R/C Soaring DIGEST

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SB-13

HIGH PERFORMANCE
FLYING WING

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FLASH ! BRIAN AGNEW WINS ALL THREE CLASSES AT U.S. R/C SOARING "NATS"! HE TOOK HOME THE LEE RENAUD AWARD, THE HI JOHNSON AWARD; AND HIS TEAM WON THE DAN PRUSS AWARD!!! CONGRATULATIONS BRIAN

F3B Rules Changes in FAI Plenary Session -- Effective 1 January 1989

Perhaps the most significant rules change involves limitation of winch power. (Excerpted from set of rules).

"The winch must meet the following specifications:

a) The winch shall be fitted with a single starter motor,out of a series production, having an internal resistance of at least 15 milliohms at surrounding temperature D=20°C. The resistance may be attained by adding external resistor, but the design must disable any change of the total resistance (for instance by over bridging the resistor). Resistance of any control device does not count.

b) Not reproduced here

c) The power source shall be a 12-volt lead/acid battery having a minimum internal resistance of 6 milliohms and a maximum cold-cranking ampere capability of 275 Amoeres DIN, or 340 Amperes IEC, or 460 Amperes SAE.

d) The motor must not be cooled, and the battery must not be heated.

e) The purpose of this rule is to prohibit the use of significant energy storage devices other than those mentioned. With the exceptions of the single winch battery, line stretch, and the small amount of energy in the rotating motor and winch drum, no energy storage devices shall be allowed. This includes, but is not limited to, flywheels, springs, weights, and hydraulic or pneumatic devices. The flywheel-like properties of the winch drum shall not be exploited.

Note: Many other rules changes were adopted at the Plenary Session held on 22 April 1988, but this one rule has outstanding significance for the future of F3B. Already, rumors abound concerning development of lighter sailplanes and other developments in aerodynamics and design. In a letter dated 13 May 1988 Byron Blakeslee (soaring editor, Model Aviation magazine) wrote: "The tricky part (of the new winch rule) will be measurement of the motor and battery resistances. I spoke to John Grigg, and he said that Rolf Decker (former F3B World Champion) built a measuring apparatus and demonstrated it at the CIAM/F3B meeting in Paris.

"...John said that the 15/6 milliohm standard will produce 1.6 kW of power. This is said to be greater than a standard Ford starter motor but less than a DGM motor. The goal is to eventually get down to 1.1 kW of power."

Hopefully, the newly-adopted rules will put an end to the winch wars that have characterized the sport for the last few years. However, there are those who argue that with current F3B sailplanes a "wimpy" winch poses a danger of its own. Nevertheless, competitors, for at least the next World Championships near Paris, will have to abide by the new rules. You can bet there will be a flurry of design activity between now and then. Already there are comments about a SYNERGY III out of California, a flying wing design from Germany, and many other new and possibly different machines originating elsewhere. The competetive spirit and determination to produce better performance won't be slowed, much less stopped, by a new winch rule! RCSD will try to keep you informed of developments in this fast-moving field. (JHG).

ON THE 'WING...

Bill & Bunny (B^2) Kuhlman
P.O. Box 975
Olalla, WA 98359-0975

Are you looking for a flying wing/tailless design for a scale project? Take a look at the first flying wing constructed with composite material technology! The SB-13 was designed to be a 15 meter high performance Standard Class sailplane. Without flaps to achieve variable camber, flight performance was to be achieved by elimination of fuselage and stabilizer drag. Constructed by Akaflieg Braunschweig in West Germany, the SB-13 was successfully flown twice from aerotow on 18 March, 1988.

The first design, with straight leading edge, was modeled at 1/3 scale and flown using radio control, but the model revealed spar flutter at a scale speed of 120 km/h (75 mph). The sweep was taken out of the spar and wing at the root to reduce the bending load and carbon fibers were added to the spar layup to increase stiffness. These modifications raised the flutter speed to 270 km/h (over 165 mph). Manufacturing the curved spars posed its own difficulties, but these were all solved quite nicely; a static bending load test that was to go to the destruction of the spar was terminated when the spar survived a load 2.3 times greater than the design maximum!

The airfoils used were designed for zero moment coefficient and maximum laminar flow. The resulting sections, HQ 34N/14.83 at the root and HQ 36N/15.12 at the tip, are laminar to 89% chord on the upper surface. Wing twist is but 1.5°, dihedral is 4°, the aspect ratio is 19.4, wing sweep is 12.5°. The elevators are near the wing tips, with the ailerons inboard; both have their own special airfoil. The spoilers are the height of the wing section and are mounted on vertical tracks, coming out of the upper surface only. When turning, the inner rudder deflects 70° and the outer deflects 15°. The winglets use the FX-71-L150/30 section, and are rather interesting as they appear to have the Schuemann tips that are becoming so popular.

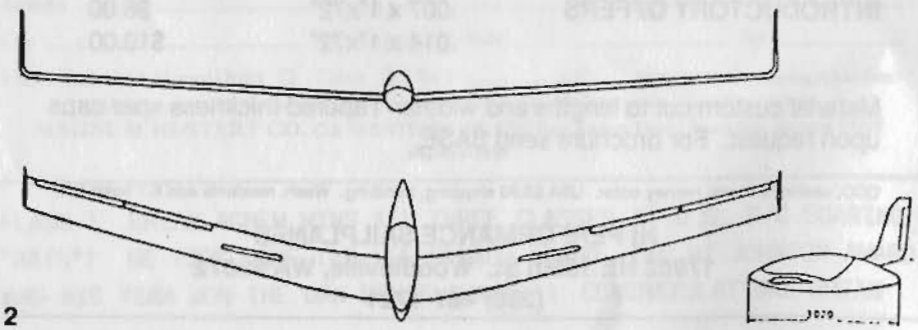
The SB-13 has a tandem landing gear setup with both wheels retractable. The fuselage is of glass fiber and includes a special safety system consisting of three parachutes that will bring aircraft and pilot down together in case of mishap. The parachutes are vacuum packed, weigh a total of 20 kg (44 lbs.) and take up only 40 liters volume (about the size of a ten gallon aquarium).

Performance is quite excellent: minimum speed is 70 km/h (under 45 mph), maximum is 210 km/h (130 mph), and the sink rate is a very low .53 m/s (1.74 ft/sec) for a glide ratio of about 43.5 to 1!

All of the above information was found in TWITT newsletters (4, 10, 21, 23). TWITT (The Wing Is The Thing) is a group of flying wing enthusiasts who promote the design and construction of tailless and all-wing aircraft. One of their goals is to construct their own full size high-performance tailless sailplane.

TWITT, P.O. Box 20430, El Cajon, CA 92021.

Should you decide to model the SB-13, we have plans which are a bit more detailed than those included here. Just be sure to let us know how you plan to solve the problem of constructing that beautiful curved wing using a styrofoam core!

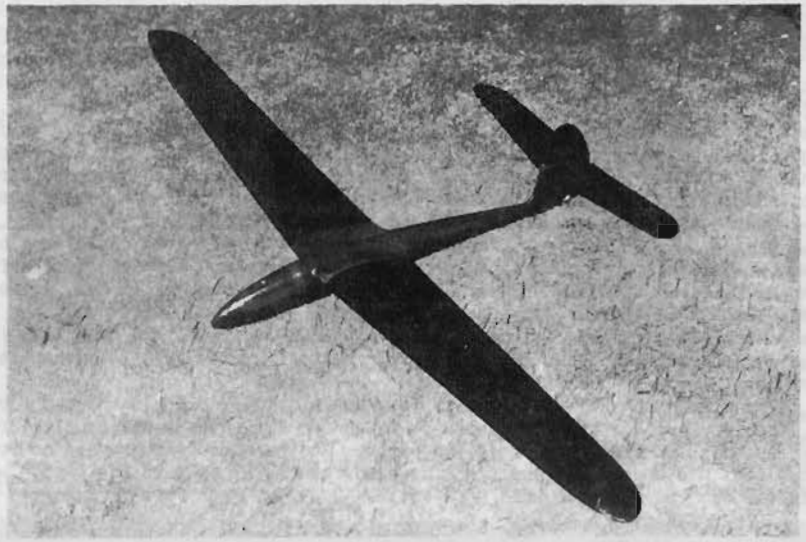


Experiments With EVANDER.....Martin Simons*

* 13 Loch Street, Stepney, South Australia 5069

"I have flown the little EVANDER a few times. It is surprisingly difficult to control. I enclose a picture (bright red on pale green lawn). The red colour will make it almost impossible for you to reproduce in RCSD, I know, but use it if you feel it worthwhile. The rudder, despite being very large, is not effective enough, and I attribute this to the model's having insufficient dihedral. Yet a free-flight design, as the model originally was, ought to have plenty. It isn't easy to alter now, as the wing roots are rigidly fixed. Anyway, and EVANDER with more dihedral wouldn't be an EVANDER! The gliding performance is good, but the trouble is that a gust can throw this small (60-inch span) very light model about quite badly, and there isn't enough rudder control to correct it quickly. It can be very embarrassing. The weight came out one ounce less than the original model, even with radio installed. I can only assume the original was built from ironwood."

As most of you know Martin Simons wrote Model Airplane Aerodynamics, a book that covers sailplane aerodynamics very thoroughly. He has made many visits to the US, and is a frequent correspondent. I was intrigued when he told me about EVANDER and his intent to turn it into an R/C soarer. The above letter tells us about that, but I'm sure Martin will solve the problem with control. (JHG).



EVANDER - a 60"-span Free-Flight model evolved into an R/C glider (Simons photo). Pretty little bird, too. Note stabilizer span/area! Fuselage is moulded fibreglass. Wings & tail conventional materials.

MORE ABOUT FLYING WINGS/TAILLESS AIRCRAFT.....Dieter Eberbach

No doubt a lot of folks will say: "Yes, I have one in a box somewhere." Well, this one is a bit different...it has winglets, and comes from MULTIPLEX in Germany. I have been waiting for over a year and a half for it to be released.

