R/C Soaring DIGEST

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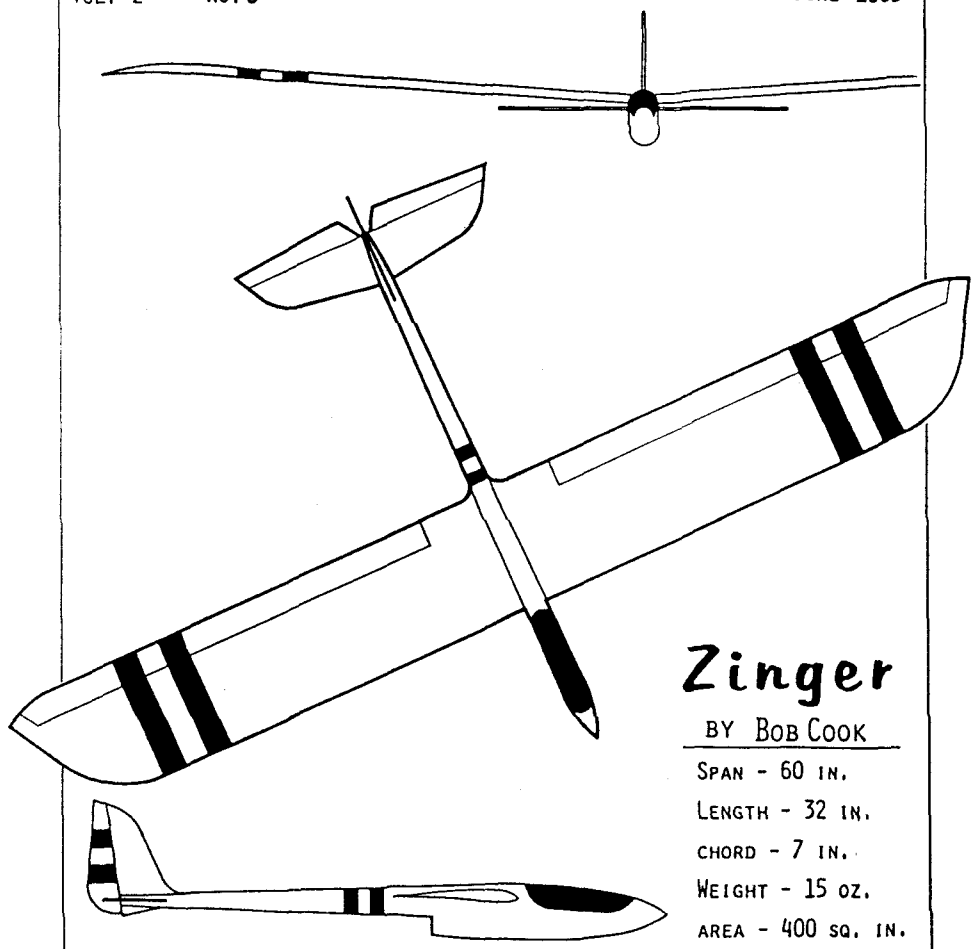

Zinger

BY BOB COOK

SPAN - 60 IN.
LENGTH - 32 IN.
CHORD - 7 IN.
WEIGHT - 15 OZ.
AREA - 400 SQ. IN.
WING LOADING - 5.6 OZ./SQ.FT.
MAT'LS - BALSA, SPRUCE, PLY

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Hi Start

ZINGER by Bob Cook

Here's another hand-launched glider to join the rapidly growing gaggle of similar sailplanes. I met Bob at the WRAM show in White Plains, New York back in February...and we had a good opportunity to 'shoot the breeze' for awhile. Bob has some very definite ideas about sailplane design and particularly controllability, so this month I'd like to pass them along to you for what they may be worth.

The glider is based on traditional H.L. dimensions and airfoil section (Eppler 387) but the obvious departure is in its 'flat' wing and aileron control. Conventional hand-launched gliders are controlled by elevator and rudder...the result of old ideas stemming from free-flight days and the era of the polyhedral wing. Plenty of stability was needed for free-flight models, but - in Bob's opinion - is neither necessary or desirable for RC soaring. In fact, three-axis control is required by full-size aircraft to provide smooth and efficient flying...so they use ailerons. The use of rudder and a polyhedral wing is a compromise for controlling a plane.

Aileron planes have an unfounded reputation for being 'hard to fly' but, if anything, they are in fact easier to fly and control is better and more positive. Yes, they do have a different 'feel' but this is something that one quickly acquires. Rudder turns are somewhat sluggish and delayed as compared to aileron turns...and there are inherent inefficiencies in the polyhedral wing. While some would argue that aileron control may add some excess weight and unnecessary complications, Bob firmly believes that the increase in efficiency is well worth the bother.

The prototype ZINGER handled with smooth responsiveness. High launches were possible, and the glide long and flat. It thermalled nicely, too, and was a breeze to fly on slopes in light winds and off the hi-start. The prototype was destroyed on a heavy-duty hi-start (20 lb. pull) when the wing blew up. It looked as if a shear web gave out, leading to spar failure. The wing was re-designed with spruce spars and beefed-up shear webbing.

A unique feature of ZINGER is the unique 'step' in the fuselage which takes the place of the usual finger hole as an aid to launching. Bob realized that a lot of guys can't get their 'fat' fingers into a small hole in a slim fuselage of a H.L. glider, so he made the 'stepped' fuselage to eliminate the problem...giving ZINGER a pod-and-boom look. The slope version of ZINGER (which Bob brought to the WRAM show) has the same basic design, but is beefed up for full slope aerobatics with its three-axis control and (slightly) heavier structure. The wing is balsa-sheeted foam core; the fuselage is heavy balsa with optional use of fiberglass on the nose section, and the tail section is solid balsa sheet. Both versions require a micro radio system with three channels and a 250 mah battery pack.

