illustrates the planform of the wing, and also the backside of my friend and flying partner Mike King (not his best side). Since the experimental wing was built I have used this same airfoil on numerous projects, the most recent being a Birdi TERCEL. A foam wing sheeted with 1/16" balsa, then covered with Monokote yields a practically indestructible wing. At our slope site, my TERCEL has bumped some sailplanes out of the sky...most of them being twice the TERCEL's size The flying site shown in the photo is located in the city of Chino (California) and is approximately 20 acres surrounded by the green pastures of two dairy farms. A pefect flying site as far as I'm concerned.

"My SB-10 is still under construction, and I plan to use it in scale competition. Controls will include ailerons, rudder, elevator, dive brakes and retractable wheel. The wings will be cut from foam and laminated with 1/16" balsa...there being two layers of 3/4-ounce fiberglass cloth between the balsa and the foam. Before sheeting, a spruce spar will be incorporated in the foam." Thanks for a great magazine. Good thermals and soaring forever!" (Signed) Mike Reed.

"P.S.: I two successful designs of my own being flown at the present time by southern California fliers. One, called LAMINAR, is for slope soaring, and the other, MK-4, is a thermal sailplane. I'll send more info on these later if you are interested."



STABILITY AND SAILPLANE TUCK - PART I .....David Fraser

Here is an article for all of us to enjoy - and learn from! Dave has contributed several times before, most recently in the March issue, comparing two airfoils - NACA 2512 - and the Eppler 205. Too long to include everything in one issue, I've decided to publish it in two parts. Read - and enjoy!

STABILITY AND SAILPLANE TUCK

Jan 1986

Recently in RC Soaring Digest (1) there was considerable discussion of the stability of our sailplanes. There exists a lot of misinformation and guessing as to what constitutes the requirements for a stable sailplane, and this has been aggrivated by a lack of good data on the performance of the airfoils we all use. Since our planes all fly at Reynolds numbers (Re) that are very low compared to full size aircraft, a lot of the information available for that flight regeme is not valid for ours. In particular, our wings frequently have a considerable amount of separated flow, which results in a wing aerodynamic center that changes position over the range of lift co-efficients (Cl) and speeds that we use. In addition we tend to fly models that have very large spans and high aspect ratios (AR), without realizing that this can result in a lot of twisting of the wing, particularly for airfoils that are undercambered at the trailing edge, e.g. Eppler 211, 212, 214, etc.

What I want to discuss here is the effects of our unique situation on the stability of the airplane, particularly in light of the data which Althaus has published in the second volume of "Profilpolaren fur den Modellflug" (PfdM). It would be great if I could say that observations which have been made and confirmed dovetail nicely with the wind tunnel data. Unfortunately that isn't the case. Altho I will suggest several possible resolutions of this miserable state of affairs, I have no guarantee that any of them is correct. What is clearly needed are more controlled experiments with actual airplanes, and confirmation of Althaus' data by some other facility.

I will not review the requirements for stability (4,5) except for the following:

1. Any airplane must be trimmable so the sum of all moments is zero.

2. At this trim, the derivative dCmt/da must be negative.

3. In the linear region of the wings' lift curves dCmt/dCl must also be negative.

4. Within very reasonable assumptions of linearity, any configuration of airplane (conventional, canard, tandem wing) except a flying wing can be made stable simply by properly locating the center of gravity (cg), regardless of airfoils or relative wing size.

The observation that started this particular investigation was a statement made to me by Herk Stokely in response to a letter I wrote him. Herk had noted that some of our sailplanes seem to "tuck under" - that is they show a divergent pitch response - at high speed, even tho they are stable at low speed. Altho in retrospect I realized I had seen the same thing, It was not violent and unless the sailplane was allowed to go for quite a few seconds it was not clear that it was really occuring. In order to make the situation more obvious, I took a stock Sagitta 900 and moved the cg aft to the point where its stability margin at low speed was very small. When this airplane was dived and the stick then released the tuck was unquestionable.