Now, flying wings are not something new, for as long ago as 1910 Professor Junkers made some designs; but, the turning point for the WING came from the Horten brothers in Germany. Their Horten III achieved a speed of over 400 km/h and a glide ratio of 24:1 which at the time was fantastic.

Finally, my WING arrived -- the first one in South Africa, I believe. The kit is very well made, and the building time of two weeks went quickly. My big problem was to keep the weight under control, as it weighs 3.3 kilograms, and I was careful! I covered the wing (huge area) in Solarfilm -- all R 30 worth! I used the strongest servos available: mini ball-bearing servos for elevator and ailerons--four in the wing-- and a heavy-duty servo for the airbrakes, as they need power to operate. The airbrakes are tricky to assemble, so I'd recommend reading the instructions first. CG and tow-hook positions are critical, and must be set up as per plans. The only real problem I had was getting a smooth finish on the body, as the paint I used produced a few runs.

The day arrived for the test flight, and my nerves were a bit rattled, as everyone had warned me about tip stall. Anyway, all was checked, and I was ready to launch...a hand launch at first. Our Eastern Thermal Busters field has long grass, and it is soft. Today, it was not mowed, so I took a long run for speed and with a great heave, off it went...but NOT well. The movement on all the controls was far too small. So, with greater movement put in, off we went again. This time it floated down the field at quite a pace -- all very nice -- and the airbrakes worked just fine. Next for the winch. I gave it a good pull before pulling up, and up it went like a rocket, F3B-style. It popped off, and at first I just flew in a straight line, but soon realized that the wing is FAST! The first turn showed that I needed more throw on the aileron. Once I had that dialed in, much better but still not enough! So I made a quick turn, lined up for the final and pulled the brake. Down she came - no vices - but with m y knees knocking a steady beat!

I then set up all surfaces for almost maximum throw (on the radio) and back to the winch. This time, I gave it a longer pull and got much higher. Once off the line, the Wing was in its element. It flies VERY fast but very well, too, and turns on a dime. Once in a thermal, it goes up chop-chop. The ground crew commented that it looks like a full-size hang glider. After a good 8-minute flight, the lift sort of died...and that was the last flight for several weeks, as the weather hasn't been very good.

To conclude: the CORTINA wing is fast but stable, and it looks good for cross-country, much as Paul Beatty predicted. It is fun to fly, but is definitely for the experienced pilot and not for a so-so pilot. At the moment, there are now three in the country, and one on the shelf at the hobby store. I am sure the design will "take off" as soon as the good word gets out.

ELECTRONIC ALTIMETER.....Jim Gray

In the May 1988 issue of RCSD one of our readers requested information about an electronic altimeter. In response, I received a nice letter from Tom Kikuchi of CIRCUS HOBBIES in Las Vegas. Tom recommended that I get in touch with JOMAR PRODUCTS in Cincinnati, Ohio, and Mr. Joe Utasi of that company. I just finished talking with Mr. Utasi who told me that in a year of advertising his PEAK READING ALTIMETER, there were less than 15 persons interested in placing firm orders for this $135 unit. Mr. Utasi told me that he had to have a minimum of 100 FIRM orders before he would undertake manufacture of the electronic altimeter.

However, he mentioned that a company called CONCORD or CONCORDE displayed a unit at Toledo in April. This company had a booth next to -- or part of -- the Joe Bridi display booth. Apparently, CONCORDE produces a real-time sensing and transmitting unit called TELEMAX which transmits information to a ground-based operator (the pilot of an R/C aircraft). Information is said to be airspeed, RPM, altitude, and one other parameter. There is supposed to be a 4-way switch on the unit which allows the pilot to select which parameter he wants to display.

I hope someone who reads RCSD and who may have been at Toledo will furnish complete details for our readers. RCSD would like to publish the information about CONCORDE and its product.

Incidentally, if you would like to talk to Mr. Utasi about the line of JOMAR products, which include such things as electronic "goodies" like speed controllers, connectors, MOSFETS, battery backers, glitch busters, control cable and rigging wire, heavy-duty servo wire, aileron-rudder couplers, etc., write to JOMAR at 2028 Knightsbridge Drive, Cincinnati, Ohio 45244; or call Joe Utasi at (513) 474-0985.

RCSD wishes to thank Tom Kikuchi at CIRCUS HOBBIES, 3132 South Highland Drive, Las Vegas, Nevada 89109 for his courtesy and for providing the above info.

xoxoxoxox

PERCENTAGE SLOT CONTESTS - AN ENGLISH WAY TO FLY.....Tony Beckett*

* The Poplars, Harringworth Road, Seaton, Oakham, Rutland, LE15 9HZ England

Tony Beckett has appeared in our pages before, and has provided news and interesting ideas for our pleasure and interest. He also sends copies of items from VERBALS and other newsletters from time to time. This month, after a bit of arm-twisting, I managed to obtain an explanation of the "percentage slot" contest from Tony. It may have some application here in the U.S., too. Incidentally, Tony mentions that VERBALS is the newsletter of the Soar Valley Soarers -- and why not? The SOAR riiver runs through the valley! It's in Leicestershire, in case you're interested.

U.K. Percentage Slot Contests.

Was it the variable British weather that caused our method of flat field scoring to evolve differently from that in the U.S.? I don't know, but it seems worth describing the % slot scheme for those of you who haven't come across it before.

At an open meeting we will normally fly three rounds. Each round divided into an equal number of "slots". Ideally there should be six or more in each slot. A pilot will stay on the same frequency for all of his three flights and not fly against anyone else more than once.

The actual slot is ten minutes long. The object being to stay up longer than anyone else flying during that 10 minute period. Individual timing is started when the model leaves the tow line and finishes on initial contact of the model with the ground - or at the slot end, which ever is first.

The scoring adds a landing bonus or subtracts an overflight penalty from the time flown. The person with the highest aggregate receives 1000 points and the rest a percentage of this amount. Consiquently each slot is a minature contest on its own, with any of the participants standing a chance of scoring 1000 in that slot. The scoring method takes care of conditions where things are so bad that the slot could be won with a flight time of less than 2 minutes. (This does happen in extremely windy weather). It will also accomodate the occasional brick lifting day when people launch at the start of the slot and will release from the tow early in order to get more flying time within the 10 minute slot. Between these two extremes is the usual U.K. flying weather that will give a mixture of conditions where there will be flying for the whole of the ten minutes as well as slots where the air consists of big holes giving flight times of less than 5 minutes.

No matter the conditions % scoring evens things up by giving the winner in each of the 10 minute slots 1000 and the rest of the flyers a score that is a % of the winners.

Slot scoring of this sort brings in the added element of a tactical decision as to when to launch. Do you go straight away and risk not getting enough lift to fly out the slot, or do you wait until someone else launches and race him up the line, or let him mark the lift and then join him?

The scores after three rounds are added and the nine flyers with the highest scores then fly another two slots to decide the top nine placings. Everyone elses position is given from their three round scores.

An extra advantage of having a standard 3000 point format is that these scores can be used in our national league contest. Every member of BARCS (British Association of Radio Control Soarers) has six league cards that can be used at any Open contest in the country. The best four of these scores is then added to produce a result for the League Championship in one of five areas. This championship is hotly contested and a high position in the league is an excellent measure of a pilots ability to fly models from a flat field.

With six or more in a slot it wouldn't be possible to operate unless the models were hand towed. Any mechanical method of launching would be too time consuming to set up and provide too many opportunities for foul ups. So we all tow each others models. Hard work on the windless, hot days but there are not many of those. The other pilots also operate as timekeepers and talkers when they are not flying. Although you might only get three flights for your day out there is no time to get bored as someone else will always be needing a back up team.

The % slot format has remained popular in the U.K. for over ten years now and it doesn't look as if there will be any radical changes in the near future. If anyone is interested enough to want a formal set of rules for this style of competition I would be pleased to pass on a copy of those used by BARCS.

HELPFUL HINTS.....Bob Champine*

* 205 Tipton Road, Newport News, Virginia 23606

" I'm going to produce some more fiberglass fuselages. In fact, I started last night, but - this morning, after a cool evening - the glass was slow to harden. Then I got a really bright idea for you to pass on to RCSD readers. When I layed up the fiberglass it needed an oven (high temperature) so I just put the molded parts in my car, closed all the windows and parked it in the direct sunlight. You'd be surprised how quick it cured in the hot car! That's what I did today for about 8 hours, and the glass cured nice and hard."

Ed's note: Okay, Bob, neat idea -- but what did the car smell like afterwards? I hope nothing dripped on the upholstery, either! Some time ago I got some epoxy on my shirt and trousers. In fact, several times on different occasions. It never came out, and I had to relegate those articles to the "shop only" category. It goes without saying that Bob is a very, very careful workman, so these problems probably never happen with him! (JHG).

" I've been using my Radio Shack digital multimeter to measure receiver and servo idling currents, running currents, etc. This is an excellent way to find jittering servos and the cost in battery drain. The whole setup is easy to do, and is very revealing. My newest 1991 receiver draws only 8.5 mA, while my ACE 1991 receiver draws 22 mA. These are small numbers, but they all add up -- like for my long flights and the 8-hour LSF duration task."

Ed's note: How about sharing the setup you used to make these measurements, Bob? I'm sure a lot of RCSD'ers would like to see how you did it. By the way, some time ago back in the old HHL/D days on Harris Hill, Graham Mosely -- one of the HHL/D members -- made some measurements of servo current draw in idling and operating conditions. The current did not drastically increase until the load on the servo was so great that the servo was close to stalling...and then it really soared! I guess the idea is to keep things from working too hard, using a big battery with lots of A/H capacity, and choosing the right servo for the job. Thanks for sharing, Bob. (JHG).