You can write to Bob at 311 Dover Street, Salem, NJ 07801.

Happy Soaring,

Olympic Unlimited.....Chuck Holland

Here's an original article by Chuck Holland from Columbia, S.C. who says that this sailplane has been very successful in his beginning contest seasons, and has been responsible for numerous trophies. Because of its success, Chuck has been reluctant to move on up to a WINDSONG for a couple of years.. .so let's see what he has to say.

"Every experienced sailplane pilot is asked sooner or later 'what is the best sailplane to start out with?' My answer would be Airtronics' Olympia II for training and learning to fly, but when I am asked about the best first contest sailplane, my answer has to be the OLYMPIC UNLIMITED. This is a simple modified ship that even the beginner will find easy to construct, and in his first contest he can just about double his flight score over any other beginner's sailplane!

"There are several reasons to modify (the Olympic II) to the Unlimited Class: most contests are Class A sanctioned events which group 2-meter, Standard, and Unlimited sailplanes in the same events, with the only separation being 'sportsman' and 'expert' divisions. Sailplanes of the unlimited category are the ones that usually place and win in these contests...so it makes sense to use a sailplane that takes advantage of the best possible performance.

Modification

"The construction modification involves just the wing and the rudder. The wing center panels were extended just 4 bays each, with the 18" tip panels remaining just as is, to produce a wingspan of 119". The additional materials come from 48" long spruce and splicing the same size trailing edge material to the existing kit stock. The spoilers are extended outward 2 bays further than on the original plans, but under no circumstances should they be omitted. Continue the spar webbing all the way to the wing tip. The only other modification I made was to add an additional wing rod - which wasn't absolutely necessary - but it saves occasional replacement of a bent rod. The rudder is extended 1½" at the trailing edge, and is given the same shape as the original merely by drawing the new extended line parallel to the original one.

"These modifications do not detract in any way from the stable, docile flying characteristics of the original Olympic II. There ar NO differences in moderate-to-heavy winds, but you will find substantial improvement in zero-to-light wind conditions. Beware of this: THE WING WILL FLUTTER IF YOU OVERSPEED ON RETURNING FROM HIGH ALTITUDES, so I allow myself an extra minute or so to lose altitude during 10-minute duration events. When beginning sailplane fliers use the Olympic Unlimited, their flight times average about 2 minutes longer. With more wing area and a lower wing loading the Olympic Unlimited will fly forever! Combined with a thermal sniffer, 10-minute flights are common."

Editor's Note:

On several sailplanes modified in this manner I found it necessary to beef up the wing structure with heavier spars and additional webbing. Chuck's suggestion of an extra wing rod to share the extra load is a good one. It is also desirable to improve the 'torsion box' by extending leading edge sheeting to make a larger D-tube where possible, and/or using slightly heavier sheeting such as 3/32" instead of 1/16" for example.

Artificial intelligence and the Robot Sailplane.....Peter Schug

I met Peter Schug at the WRAM show, and we had a really interesting conversation on topics ranging from astronomy to soaring, and a particularly interesting diversion to computers and artificial intelligence. Peter uses a MacIntosh, and has done some extremely attractive graphics with it which show up on his letterhead. One of the items he is currently working on is a database containing 44,000 stars. His computer will then be able to 'project' these stars graphically to show constellations as well as individual stars of magnitudes ranging from negative 5 to positive 8. A Mercator projection of the Pleiades (seven sisters) by computer at 150X magnification is a treat, believe me. Peter has also composed music on the computer and has programmed already existing music into it as well, tailoring the program to achieve desired nuances. The following article is an excerpt and a desription from a longer article which awaits publication, and RCSD uses it with Peter's express permission, for which I am grateful.

"Soaring is largely an algorithmic task. It consists of clearly definable elements each of which can be handled by a small program dedicated to a specific task. The 'intelligence' is a supervisory program that decides what the current task is. For an intelligent sailplane, an overall task like free distance in some direction is given as a goal. The plane is launched,and it glides around looking for lift. As soon as it finds som, the supervisor jumps to a centering subroutine and, if the programmer has done his job well, the plane rides the thermal. (I'm not going to even think about wave or ridge lift yet.)

"On the way up, the supervisory program gathers rate-of-climb data vs. altitude and decides on what altitude to quit the thermal and head off on course. There is also an altitude at which to seriously look for a thermal, and algorithms to handle speed changes through lift and sink while on course.

"Not to be forgotten is the human supervisor. His task is to watch the sailplane, advise the onboard computer of position so it can update its dead reckoning, and - in case of trouble - either advise the computer or totally override it with a conventional RC transmitter.

"With gyros an over-the-counter item and the Thermic Sniffler available, plus solid-state devices that can perform the function of altimeters, there is not a lot that would have to be built totally from scratch to make such a sailplane. I envision it as a student project in computer science, but my daydreams include contests with free distance, goal (possibly to a radio beacon), and maybe even triangular events with score reduction for number of bits sent and 'hard control.' (Barring time spent landing, since the problem of self-landing robot could be as complex as everything else put together.)(Though it would make an interesting category itself...hmmm...a couple of those polaroid ranging devices angled out at about 30 degrees and down about 10 degrees... hmmm...yeah, two of them so you could sense yaw or crosswind conditions, got to think about that.) Of course things like that couldn't be done without the FAA (unless the equipment was good enough to fly cross-country without going over 500 feet.) There is also the idea of something capable of doing the FAI type stuff all on its own if the markers,

Artificial intelligence (continued)..

pylons or whatever they use (I am not competition oriented) could be sensed by the aircraft.