Linear stability theory predicts that the stability is, for all practical purposes, independent of speed or Cl, so the question arises as to why a sailplane can be stable at low speed yet unstable at high speed. If we were talking of power planes the problem wouldn't exist since the effects of the propeller can easily cause considerable variations in pitch stability.

Herk had suggested the possibility that the relatively high effective dihedral we see in polyhederal planes might be the cause, since the cg is now well below the wing's vertical center of lift. It has long been known that the vertical location of the cg influences the stability derivative such that a high wing is more stable and a low wing less stable at low speed than at high speed, but the effect is relatively small. My own thoughts were that the wing might be twisting at high speed in response to the aerodynamic moment which would have the effect of increasing the lift-curve slope, dCl/da, and this would have a direct impact on stability. And then there is the Althaus data which shows that the location of the aerodynamic center (ac) of our wings is far from constant.

In order to investigate these effects I wrote a computer program which allowed me to model all these possibilities, and to graph the output. What came out of this effort is quite interesting, but the problem still hasn't been solved.

The program works as follows (6):

1. The various data necessary to describe the airplane are either entered from the keyboard or recalled from the file. These data are: the areas and AR's of both wings, the horizontal and vertical separation of the ac's, the aerodynamic moment co-efficients (Cm) of both wings, the desired value of dCmt/da, and the starting Cl of the forward wing.

2. The program first of all adjusts the angle of attack of the forward wing to realize the desired Cl. Next it moves the cg to get the correct stability, and finally it adjusts the angle of attack of the rear wing so the total moment co-efficient (Cmt) is zero. Since there can be some small interaction between these steps, they are repeated until all errors are acceptably small, i.e. less than .002 in Cl, .0003 in dCmt/da, and .0001 in Cmt. Assuming positive stability was requested the airplane is now trimmed and stable at the design Cl and dCmt/da.

3. The program now plots Cmt vs Cll from zero to the design Cl; see the figures.

4. The program also will plot the lift-curve for the forward wing.

Altho the program uses the standard definition of Cl, the Cm's need some explanation. The Cm of the individual wings is the standard one, i.e. based on the area and mean chord of the wing. Cmt, however is based on the total area of both lifting surfaces, and the characteristic length is the separation of the ac's, rather than the chord of the forward wing (cl). The difference is only a constant and the shape of the curves is in no way affected. The constant is:

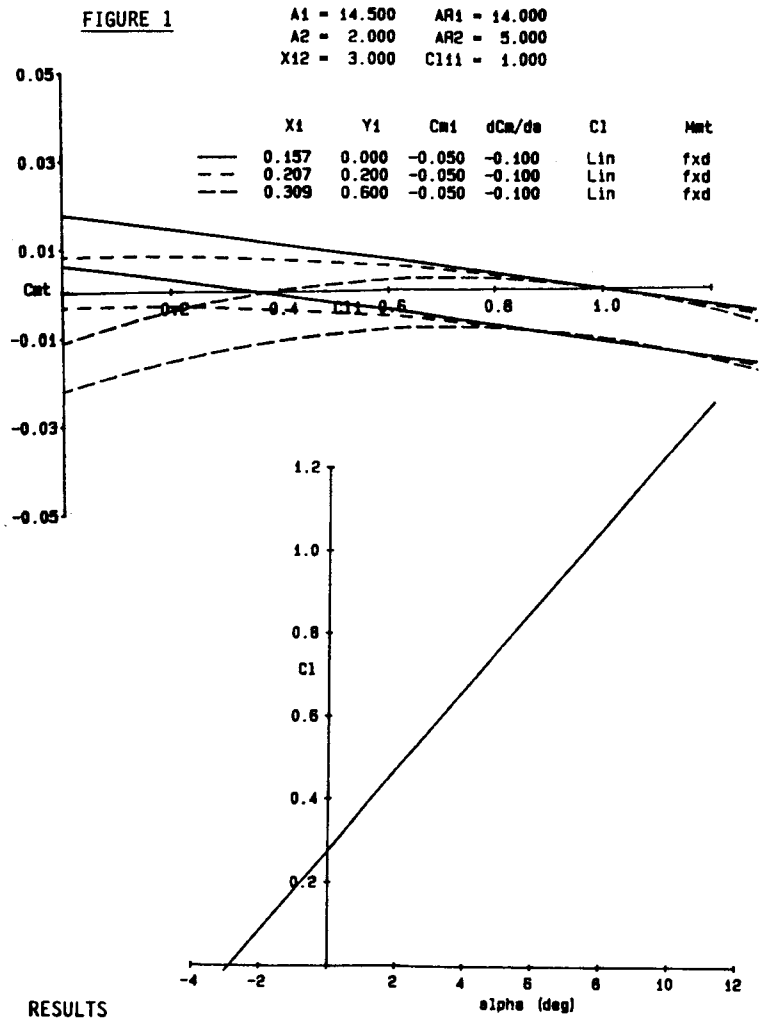
$$K = \frac{(A1 + A2)*X12}{A1*c1} = 3.3 \text{ for this case.}$$