Things of Interest To Glider Guiders.....Bob Champine *

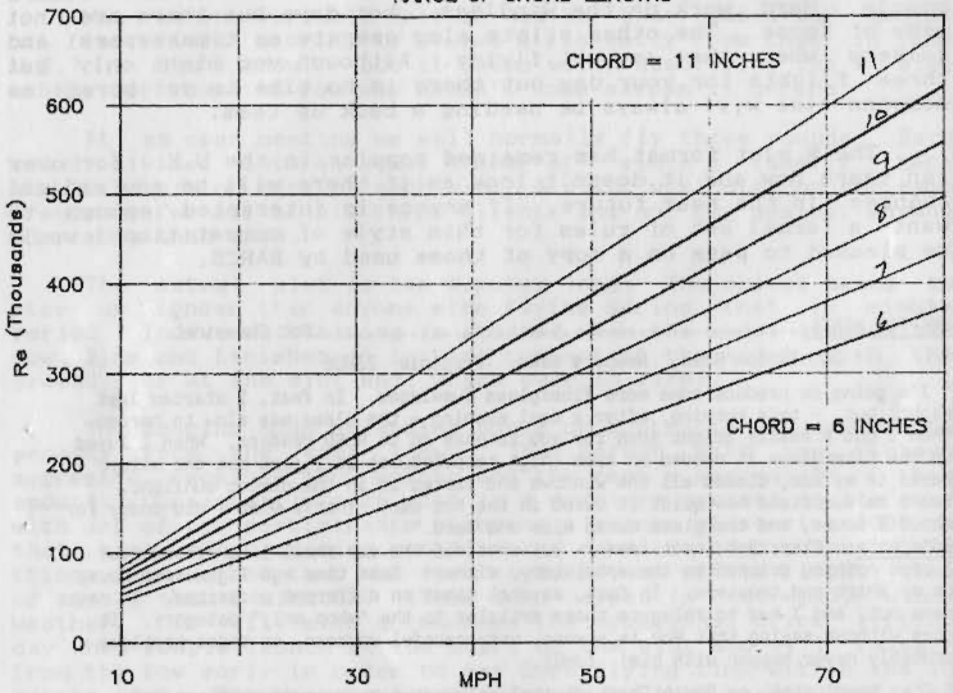
* 205 Tipton Road, Newport News, VA 23606

Bob has been sending information to RCSDS for a good many years now, and we've all enjoyed seeing what that brain has had to offer in the past. Once again, he sends in a letter that's food for thought as well as contining some valuable and helpful information on Reynolds Number, speed and chord length. Here's Bob:

These graphs are of interest in a discussion of wing chord size and wing loading. Look 'em over and see what you think.

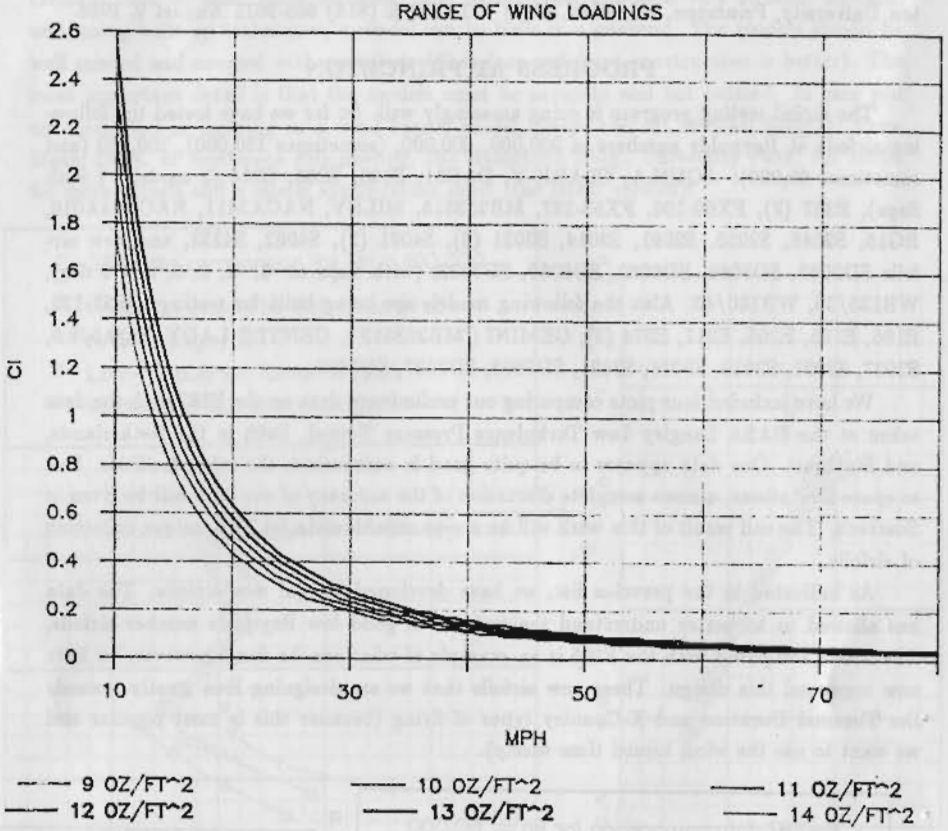
REYNOLDS NUM. .VS. VELOCITY

RANGE OF CHORD LENGTHS



CI .VS. VELOCITY

RANGE OF WING LOADINGS



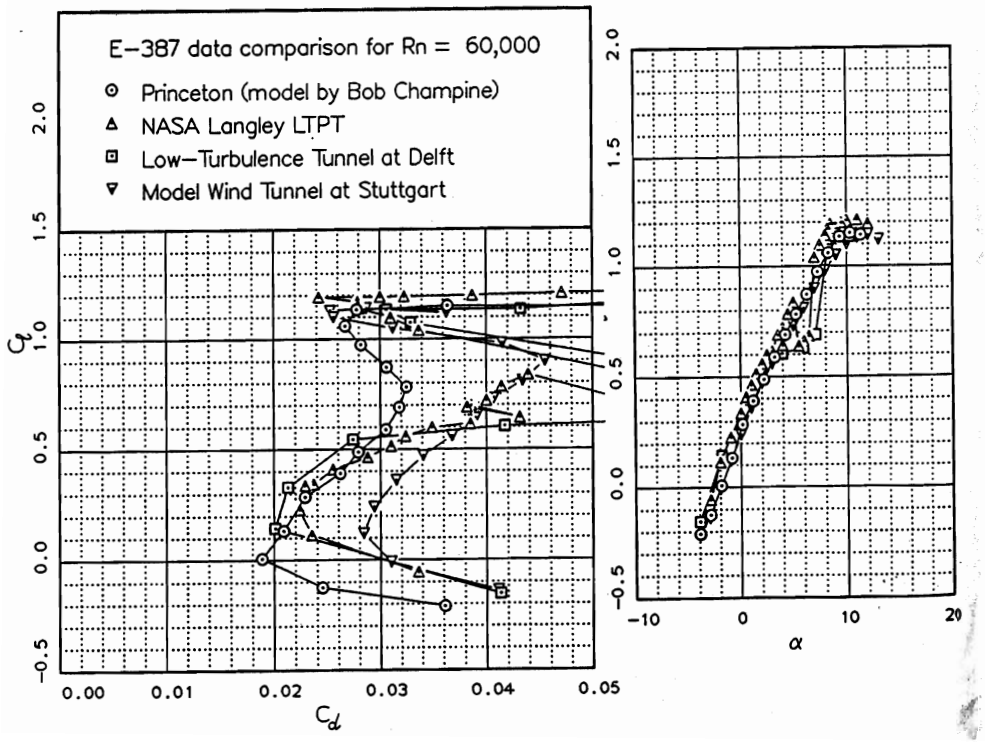
John Donovan & Michael Selig, Gas Dynamics Lab, James Forrestal Campus, Princeton University, Princeton, NJ 08544, (609) 452-5379 & (814) 865-9611 August 9, 1988.

PROGRESS AT PRINCETON

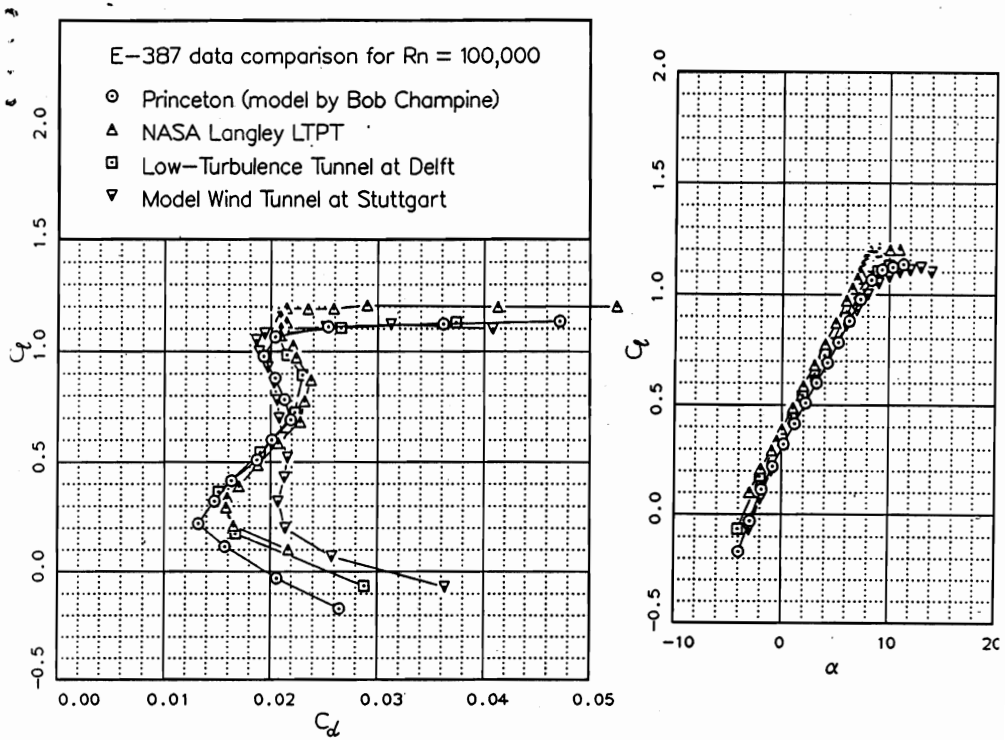
The airfoil testing program is going amazingly well. So far we have tested the following airfoils at Reynolds numbers of 300,000, 200,000, (sometimes 150,000), 100,000 (and sometimes 60,000): AQUILA, CLARK-Y, DAE51, E193, E205, E214 (2 models; 1 with flaps), E387 (2), FX60-100, FX63-137, MB253515, MILEY, NACA2411, NACA64A010, RG15, S2048, S2055, S2091, S3014, S3021 (2), S4061 (2), S4062, S4233, and new airfoils SD2083, SD5060, SD6060, SD6080, SD7032, (with flaps at -6, -3, 0, 3, and 6 deg), WB135/35, WB140/40. Also the following models are being built for testing: DS37-122, E186, E195, E205, E211, E374 (3), GEMINI ('MB253515'), GENTLE LADY, HQ2.5/9.0, S2027, S2091, S3010, S3016, S3021, SD7003, SD7037, SD7090.