"I described building the system a little at a time starting with a pure R/C sailplane, and telemetering the sensory data down and displaying it on a computer screen. Then the ground-based computer would be linked to the sailplane using direct joystick input, transmitting a digital signal to an onboard computer which converts the digital signal to pulse width (with a normal transmitter to override). Following that, a software autopilot would be programmed in the ground-based computer using telemetered information info from the sailplane. Thus, by stages, the whole project could be built gradually, with a lot of flying mixed in."

Editor's comments:

It's interesting to speculate about these possibilities, and - in fact - some of the work has already been accomplished. For example, the LEM was capable of semi-automatic or fully-automatic descent and landing on the moon's surface, although the 'pilot' did use manual control for final descent and touch down...mainly to avoid craters and terrain that was too uneven to support a LEM properly for later lift-off.

One has only to look at the remotely-controlled 'drones' with TV guidance (as used by the Israelis in the Bekaa valley) or at the 'smart' bombs used elsewhere, to visualize some of the possibilities.

One of the more interesting programs available today is Flight Simulator, which affords a real-time mode, whereby a pilot can 'fly' a typical light aircraft to any one of several airports. Visual references are given with the capability of side-look-forward-look, or rear-look, as well as 'bird's-eye view' from above. Complete engine, radio, and flight instrument output is available to the 'pilot' and throttle response, climb, descent, turn, and even crash information is most realistic.

If that kind of software is currently available, then it would be possible (if not simple) to integrate digital information derived from on-board measuring and sensing equipment with the software...just like joystick information is integrated with it in the simulator. I believe that Peter's 'vision' of the future is not as far off as he believes. For example, there are several cross-country soaring simulated programs available for full-size sailplanes, and I have even heard of one available for RC model sailplanes. With the advent of 32-bit microprocessors on chips, and 128K in RAM taking up very little space, there is every reason to believe that an onboard computer for a reasonably sized sailplane is not out of the question. Perhaps a complicated flight program would require over a meg of RAM, but that is not impossible, either.

I guess the question then becomes "who" and "when", rather than "if." Several RCSD readers have indicated an interest in this kind of thing, and have been working on it for some time. Let's DO IT!

How to make wing seat cut-out in a fiberglass fuselage...Michael Bame

(This article was taken from the San Fernando Valley Silent Flyer, newsletter of the club bearing the same name in California...April 1985).

Mike Bame has been involved with soaring for a long time and is well known to most of us for his novel airfoils and his Mirage sailplane. In this article, he contributes mightily to the solution of a problem that has bugged me for a long time, and others, too, I'm sure. With thanks, therefore, we publish Mike's contribution....Editor.

"Note: It is assumed that your fuselage has molded-in reference lines, but the technique can be applied to other fuselages as well.

"Start by taking a full-size drawing of the root airfoil of your wing and transferring it to some card stock (include the chord line). Decide how much incidence your wing will have and draw a line (Line 'A') through the trailing edge of the airfoil drawing that is at the same incidence angle BELOW the chord line. Generally, the wing will have from 1½ degrees to 4 degrees positive incidence

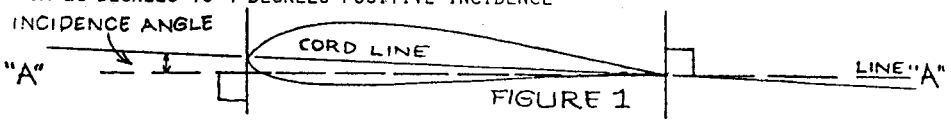


FIGURE 1

"Draw a line perpendicular to the line 'A' that passes through the leading edge, and another that passes through the trailing edge (see Figure 1) . Decide how high up on the fuselage the wing will be mounted, and measure the distance from the trailing edge to the reference line. Draw line 'B' parallel to line 'A' and below line 'A' by the distance you just measured from the trailing edge to the reference line.

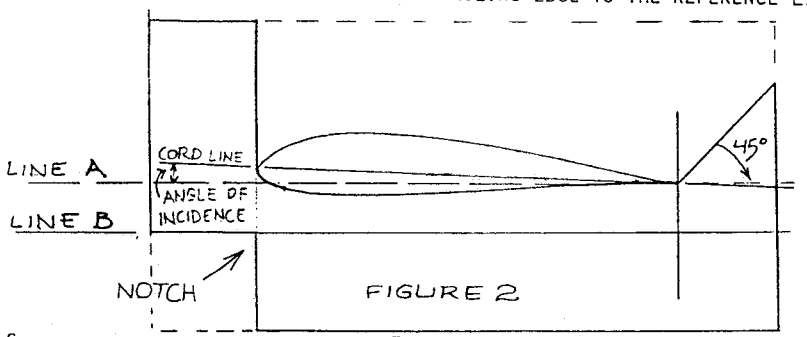


FIGURE 2

Cut out the template as shown in Figure 2. Note the 45-degree cut at the trailing edge and the notch at the lower left corner.

"Cover the area of the fuselage that will be cut out with masking tape. Place the first piece of tape on each side such that the lower edge of the tape is even with the reference line. Make a mark showing how far back the leading edge of the wing will be on the fuselage, then add another small piece of tape below the reference line and extend the leading edge mark onto this piece of tape. (See Figure 3).