(X12 is the horizontal separation of the ac's; 3 ft. in this case. The airplane represented for the rest of this paper is approximatly the Sagitta XC, which I fly, and which exhibits the tuck being discussed.)

Multiplying the graphed Cmt by K will yield a Cmt based on the forward wing.

The independent variable is actually the angle of attack rather than Cl - this makes it easier to introduce non-linearities in the lift curve.

FIGURE 1



RESULTS

If the vertical separation between the cg and the main wing's ac is zero, the lift curve is a straight line, and the Cm's are held constant, this program produces a series of essentially straight, parallel graphs, each one representing a different stabilizer incidence; see fig. 1. When Y1 is increased to 0.2, the lines' slopes are the same at high Cl, but they goes thru zero at about Cl = 0.3, and then become positive below that. Note also that the program moved the cg further aft in order to get the same stability at the design Cl (Cl1i). This is, of course, exactly what one would expect.

In order for the airplane to tuck after the stick is released, Cmt actually has to pass thru zero and become negative. This it does not do; even tho the slope is positive, the trim Cmt is also positive, i.e. pitch up. How much must Y1 be in order for the graph to go thru zero at some reasonably positive value of Cl? Well, if Y1 = 0.6 (7.2 in.) and if the airplane is trimmed at Cl =1.0, the graph passes thru zero at Cl = 0.4. There are two problems with this, however. First, look at X1. X1 = 0.309 means the cg is 6.7 in. behind the leading edge, which is ridiculous. Secondly, the actual Y1, as nearly as I can measure it is about 0.15 to 0.18, depending on how much the wings flex. In short, while this may contribute to the problem, it's not the whole answer.