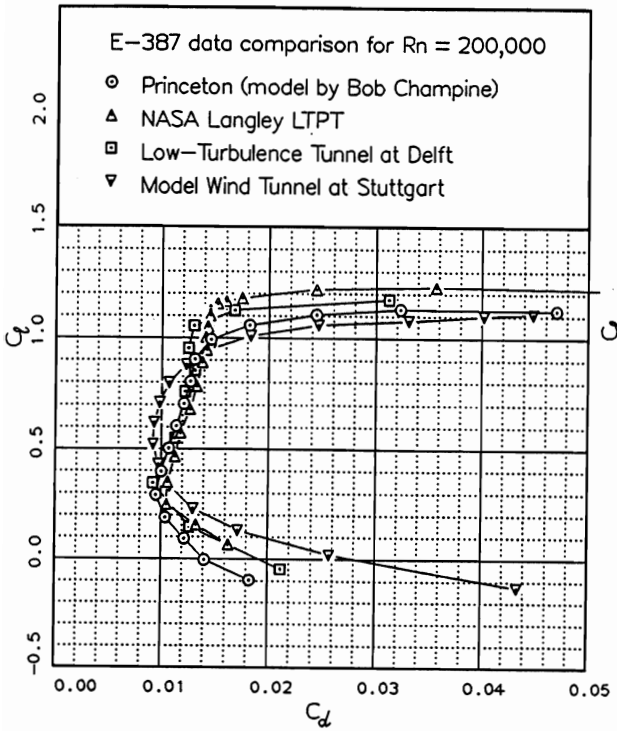
We have included four plots comparing our preliminary data on the E387 with the data taken at the NASA Langley Low Turbulence Pressure Tunnel, Delft in the Netherlands, and Stuttgart. Our data appears to be quite good in comparison the other facilities. Due to space limitations, a more complete discussion of the accuracy of our data will be given in Soartech. The end result of this work will be a very reliable data set on a unique collection of airfoils.

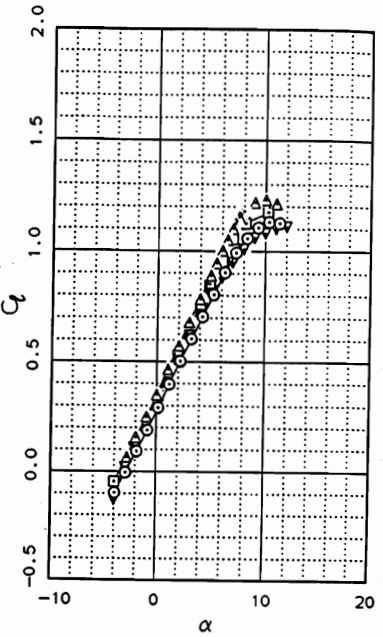
As indicated in the prevoius list, we have developed several new airfoils. The data has allowed us to better understand the features of good low Reynolds number airfoils. The S3021 compared with the E205 is an example of what can be done; however, we have now improved this design. These new airfoils that we are designing lean mostly towards the Thermal Duration and X-Country types of flying (because this is most popular and we want to use the wind tunnel time wisely).

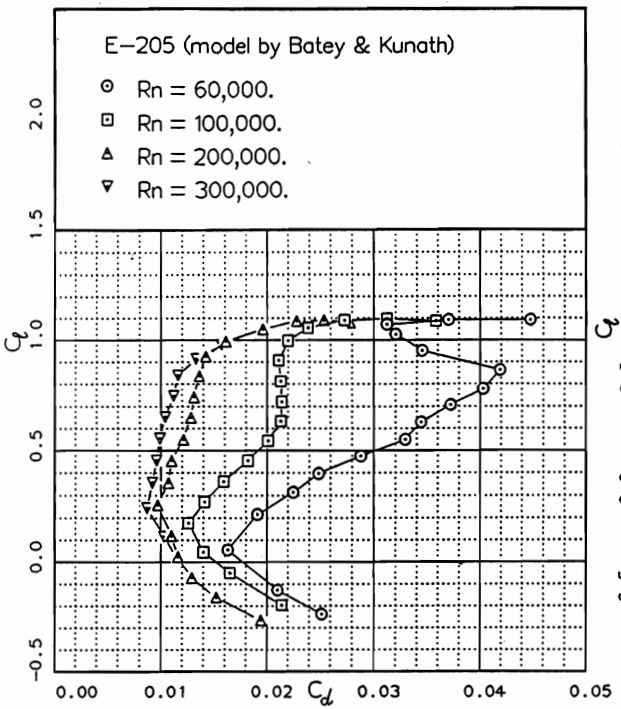


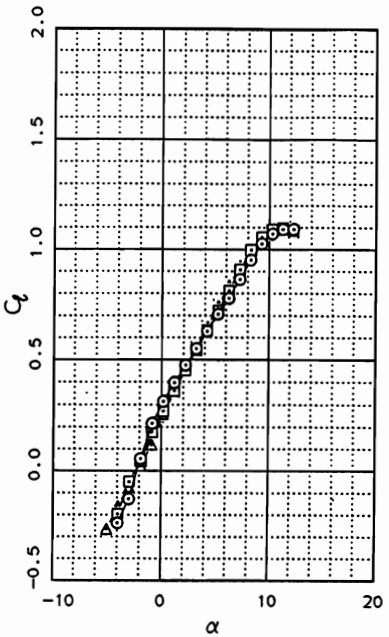
We want to design and test more new airfoils before the system is disassembled in October, but we need more builders. The model construction is very straight forward, and, using built-up techniques, a model can be built in a weekend. The models should be well sanded and covered with monokote (fiberglass and foam construction is better). The most important detail is that the models must be accurate and not twisted. In case you are interested in building us a wind tunnel model, please contact Michael Selig at: Penn State, Dept. of Aerospace Engineering, 233 Hammond Bldg., University Park, PA 16802 for more details and a model specification sheet (the latest version).