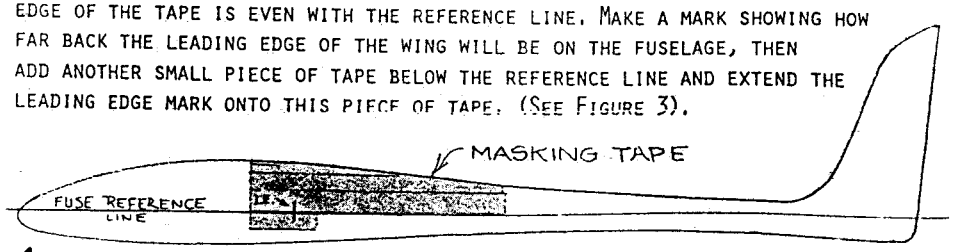


FIGURE 3

Wing cut-out (continued)....

"Place your cardboard template on the fuselage lining up the notch and the line 'B' with the reference line and the line going through the leading edge with the leading edge mark on the fuselage. Using a sharp pencil, trace the cut-out outline outline onto the fuselage, include the vertical line at the leading edge and the 45-degree line at the trailing edge (See Figure 4).

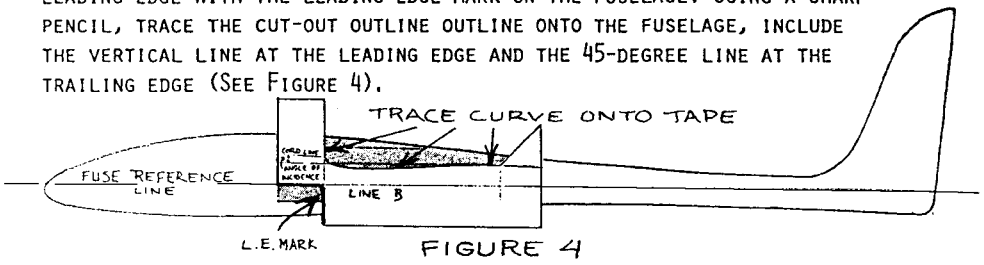


FIGURE 4

"Repeat for the other side of the fuselage after transferring line 'B' to the other side of the template. Connect the vertical and 45-degree lines across the top of the fuselage. Note: the 45-degree line will look straight when viewed from the side; use this fact to help you when you sketch the line across the fuselage.

"The cut-out can be made with an X-acto knife, a moto-tool with a rotary saw blade, or with a small fine-tooth saw. If you use an X-acto knife, first make several passes over the line, then push the point through at one end of the cut-out using a rocking motion in the direction of the cut. Using the same rocking motion and some pressure in the direction of the cut, 'nibble' your way along the line. Once you have the cut started, you can also use the X-acto saw to complete the cut. If you use the moto tool, be careful that the blade does not slip and run along the surface. WITH ALL MEHTODS, KEEP YOUR HANDS OUT OF THE WAY OF THE BLADES. Note: it is easier to use the 'nibbling' method to go around the leading edge curve. SAVE THE PIECE YOU CUT OUT SO YOU CAN USE IT FOR THE WING FAIRING PIECES.

"Clean up the cut with a sanding block and place the wing in the cut-out to check the fit. Sand the cut-out as necessary to get a good fit to the wing and to make the wing sit perpendicular to the fin.

"After you have your wing mount done, mount the wing and use a tin snip to trim the cut-out piece for the wing fairings."

Editor's comment:

Mike Bame has gone to Australia as a member of the USA FAI-F3B team. He is not available at this time, therefore, to get permission to use his article. By the time he is back, I will be gone and the article will be at the printers. RCSD sincerely hopes that Mike will approve of the use of his original material in this manner...as an aid to all of those who have struggled so hard to get a good wing-to-fuselage fit, without success. Thanks again, Mike, and the best of success in your "Down-Under Adventure."

You should also know that Mike's Club, The San Fernando Valley Silent Fliers, is one of the most innovative clubs in the world, having developed a great many soaring 'firsts' over the years. The use of 'thick' airfoils for RC sailplanes, super winches, cross-country races, distance records, methods and systems for performance evaluation, and dozens more. RCSD salutes SFVSF.

'How to' Build better sailplanes.....Stan Watson, S.O.A.R.

Stan Watson hardly needs an introduction to RC glider pilots because his achievements are so well known. Briefly, Stan approaches RC soaring with knowledge, dedication and ingenuity...not to mention persistence and engineering thoroughness. His Pegasus designs are famous for their performance and cross-country achievements. In this article, Stan gives us some insights into building and designing... all of which bear the unmistakeable stamp of experience and authority. Originally appearing in Soaring Flight-newsletter of S.O.A.R., we take pleasure in acknowledging this contribution by Stan and his fellow S.O.A.R. members.

"Original designs, 'parts' method & other experiments

"After the modeler has been in the Sailplane Game for several years, he begins to accumulate 'parts.' These are components, usually damaged, of all the models he has made to date that were too good to throw away. A wing here, a fuselage there, it all adds up.

"This kind of Original Designing has an old and honorable history. I'll bet the Wright Brothers had a lot of old glider parts that just naturally found their way into the original FLYER. And you WW-II historians may know about the DC-2½, composed of a DC-3 and a salvaged half of a wing from a DC-2. 'Whatever Works' is the motto here, and there is a lot to learn in the doing.