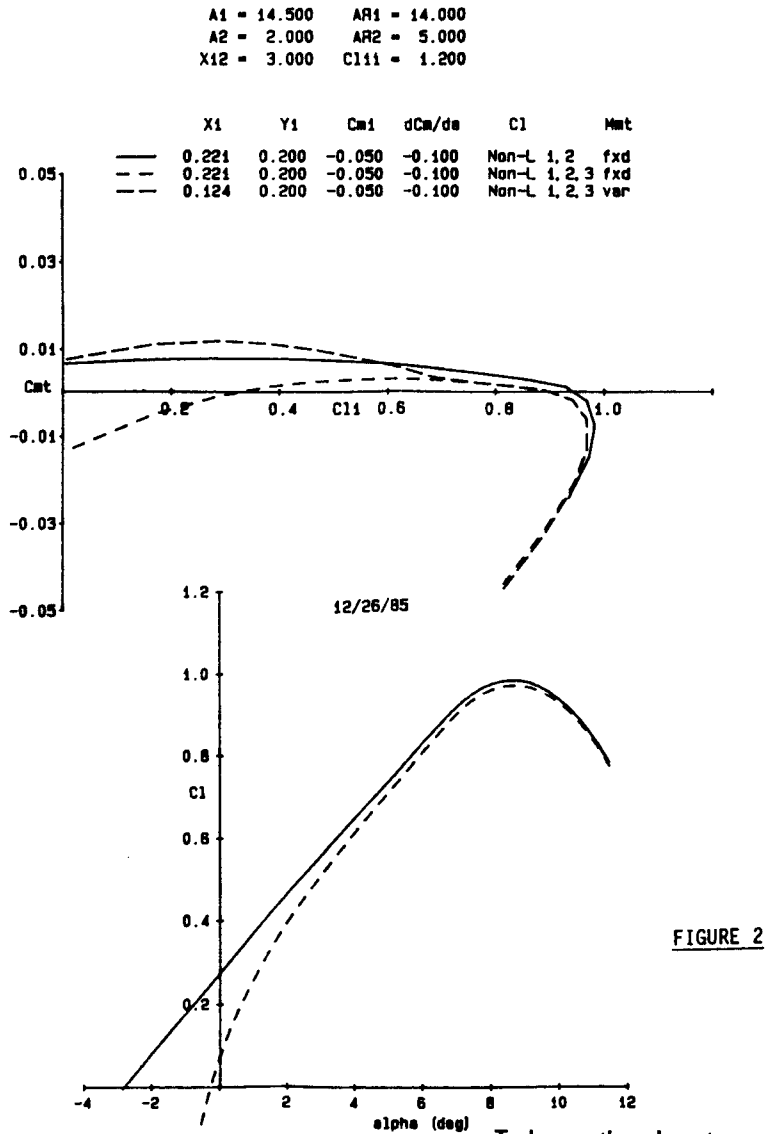


FIGURE 2

To be continued next month...

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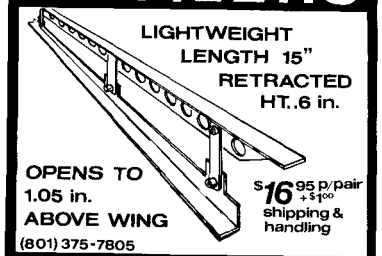

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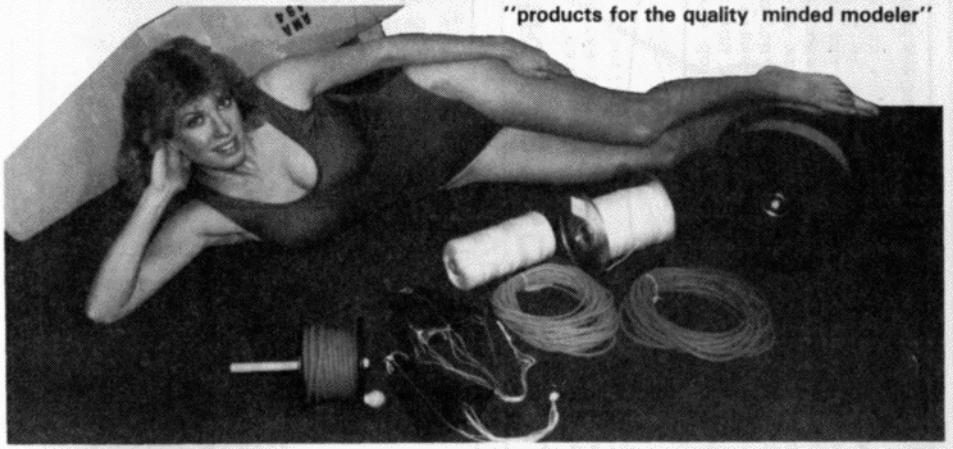

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