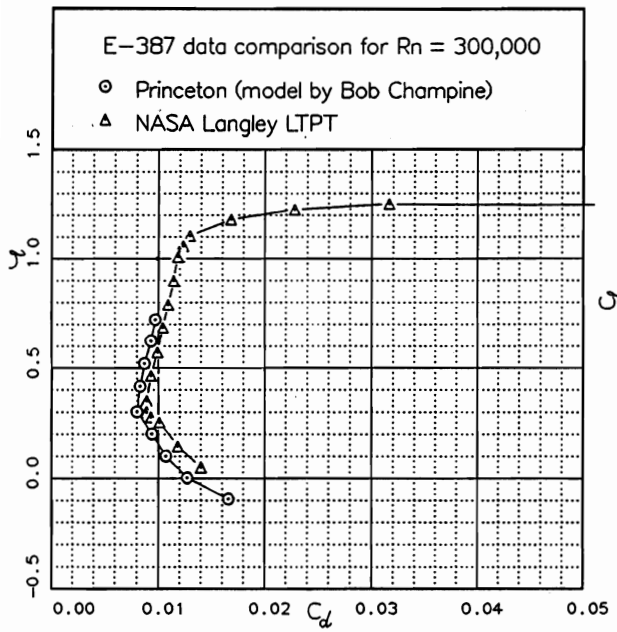


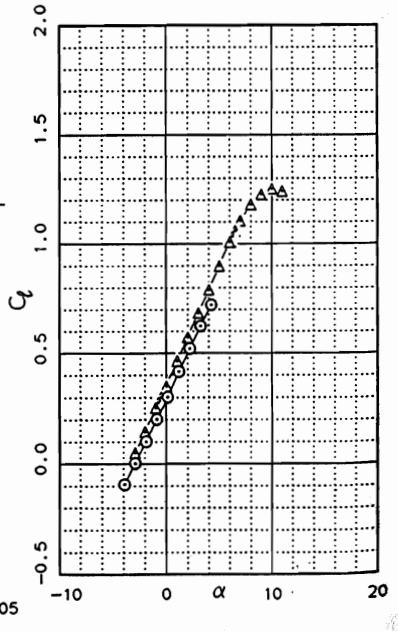


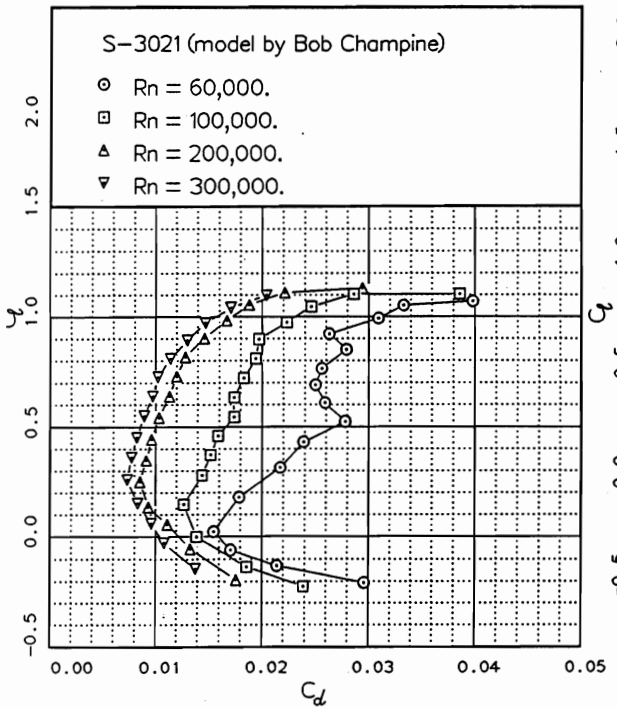


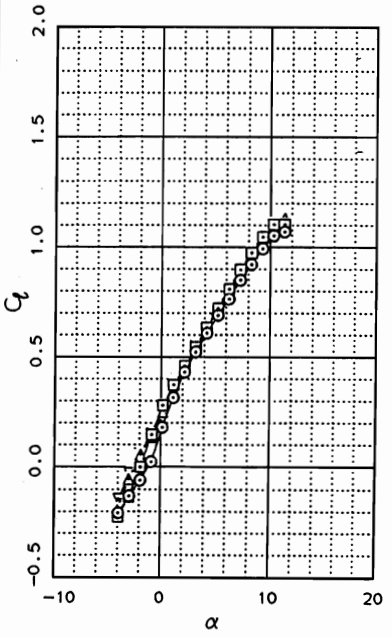


On a different note, everyone will be able to get copies of the data. The earliest data release will be the Soartech publication and will include data on several popular airfoils. This may be out in 2 months (probably more). Our method behind the design of low Reynolds number airfoils is still in the preliminary stages, and thus the data on the new airfoils will not be released until we can refine our ideas and submit this work to a refereed









journal. However, at that time, we plan to put together all of the data from this work in a book which will be easily available. If you have any ideas about how this can be done, please contact us. Finally we want to again thank all of the people who are contributing to the project. Stay tuned.

The 1988 AMA Reno Convention and Fun Fly or "Are we having (a) Fun (fly) yet ?

The following was taken from the Modesto R/C Club newsletter "Thermal Topics" and although not specifically stated We assume that it comes from the pen of Dave Darling, Editor, 2705 Harvest Road, Modesto, CA 95355-3430 USA.The views expressed herein are not necessarily those of RCSD or the publisher. They are however, worthy of publication and consideration by soaring pilots everywhere.

On June 23, I traveled to Reno, Nevada for what promised to be AMA's first attempt for a convention and fun-fly separate from the Nats. I am sorry to report that it turned out to be as big a disaster as I expected. First, let's go over what was right about it. That won't take long. Well, the facilities were great! The Reno Convention Center has lots of room, and indoor rubber and electric power was outstanding, if a little short of participants. Booths occupied by real, live, people were limited to a few hardy vendors hawking their wares, plus the usual AMA bunch peddling certificates of participation and pins and patches. The AMA staff does seem very good at this sort of thing, and the women there worked tirelessly, both at the Center and at the flying field. Ah, the flying field. It was located about ten miles north of Reno on a combination of state and local roads, plus about two or three miles of corrugated dirt roadway. At the R/C site, ALL forms of flying were carried out: every form of power, including helicopters, plus sailplanes. The weather was not great, but AMA wasn't responsible for that. However, an earlier promised separate soaring site was turned down at the last minute, so we all flew together. I might add that one mile across the sagebrush from the AMA flying site was the free flight site, and a mile further from that was the Society of Antique Modelers (SAM) contest, complete with R/C fliers. I was not aware of any frequency conflicts from that situation, but I wasn't there all day, either. Fortunately, or unfortunately, depending on how you look at it, there weren't many glider fliers in attendance, which supports AMA's view that we are a small and unimportant facet of aeromodeling.

Before I left home, I received a petition signed by some forty members of the Thousand Oaks Soaring Society from Myles Moran, their President. I had intended to present it to the big AMA honchos at the Convention, but apparently they all split to have fun after the Executive Council meeting held on Friday evening. I never saw our President, or more importantly, Mr. John Worth to deliver the petition. However, Myles, I will collect a few more signatures and mail it to AMA headquarters.

I spent a lot of time with Steve Neitzke of the Sierra Silent Soarers, looking at flying sites and discussing the current state of affairs. Out at the alleged fun-fly, we met with a couple of AMA underlings to express our concerns for the soaring community. They don't see any problem. Even when I mentioned the fact that the AMA has lost their soaring site for the NAts this year did they think that there was a problem. When I mentioned the trumped-up excuse that AMA got for dumping the scheduled F3B World Championships next year, when all of the rest of the World Championships will be held in the United States, we were told, "Well, it doesn't matter, because there are only twenty or so F3B flyers in the United States". When I said that the development of sailplanes is directly related to the progress made in the design of F3B aircraft, I could see by the look in the AMA official's eyes that he had tuned me completely out. So be it.

Although I will continue to try to work for a major change in the attitude of the top AMA officials in Reston, I firmly believe that it is hopeless. The existing bureaucracy is essentially self-serving who believe that sailplaners (as well as other special interest groups) don't know what they are doing and don't know what they want. I believe that the only permanent solution to the situation is to rely on another source for organization and insurance. I believe that group to be the National Soaring Society. I feel very strongly that through the National Soaring Society, we can obtain insurance at a rate at least comparable to that of AMA. With insurance, sanctions become unnecessary. The next step is to have the National Soaring Society declared the sole liaison to international sailplaning through the National Aeronautic Association, and thus to the CIAM in Paris. Steps have already been taken in these directions, and not just my me. The harangue is all over, it's time for action! Over the next few months, I will keep you all informed of the progress made, but don't cancel your AMA membership just yet. Wait for the word, and when ten or twenty thousand of us pull out all at one time, they will realize that it is too late for their excuses, promises and inaction. In the mean time there are some things that each of you can do. Contact your friends in the insurance business for possible contracts for coverage. Talk to each other about the situation and, for God's sake, if you are not a member of the National Soaring Society, join today! And if you disageee with what I say, and think that I am doing a great disservice to the R/C soaring community, vote me out of office at the next election! Elect John Worth or one of his gang. Thank you for your patience with me on this issue.

NEAT THINGS TO KNOW ABOUT.....Jim Gray

RCSD Data Base : Contains references to articles from Vol.1 #1 (first issue) through Vol.5, #6 (June 88) listed by subject and by author. This is a comprehensive compendium of information and will save you a lot of time in research. Available from LJM Associates, 1300 Bay Ridge Road, Appleton, WI 54915 Tel.: (414) 731-4848 after 5 PM. Also available is a list of sources for materials and supplies that have appeared in RCSD. Data Base is on diskette.

Washington Scale Slope Fun Fly : Video Casette contains more than an hour of slope soaring footage featuring the wild and wonderful designs seen on Memorial Day Weekend at the Richland, Washington fun fly. Flying wings, fiberglass "orchids", Power Scale Soarers, and much, much m ore. Makes you want to be there next year. Write or call Mark Foster, 826 Oneonta Drive, So. Pasadena, CA 91030. Ask about prices for videos in Beta or VHS format. Tel.(213)257-4573.

RCSD Decals: If you would like to have a peel-and-stick decal of the RCSD logo in light blue and white, we have 'em at a discount. Decals contain two sizes of logo suitable for wing or for rudder and fuselage. Also contains labels for various functions and identification of parts, components, wires, etc. "On", "Off", "Experimental" "Ail", "RUD", etc. 75¢ each or 3 for $1.50. Add 25¢ for postage or send S.A.S.E. RC Soaring Digest, P.O. Box 1079, Payson, AZ 85547.

RCSD Back Issues: Send S.A.S.E. for list of back issues. We still have a few from 1984; many 1985; a lot of 1986; and all of 1987 and 1988. If you're a recent subscriber and haven't caught up with all the good things that have happened in past issues, now is your chance! Get 'em while they last. Buy individual copies or the entire set, if available. Many complete sets for '86 and '87 left. All of '88 to date also available. RC Soaring Digest, P.O. Box 1079, Payson, AZ 85547.

Northwest Soaring Society Tournament: September 17th & 18th. Hanford High School Field - Richland, Washington. Tom Culmsee, CD. 2304 Snohomish Avenue, Richland, WA 99352.

Capitol Area Soaring Association: Sixth Annual Soaring Meet. September 10th and 11th, at National Geographic Facility, Gaithersburg, MD. Kenneth Troxell, 12504 Circle Drive, Potomac, MD 20854.

Spoiler Cable, Rudder Cable, etc.: "Sevenstrand" is the trademark of a company that produces nylon-covered stainless steel fishing leaders available in 20 to 50 pound strengths. Crimp-on ferrules are available, or use 1/16" o.d. brass tubing in short lengths. Can be glued with CA, cuts easily with side cutters; a little harder with

Windsongs, Lovesongs and Design Integrity ..... Bob Dodgson*

Bob takes us to task for confusing his new Lovesong design with the beefed-up Windsongs we've been seeing around lately, go Bob !

Thank you for the kind words in July 1988 *R/C Soaring Digest.* I do want to point out, however, that the Lovesong embodies my continuing design philosophy of approaching the structural design as a whole, carefully balancing the entire system. The Lovesong does not "incorporate some of the very innovations that he has discouraged when building Windsongs..." as you stated. With all of my kits, I discourage piecemeal structural changes and the inappropriate use of carbon fiber etc. which in many cases can cause premature structural failure. I also discourage the use of separate servos for flaps, rather than using our flap linkage etc. The push-pull from a servo arm is not compatible with the laced hinge system that works so well on the flaps. The up and down action of the flap arm is compatible.