"I've seen some 'OlyDrifters' made up of wings from a Windrifter and fuselage/tail from the Olympic II. Have never seen a WindLympic, come to think of it. (This may mean that the 'weak links' on those two kits are the Oly-II wing and the Windrifter fuselage, come to think of it.) (Note: the views are the author's and not necessarily RCSD's...JHG)

"You'll see longer wings of the original chord length grafted onto a shorter fuselage. This is the way you get 100" Standard-class models from 2-meter kits, and 120" Unlimited class models from Standards. What you may imply from this is that the tail feathers on most kits are probably suited for a larger, longer-span model, and this is the truth. Kit manufacturers usually want to guarantee success for the builder and therefore 'build in' extra stability. You cannot take this for granted: for instance, the Oly-II fuselage looks abit short to me for models of much greater span, but John Dineen flew a 'stretched' Oly with an extra piece of center section about 20 inches long (see article this issue... JHG) and it was a real floater. If you try this yourself, include dihedral in the 'cheater' section. (Personally, I'd lengthen the fuselage a bit before I tried this, but it will work. Remember to use lots of washout in the wing tips, just to be safe rather than sorry.)

"You'll see original wings on kit fuselages and tails. Finally, the modeler has gotten enough confidence to build an original wing, to perhaps try for more performance or strength.

"Major mistakes: Sharp Leading Edges and Thinner Wings. All you'll get is a headache, sharp stalls, tip stalls, 'knife-edge' performance, and parts left over that you'll never want to use again (but may be willing to sell to someone who hasn't learned yet!)

Stan Watson on design (continued)

"Good Ideas: build new tailfeathers with a symmetrical airfoil, the best being the NACA 0009. This means 9% thick when compared to a chord length. You could also eliminate the 'aerodynamic balance' on the rudder and just continue the fin post all the way to the top. Make it strong enough to survive a flip on landing...you'll be a lot happier in the long run. Sharpen the trailing edges (rudder and stab) by grafting on 1/8" x 1/4" spruce strip, then razor-planing it to a sharp edge. Remember, make the leading edges blunt, and the trailing edges sharp.

"Wing Chords are sometimes increased, perhaps in an attempt to get higher on launches. You should avoid this: the tail moment arm is reduced, in terms of % of average wing chord, and the glide slope suffers, too.

"Experiment with Turbulator String

"Turbulator strips are the nearest thing to 'something for nothing' that you'll find in the glider game. The concept goes something like this: at slow speeds, sometimes our sailplanes stall because the air breaks loose from the top of the wing. A 'laminar separation' bubble, which naturally exists over the top front of the wing, finally bursts, and the wing 'stalls' (drops). The separation is most noticeable when we try to slow down a model which has a thin, low-camber profile. Examples of this kind of wing are the Aquila Grande and the Aquola buolt with the Miller modifications (raised leading edge, less camber). The Eppler 205 and 193 airfoils are in this category, if used on light-weight models. When these wings are flown slowly, as in landing or thermalling, they will sometimes be seen to stall at times that are unexpected by the flier who is used to Windrifters, Paragons, or other models with thick wings and blunt leading edges.

"There are two solutions: 'Keep it moving' is often heard...i.e., fly the model fast enough so that the stall doesn't occur (keep the 'Reynolds Number' high, the advanced types say); 2) try a 'turbulator strip', specifically a strip of 1/8" or 3/32" trim tape located spanwise at about the 20-25% point of the chord back from the leading edge. This location is shown on some wind tunnel tests from Germany to dramatically improve performance at low speeds (RN=40,000 to 80,000) while showing no measured increase in drag at higher speeds (RN=150,000 and above) on the E193 airfoil. There is never a free ride, and there must be some losses, but I haven't been able to spot them. Experiment with and without, alternate flights and see your landing scores improve as you are able to 'hover' the model into landing with confidence (and no spoilers). Remember your 'overall' flight performance will be improved, even when flying distance, so you gain points overall. (Note: some airfoils are poorer with 'trips';i.e., turbulation!)

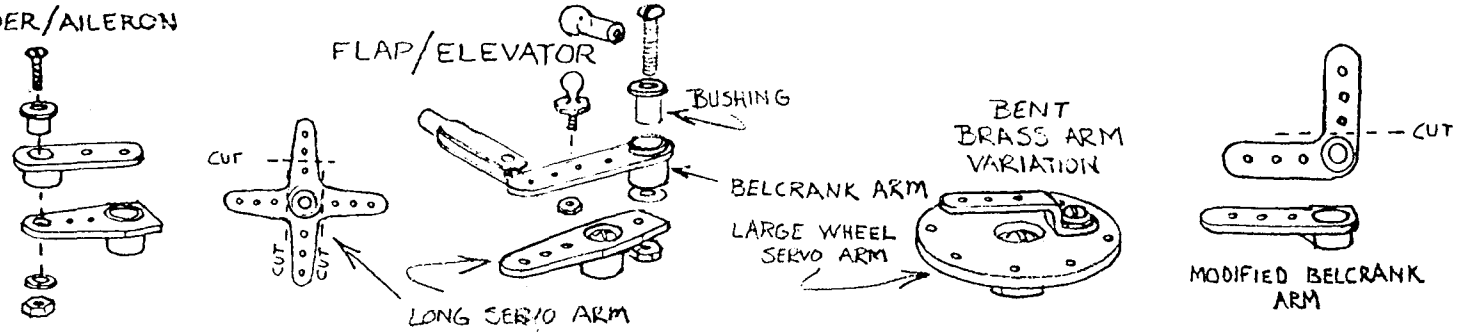
"Don't confuse this approach with that of the lightly-built 'floater' wing with 1/8" square 'turbulator spars' on the top front surface. THese models, patterned after old free-flight types, are essentially designed for a narrow, low speed range and are best suited for duration flights under light wind conditions. Their drag rises rapidly with speed and they are not the best bet for modern competition or sport flying. Finally: for only high speed you probably don't need trips.