I am the one that people call when their Windsong etc. does not perform properly and so I have to trouble shoot the cause. Nearly always the problem was caused by some seemingly "innocent change" that had unforeseen consequences down the line. When truly "innovative" or worthwhile ideas come to light, we incorporate them into our kits. We are not "resistant" to innovation but we are responsible to incorporate only those that will improve the kit, not degrade it. Some people, for instance, even think they are innovating by putting an aerodynamically draggy rudder horn outside the fuselage on the Windsong! Most modifications are not innovations.

The Lovesong has flying surfaces that are about 40 percent stronger than those on the Windsong. These surfaces are also designed to be immune to high-speed flutter. These changes push the performance envelope of the Lovesong beyond that of the Windsong in the high-speed end and in maximum tow altitude. To achieve these ends, the total structure of the wings (including the rod size) and stab was redesigned along with the linkage system to the flaps. The flaps were themselves turned into torque tubes by covering them with fiberglass on all three sides. The structure was designed as a "total system" as was the Windsong structure.

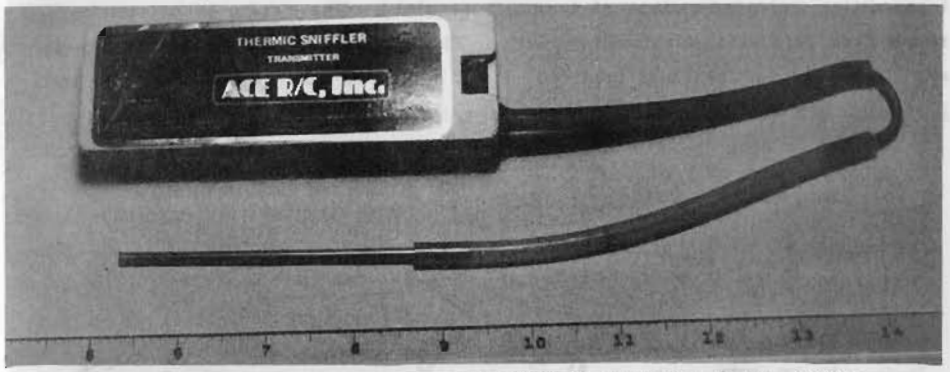
Most people who have tried to "modify" or "beef-up" the Windsong have been obsessed with one or two aspects and have gone berserk on these, ignoring the rest of the chain and thus they have gained nothing in actual strength. In many cases they put their hopes in carbon fiber but they did not use enough of it to carry the entire structure. Since carbon fiber has a modulus of elasticity that is incompatible with that of the spruce spar system, it initially picks up the entire load and carries it, giving the illusion of a stiffer and thus stronger wing. When the carbon fiber cannot carry the entire load by itself, it fails suddenly, throwing an instantaneous shock wave into the conventional structural system, causing it to fail. Without the shock caused by the carbon fiber, the conventional system could have carried the same load with no problem. Nearly all of the Windsong wing failures that I have heard of, and they are very few, have occurred in wings where the builder tried to "beef them up" with carbon fiber.

I acknowledge that most glider flyers are tinkerers by nature and that few kits are ever built completely stock. Still, the kit manufacturer has the responsibility to design it right for those who are really serious about building a top performing plane. Hopefully the design can withstand minor changes and still perform as expected.

*Dodgson Designs, 21230 Damson Road, Bothell, WA 98021 USA

A TOTAL ENERGY PROBE.....Ben Trapnell

Joe Wurts reputation in cross-country soaring is legendary and justified. Ben Trapnell is a frequent contributor to RCSD (Big Wing review, August 1988) and a friend of Joe Wurts. Ben is also an accomplished soaring pilot and enjoys testing new ides and equipment. In this article, Ben describes a new (to R/C soaring) device adapted by Joe Wurts from full-scale soaring. It has already proved to be an effective and outstanding addition to the R/C soaring pilot's "kit". Using Ben's instructions you can build one yourself. This is believed to be an RCSD "first" scoop.

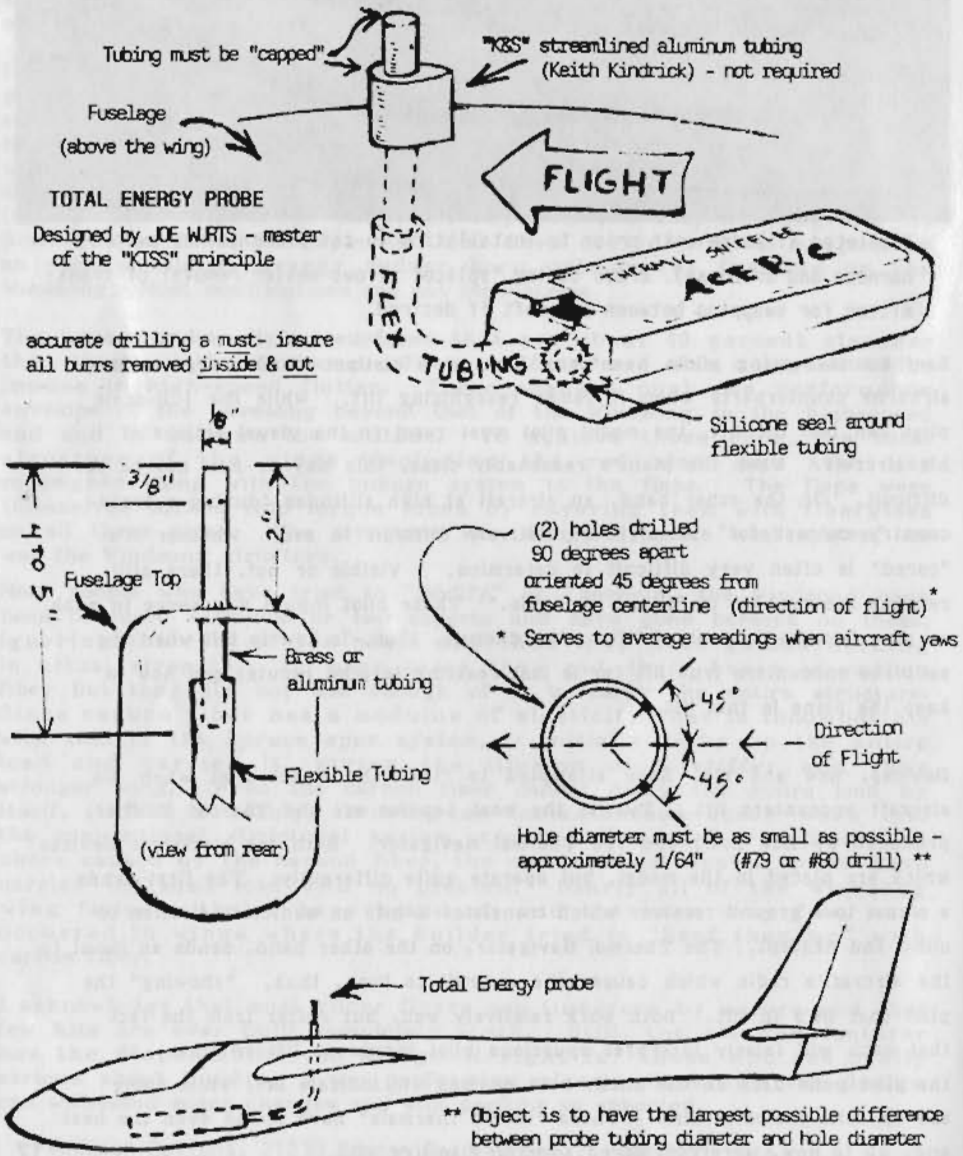


Completed airborne unit prior to installation in sailplane (minus switch harness and antennae). Brass tubing "splice" allows easier removal of transmitter for swapping between aircraft if desired.

Earthbound soaring pilots have long been at a distinct disadvantage to their airborne counterparts when it comes recognizing lift. While the full-scale pilot can feel the lift, the model pilot must react to the visual actions of his aircraft. When the plane's reasonably close, this may or may not be too difficult. On the other hand, an aircraft at high altitudes (during a cross-country contest for example) is relatively difficult to see. Whether it's "cored" is often very difficult to determine. Visible or not, there still remains the problem of "thumb thermals." These pilot inputs may serve to mask or give false indications of lift. The dilemma, then, is how to tell when the sailplane encounters true lift (or is just reacting to pilot inputs) and how to keep the plane in that lift.

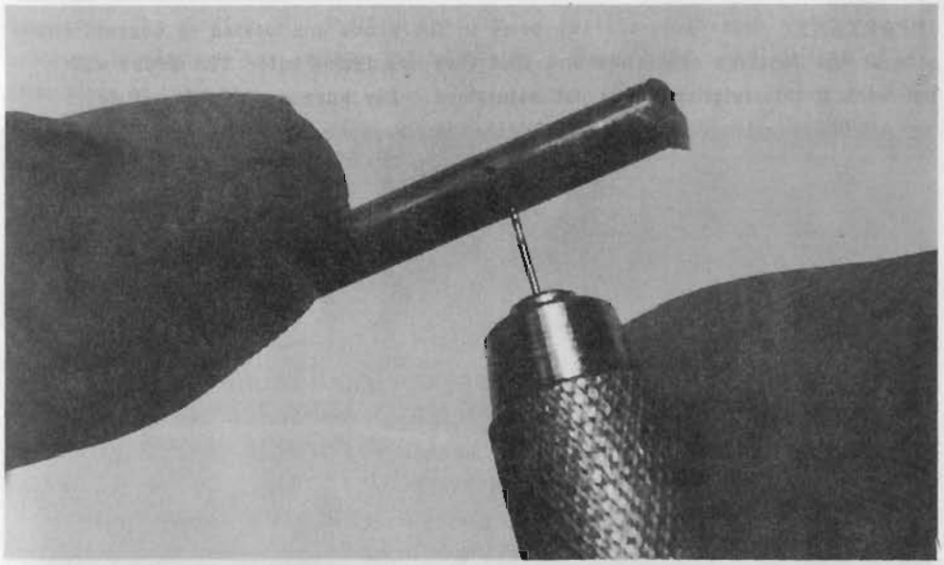
Devices, new and old, have attempted to "tell" the model pilot when his aircraft encounters lift. Two of the most popular are the Thermic Sniffler, produced by Ace R/C, and the Thermal Navigator. Both are electronic devices which are placed in the model, but operate quite differently. The first sends a signal to a ground receiver which translates it into an audible indication of climb and descent. The Thermal Navigator, on the other hand, sends an input to the aircraft's radio which causes the aircraft to turn, thus, "showing" the pilot that he's in lift. Both work relatively well, but suffer from the fact that each will falsely interpret spurrious pilot inputs as lift or sink. If the pilot pulls back on the stick, both devices will indicate lift, while doing the opposite indicates sink. These "thumb thermals" have fooled even the best and, up to now, were considered something to live with.

Enter "The Boss." Famous for his cross-country exploits and fiberglass construction techniques, Joe Wurts, has been winning nearly everything in sight with his transmitter in one hand and Thermal Sniffler in the other. Realizing the limitation of his Sniffler, he knew there had to be a "better mouse trap." Borrowing from full-scale soaring's total energy probes and using his own aeronautical engineering talents, Joe proceeded to modify the Thermic Sniffler allowing it to, in effect, disregard any of the pilot inputs, thereby transmitting only indications of true lift or sink! The device is extremely simple yet functions surprisingly well. Though not enough of an expert to explain all the aerodynamics involved, I will show you how I made my probe and, basically, how it functions.



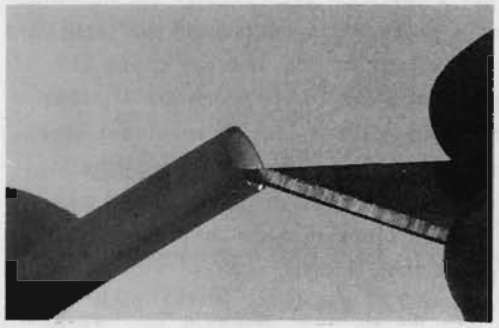
The heart of the system is the standard Thermal Sniffler. If you're not familiar with it, the device is a transmitter with a small orifice at one end which allows air to enter or exit a plennum chamber with changes in atmospheric pressure (translate: climbs or descents). The rate at which the air enters or exits is "measured" and transmitted back to the pilot as an audible signal. The higher the pitch of this signal, the faster the air is leaving the cavity, hence, the faster the aircraft is rising. Just the opposite occurs when the aircraft is descending.

Joe's modification starts with fabricating a probe which "measures" the total energy of the system and cancells out the effects of pilot-induced climbs and descents. The probe is a piece of 1/8th tubing cut to approximately 4 inches in length. One end is then plugged. I used hot-melt glue on mine, but epoxy might work, or solder if the probe is made of brass. Approximately 3/8ths in. from the plugged end, two tiny holes are drilled 90 degrees apart. These holes must be as small as possible in order for the probe to function properly. (I used #80 bits on mine) The open end of the tube is then "stuffed" with a small amount of foam. This prevents any turbulence generated in the holes from reaching the Sniffler's orifice. Just how much foam needed is mostly a product of experimentation. Joe recommends enough to provide a time constant of 1 (meaning: if you were to draw a vacuum, it would take 1 second for the vacuum to decrease by half)

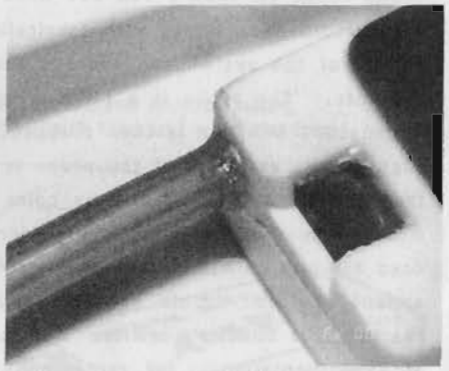


#79 Drill bit in pin-vise used to drill 1/8 th inch K&s alluminum tubing. Holes 90° apart, 3/8 th inch from top end. Note tubing is "capped" with hot-melt glue.

The second part of construction is getting the Thermic Sniffler ready for the probe. A piece of large fuel tubing (what is that?) is chamfered at one end so it can more easily be fit over the orifice of the Thermic Sniffler (A sharp #11 blade works well). I used a little bit of gap-filling CyA to hold this tubing in place, then applied a bead of silicone adhesive around the tubing. Be very careful in these operations that you don't plug up the tiny hole in the Sniffler. As the final device may be required for more than one airplane, I use a relatively small length of tubing for this and splice a longer piece in later.

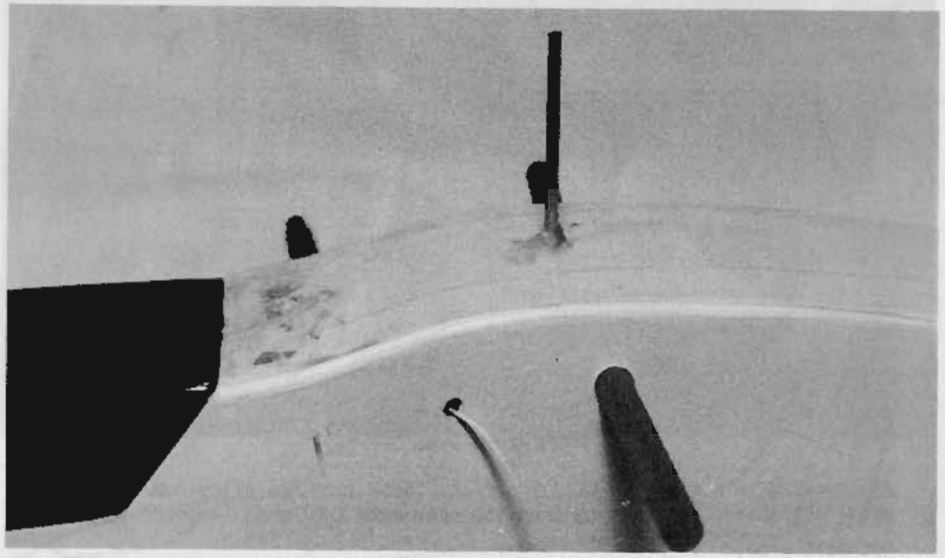


Close-up of chamfered end cutting process.



Tubing tack-glued with gap-filling CyA then caulked with silicone adhesive.

Mount the probe on/in the fuselage with approximately 2 inches protruding from the top. This is to keep the small holes away from the boundary layer. VERY IMPORTANT: Make sure the two holes in the probe are located 45 degrees either side of the fuselage centerline and that they are facing aft! The probe will not work if this relationship is not maintained. For purposes of this article,



Completed unit installed in aircraft. Drag of 2" probe "negligible". (∠ 2% max. for planes of approx. 1000 sq. inches.)

(I was in a hurry) I mounted mine with hot-melt glue, but any adhesive should work. If you're wondering about the drag of such an arrangement, don't! Joe's calculations indicate that, on a ship of approximately 1000 squares, the drag created is less than 2% of total at high airspeeds. At max L/D, the drag is less than 1%! The potential gain by being able to remain in the lift far outweighs the drag produced. The probe is now spliced to the "modified" sniffler and the unit is mounted as usual in your aircraft. That's all there is to it!

Operation is simple. Turn the system on, launch the plane, then listen for any change in the neutral tone once established in a glide. A change in pitch indicates a change in rate of descent due to the air mass the plane is "floating in." Theoretically, when moving through the air, the pressure behind a cylindrical body is less than that in front. As the velocity increases, the negative value rises. In our sailplane, one reason for an increase in velocity is due to pushing the stick forward, causing a descent. The normal sniffler, sensing the increase in static pressure would indicate sink The design of the probe overcomes this because , as the static pressure is increasing due to a loss in altitude, the dynamic pressure (negative value) is increasing due to the resultant increase in velocity. Amazingly, this happens simultaneously, cancelling out any change in "total energy." The exact opposite occurs in a climb.

If true lift is encountered, the aircraft's velocity shouldn't change appreciably. Dynamic pressure remains the same while static pressure decreases, the Sniffler will indicate that lift. In sink, with only static pressure increasing, the sniffler indicates sink. Neat, huh? And all from a little piece of tubing!

Well, not an engineering treatise by any standards, it should get the point across. If you're like me, the advantages of this type of system are incredibly obvious. If not, check with your competition! Very few things these days are revolutionary. This is certainly one of them. Thanks again to Joe for "having no secrets."