MECHANICAL Couplers

DODGSON TYPE * MIXING LINKAGE

BY BOB RONDEAU

*WITH APOLOGIES TO BOB DODGSON

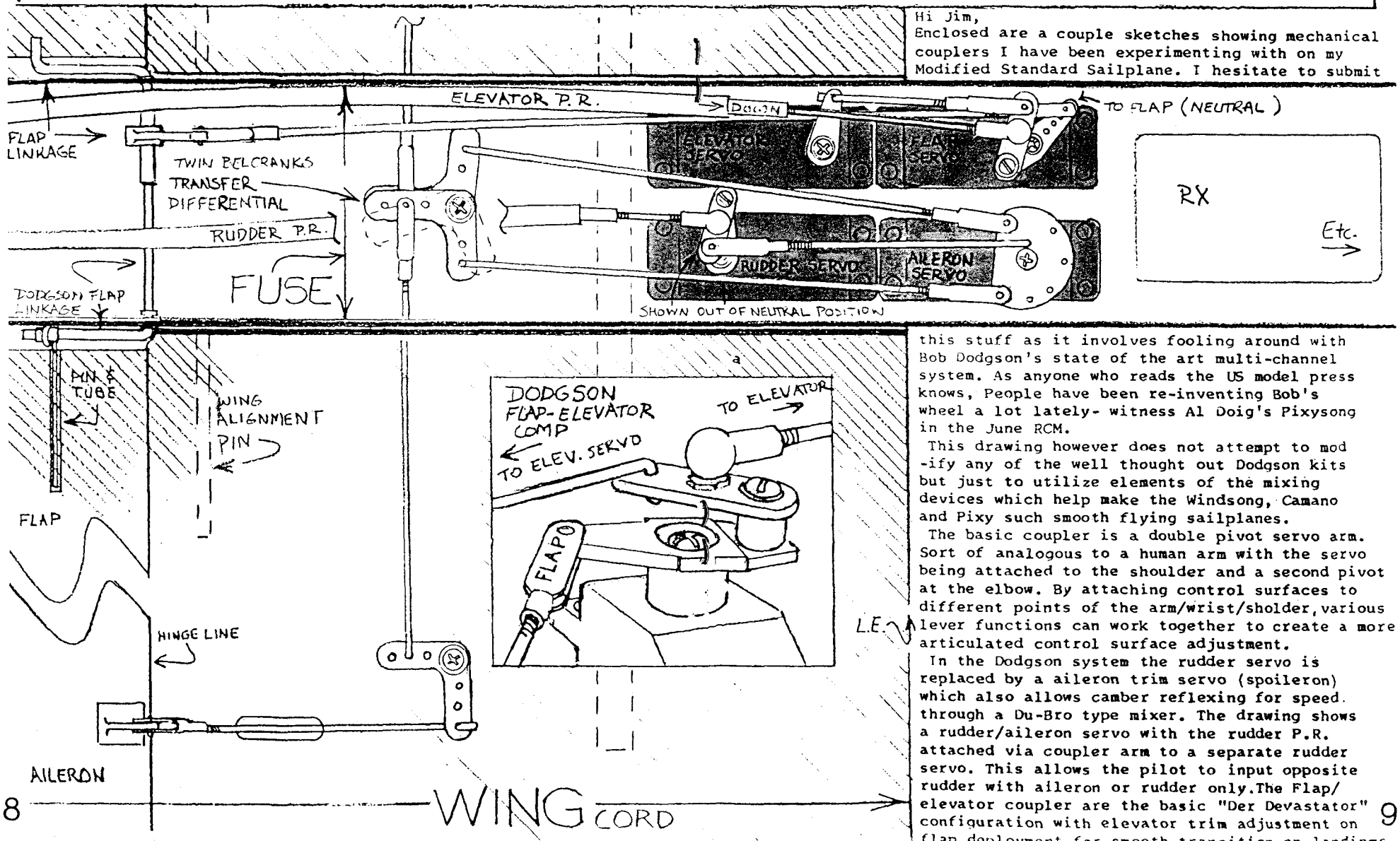


Hi Jim,
Enclosed are a couple sketches showing mechanical couplers I have been experimenting with on my Modified Standard Sailplane. I hesitate to submit this stuff as it involves fooling around with Bob Dodgson's state of the art multi-channel system. As anyone who reads the US model press knows, People have been re-inventing Bob's wheel a lot lately- witness Al Doig's Pixysong in the June RCM.

This drawing however does not attempt to mod-ify any of the well thought out Dodgson kits but just to utilize elements of the mixing devices which help make the Windsong, Camano and Pixy such smooth flying sailplanes.

The basic coupler is a double pivot servo arm. Sort of analogous to a human arm with the servo being attached to the shoulder and a second pivot at the elbow. By attaching control surfaces to different points of the arm/wrist/sholder, various lever functions can work together to create a more articulated control surface adjustment.

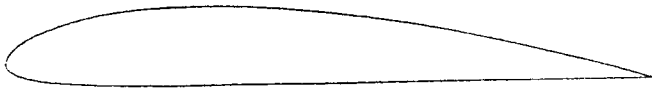
In the Dodgson system the rudder servo is replaced by a aileron trim servo (spoileron) which also allows camber reflexing for speed. through a Du-Bro type mixer. The drawing shows a rudder/aileron servo with the rudder P.R. attached via coupler arm to a separate rudder servo. This allows the pilot to input opposite rudder with aileron or rudder only. The Flap/elevator coupler are the basic "Der Devastator" configuration with elevator trim adjustment on flap deployment for smooth transition on landings.