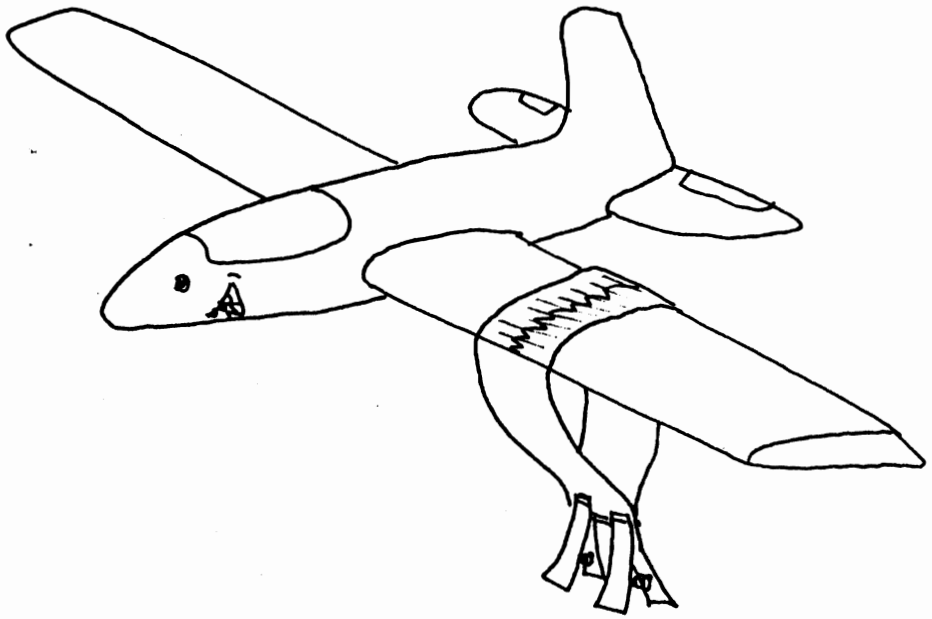
BUILDING TIP-

IN MAY OF 1987 WHILE SLOPE SOARING WITH MY GOOD FRIEND KEITH SMITH MY SCRATCH BUILT SLOPE GLIDER "B25" GOT BROKEN INTO FOUR LARGE SECTIONS. NO, I DIDN'T CRASH THOUGH THAT WOULD BE YOUR OBVIOUS GUESS IF YOU'D EVER FLOWN WITH ME. THE FACT IS THAT KEITH DID VICIOUSLY AND WITHOUT PROVOCATION TURN HIS "HABU" 2-METER PLANE AGAINST ME AND WILLFULLY SMITE MY GLIDER FROM THE AIR. BE THAT AS IT MAY I HEREBY PUBLICLY FORGIVE HIM, HOLD NO MALICE, AND CERTAINLY WILL NOT SEEK REVENGE...(TRUST ME).

WHEN I FINALLY GOT AROUND TO DOING THE REPAIR JOB IT REALLY WASN'T THAT TOUGH. THE PIECES WERE LARGE AND FIT BACK TOGETHER FAIRLY WELL. THE FOAM CORE/BALSA SHEETED WING WAS BUTTGLUED BACK TOGETHER WITH SOME 10 MINUTE EPOXY AND THEN A SMALL SUB-SPAR ADDED. IT'S A GOOD IDEA TO PUT A FIBREGLAS "BAND-AID" AROUND THE

REPAIRED AREA BUT I DIDN'T FEEL LIKE DOING A LOT OF FILLING AND SANDING AS YOU NORMALLY WOULD WHEN YOU'RE 'GLASING A CENTER SECTION AND TRYING TO DO A NICE JOB OF IT. I ALSO DIDN'T WANT RESIN LUMPS UNDER THE MONOKOTE SO THE SOLUTION TO GETTING A REASONABLE FINISH WITH MINIMAL WORK (IT'S AN OLD GLIDER SO LET'S NOT GET CARRIED AWAY, RIGHT?) TURNED OUT TO BE REALLY SIMPLE AND SORT OF A VARIATION ON THE VACUUM BAGGING METHOD OF FINISHING WINGS.

FIRST I CUT OFF A 24" PIECE OF WAXED PAPER AND SET IT ASIDE. YOU DON'T REALLY HAVE TO DO THAT RIGHT NOW BUT EVERY AIRPLANE I EVER BUILT HAD INSTRUCTIONS THAT HAVE YOU DO SOMETHING AND THEN SET IT ASIDE SO I FIGURE IT'S SOME SORT OF REQUIREMENT. NEXT, THE REPAIR POINT ON THE BOTTOM OF THE WING WAS COATED WITH RESIN AND ONE LAYER OF 2 OZ. CLOTH IN THE USUAL FASHION. WHILE THE RESIN IS STILL WET DRAPE THE WAXED PAPER OVER THE REPAIR POINT AND SLIDE THE WING OUT OVER THE EDGE OF YOUR BUILDING TABLE SO THAT THE ENDS OF THE WAXED PAPER CAN HANG DOWN. PUT A WEIGHT OF SOME SORT ON THE OTHER END OF THE WING SO THE WHOLE MESS DOES'T FALL ON THE FLOOR. BRING THE TWO ENDS OF THE WAXED PAPER TOGETHER AND TAPE THEM TO EACH OTHER. ADD SOME SORT OF WEIGHT TO THE TAPED ENDS OF THE WAXED PAPER. IT DOESN'T HAVE TO BE VERY HEAVY, I USED A COUPLE OF 4" SPRING CLAMPS. THE WAXED PAPER OVER THE REPAIR POINT WILL CAUSE THE RESIN TO FLOW OUT SMOOTHLY AND TO A DECENT FINISH.



LEAVE THE WAXED PAPER IN PLACE UNTILL THE RESIN CURES. AFTER THE CURING IS COMPLETE PULL THE PAPER UP, FLIP THE WING OVER, AND REPEAT THE PROCESS ON THE TOP OF THE WING. AFTER BOTH SIDES ARE FINISHED A LITTLE CAREFUL SANDING ALONG THE EDGES OF THE RESIN WILL FINISH THE JOB. ON MY B25 THE REPAIR WORK IS BARELY NOTICABLE UNDER THE MONOKOTE.

GOOD LUCK WITH YOUR REPAIR WORK AND REMEMBER: NEVER LET 'EM GET ALTITUDE ON YOU; EVEN IF IT'S YOUR BEST FRIEND.

DOUG KLASSEN

WING TIP EXPERIMENTS

GERALD REED TAYLOR, III*

* 1110 South Dogwood Drive, Harrisonburg, Virginia 22801

I would like to report the results of some wing tip experiments I carried out over the past year.

1) The simplest experiment was the addition of a NASA leading edge droop to my Prodigy. The addition was constructed of a bottom piece of 1/64" plywood with a balsa leading edge. This was shaped to form the NASA LE, and then attached with double sided tape to the covered wing. The LE was then covered over, resulting in a clean airfoil without having to make any structural modifications.

Results The launch was slightly steeper, with less rudder input required to maintain a straight climb. The spot landings were also easier. Unfortunately, the glide ratio was destroyed. The sinking rate was increased nearly 50%. Also, the top end of the speed range was lost. I am curious if anyone else has had these results with the S4061. Needless to say, the LE addition did not stay on for long.

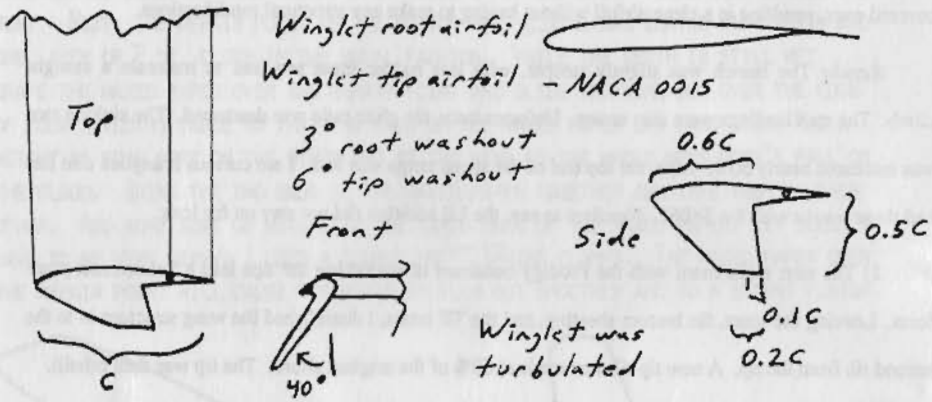
2) The next experiment with the Prodigy consisted of reworking the tips into a Schuemann planform. Leaving the spars, the bottom sheeting, and the TE intact, I demolished the wing structure in to the second rib from the tip. A new tip rib was made at 60% of the original chord. The tip was then rebuilt.

Results As before, the launch was slightly steeper and more hands-off. The sinking speed was reduced slightly. Unfortunately, the spiral stability was reduced slightly, as anticipated from the loss of tip panel area. Overall, I would call this simple modification a success. If any reader attempts this, I recommend a small increase in dihedral to maintain the stability of the original design.

3) The third experiment consisted of testing variations on a winglet idea. The best version tested is pictured below. The idea is to create a second small vortex beyond the normal wing vortex, and to have these vortices partially cancel each other, making the wing behave as if it had a greater span and a better lift distribution. Having the winglet in the front with a sharply swept-back LE may reduce spanwise flow. The winglets were anhedral to simplify the experiment with the plane I had on hand. I do not know the correlation between their dihedral angle and performance. I do not know if I can take credit for this winglet idea, but I have not seen it elsewhere. The test plane was a small (2.5M) F3B design of mine with 240mm HQ2.5/8 root, 200mm HQ2.5/9 tip, and no sweep. The anhedral winglets were spot glued to the tips of the wings. Construction was mostly 1/64" plywood.

Results Before: Excellent handling at all speeds. Good sink rate at speed; lousy sink rate at normal thermalling speed. After: Due to the effectively negative dihedral of the wing (1.5 degree dihedral before winglets added), some reverse aileron was required in a thermal turn. Surprisingly, there was no observable loss of glide performance at speed. At slow speed, the sink was greatly reduced. The only

real problem was the necessity of perfect 4 point landings! In this experiment I found a large variation of performance with a relatively small variation in winglet design; fine tuning for specific planes may be required. I urge anyone out there with a heavy flatwing plane, with reverse bevel tips (what are they called?) to experiment with this simple modification. I specified flatwing, since winglets are sensitive to yaw and can be stalled. This would result in poor roll control on a polyhedral sailplane. It requires about 2 hours to build the tips, and in my case the performance boost at slow speeds was astonishing.



TOTAL ENERGY PROBE SALE ..... Proceeds to go to 1989 US F3B Team

A limited number of total energy probes (see Ben Trapnell's article in this issue of RCSD) have been made available for sale. The cost is $10.00 each, including postage. Half of the money is for materials, postage and handling. The other half will be given to the 1989 US World Championship Soaring Team. Send your check or money order to RC Soaring Digest, P.O. Box 1079, Payson, AZ 85547. Your probe will be shipped to you by return mail.