WATSON (CONTINUED)...

"DOING YOUR HOMEWORK: THE CLARK 'Y'

AS YOU PROGRESS, YOU SHOULD BE FINDING THAT MORE AND MORE QUESTIONS COME TO MIND. YOU SHOULD TRY TO ANSWER THESE FOR YOURSELF...ASK AROUND AND LOOK INTO THE 'LITERATURE'. THERE ARE LOTS OF BOOKS WRITTEN ON SAILPLANE DESIGN, BOTH AERODYNAMICS AND STRUCTURES, AND ON FLIGHT TECHNIQUE. NACA (NASA) SCIENTISTS DURING THE 20'S AND 30'S TESTED LOTS OF AIRFOILS AND FOUND MANY THAT ARE WELL SUITED FOR OUR KIND OF FLYING. THE OLD 'CLARK Y' AIRFOIL IS ONE THAT EVEN NOW IS TALKED ABOUT WITH RESPECT, AND IT IS ALMOST ALWAYS INCLUDED AS A 'BENCHMARK' IN MODERN WIND-TUNNEL TESTS OF LOW-SPEED SECTIONS. WHY? BECAUSE IT IS A FINE CHOICE IN THE 'CRITICAL' REGION IN WHICH WE FLY (RN FROM 50,000 TO 150,000). IT MAY BE A BIT HIGHER IN DRAG THAN THE E205 OR E193, BUT THE EXTRA THICKNESS (11.7%) GIVES EXTRA LIFT STRENGTH. THIS AIRFOIL IS MUCH BETTER THAN THE E205 OR E193 IN THE RANGE OF 40,000 TO 80,000 (AT ABOUT THE SPEEDS AN OLY-II FLIES ON A DEAD CALM DAY). NOW, MOST NEWCOMERS TO THE SPORT HAVE NEVER SEEN A TRUE CLARK Y. (EDITOR'S NOTE: THE LIFT/DRAG CURVES SHOWN IN THE ORIGINAL ARE OMITTED HERE. IF THERE IS SUFFICIENT INTEREST, PLEASE WRITE AND I WILL EITHER REPRODUCE THEM IN A LATER ISSUE OR XEROX THEM AND SEND THEM ALONG TO A FEW INTERESTED PARTIES...JHG).



THE CLARK-Y AIRFOIL

MOST MODELS SAID TO HAVE THIS AIRFOIL REALLY DON'T...THE LOWER LEADING EDGE UPCURVE OR PHILLIPS ENTRY IS USUALLY OMITTED FOR EASE OF BUILDING. TOO BAD, BECAUSE THAT IS ONE 'SECRET' TO THIS AIRFOIL'S EXCELLENT SPEED RANGE.

"MORE HOMEWORK: 3-VIEWS AND DRAFTING

MANY FINE MODELS ARE PRODUCED BY DESIGNERS WHO USE THEIR INTUITION AND 'EYEBALL' RATHER THAN ELABORATE CALCULATIONS, OR WHO CONFIRM THEIR FINDINGS BY CROSS CHECKING. THE POINT IS, YOU SHOULD DRAW YOUR MODELS TO SCALE AND COMPARE THEM WITH OTHER SCALE DRAWINGS OF SUCCESSFUL MODELS AND SEE IF YOU ARE IN THE 'BALL PARK', IN ALL THREE VIEWS. THIS METHOD ELIMNATES A LOT OF WASTED BALSA AND MONOKOTE, AND YOU WILL BE HAPPIER IN THE LONG RUN SINCE YOUR MODEL WILL BE MORE LIKELY THAN NOT TO SUCCEED.

"DON'T WORRY ABOUT BEING THOUGHT OF AS UNORIGINAL...THE MODELS ARE NOW IN A THIRD OR FOURTH GENERATION AND ARE BEGINNING TO LOOK ALIKE BECAUSE THE DESIGN OBJECTIVES ARE WELL KNOWN, RELATIVELY STABLE, AND ARE BEING MET IN FINE STYLE BY LOTS OF DESIGNER-FLIERS WHO ARE UP AGAINST EACH OTHER IN MAN-ON-MAN COMPETITION FLYING.

"THE MODELS WE SEE FOR AMA PRECISION DURATION CONTESTS, AND WHICH ARE DESIGNED IN CALIFORNIA, TEND TO LOOK ALIKE - AS DO THE MODELS DESIGNED FOR FAI COMPETETION. BUT THE FAI MODELS ARE BECOMING MORE COMMON: THEY ARE CLEANER, STRONGER, AND WILL DO BETTER IN WIND WITH NO BALLAST THAN THE AMA 'GAS BAGS' WILL WITH BALLAST. AND, IF MADE WITH FOAM CORES, THEY ARE QUICKLY BUILT, ESPECIALLY WHEN COMPARED WITH COMPLEX 'CROSSOVER' OR TRANSITIONAL MODELS SUCH AS THE SAGITTA. THE HOT SHOTS IN CALI-

WATSON (CONTINUED)...

FORNIA AND ON THE EAST COAST ARE BUILDING FOAM-WING, V-DIHEDRAL, AILERON VERSIONS OF THE SAGITTA AND ARE CLEANING UP IN AMA CONTESTS (CA. 1981... JHG) ESPECIALLY THOSE WHEN THE ELEMENTS ARE KICKING UP THEIR HEELS, AS THEY DO HERE IN THE MIDWEST.

"SO, DRAW YOUR 3-VIEWS...THE OLY-II WOULD BE GOOD TO DRAW, AS WOULD SOME OF THE MORE EXOTIC BIRDS. USE A 3-SIDED SCALE AND 8½" X 11" PAPER (SO THAT IT CAN BE PUBLISHED AND EASILY KEPT IN OUR NOTEBOOKS)...

"LEARN HOW TO DRAW AIRFOILS FROM CO-ORDINATES. THIS JUST DEMANDS A SHARP PENCIL AND A FEW MOMENTS OF THOUGHT. A CALCULATOR IS NOT NECESSARY BUT IS HELPFUL, AS IS A SCALE IN TENTHS OF INCHES. BUY A GOOD COMPASS WITH DEGREES AND HALF-DEGREES SHOWN. START THINKING OF DIHEDRAL IN TERMS OF DEGREES, NOT INCHES. FAI IS EASY, USE 3-DEGREE 'VEE' DIHEDRAL. AMA POLYHEDRAL IS ALSO EASY: USE 4-DEGREE CENTERS, 7-DEGREE TIPS FOR A TIP-TO CENTER SPAN RATIO OF 3 TO 5.

"CALCULATE THE WING AREAS OF YOUR MODELS IN SQUARE FEET, AND DETERMINE THEIR WING LOADINGS IN OUNCES PER SQUARE FOOT. CONTEMPORARY PRACTICE IS HEADING MORE TOWARD 9 OZ./SQ.FT. LOADING WITH NO BALLAST, A FAR CRY FROM THE FLOATERS WE USED TO HAVE TO LOAD WITH LEAD TO PENETRATE. BUILD IN YOUR STRENGTH AND FORGET BALLAST, IF YOUR MODEL IS 'CLEAN', UNDER MOST CONDITIONS (UP TO 15 MPH WIND). USE THE EPPLER 193 AND 205 AIRFOILS.

"CALCULATE YOUR STABILIZER AREAS AND DETERMINE THEIR PERCENTAGES OF WING AREA. MODERN MODELS USE A BIT LONGER REAR FUSELAGES, AND ARE GOING TO HORIZONTAL STABILIZER AREAS OF 11% OR LESS OF THE WING AREA. (BE CAREFUL WITH THIS FOR SPORT FLYING, AS 11-15% SEEMS BETTER FOR EASY, STABLE FLYING...JHG). 10 PERCENT IS COMMON IN CONVENTIONAL CONFIGURATIONS, AND 9% SHOULD NOT BE TOO SMALL FOR A LONG-TAILED 'T'. VERTICAL TAIL AREAS ARE ALSO TO BE CALCULATED AND COMPARED WITH THE WING AREA. ABOUT 6% IS OKAY. THE NACA 0009 AIRFOILS FOR BOTH STAB AND FIN-RUDDER IS FINE."

EDITOR'S COMMENTS:

STAN WATSON DID A SERIES OF ARTICLES DURING 1981 FOR SOARING FLIGHT, AND THEY ARE GEMS FOR INFORMATION, CLARITY AND IMPACT. MOST OF THE THINGS HE TALKED ABOUT ARE STILL VERY TRUE. THERE IS NO SUCH THING AS 'REVOLUTION' IN AIRCRAFT DESIGN, BUT RATHER EVOLUTION; TRIAL-AND-ERROR DESIGN IS KNOWN AS EMPIRICAL DESIGN, AND OUT-AND-OUT COPYING OF A SUCCESSFUL DESIGN IS NOT ONLY TOLERATED, BUT FREQUENTLY DONE. CONSIDER THAT SLIGHT ALTERATIONS OF WING, FUSELAGE AND TAIL SHAPE ARE NOT NEARLY AS IMPORTANT AS THE LENGTHS, AREAS AND VOLUMES. THESE ARE THE BASICS THAT MAKE ONE DESIGN EQUIVALENT TO ANOTHER. IN REALLY SOPHISTICATED TERMS ONE CAN ARGUE THAT WING PLANFORM SHAPE IS IMPORTANT (AS INDEED IT IS) AND THAT SUBTLE CHANGES OF FUSELAGE PROFILE AND PLANVIEW SHAPE HAVE A POWERFUL INFLUENCE ON DRAG...BUT FOR BEGINNERS, THE BASICS OF LENGTH, AREA AND VOLUME ARE TO BE COPIED FROM SUCCESSFUL DESIGNS. SINCE THE ORIGINAL ARTICLES WERE WRITTEN, DR. EPPLER HAS COME UP WITH SOME NEW AIRFOILS THAT ARE EVEN BETTER THAN HIS EARLIER ONES. AMONG THE NEW ONES IS A STELLAR PERFORMER...THE E214. THIS WAS DESIGNED FOR USE WITH FLAPS, BUT CAN BE USED WITHOUT THEM, TOO. CONSIDER THIS AIRFOIL IN YOUR OWN DESIGN, AS IT IS A WINNER.

Sport Winch, etc.....Bob Champine

Faithful contributor Bob Champine sent along some snaps of his new sport winch to share with RCSD readers. He also sends us a photo and some comments about his new Dodgson Camano 100. Here's Bob...

"The main feature of the winch is light weight and small size... i.e. portability. There are a number of safety items I'd like to point out:

1. Battery quick-disconnect knife switch. This is from page 141 of the J.C. Whitney catalog #456E. When the foot switch or the solenoid fails in the 'on' position, the knife switch can be raised, breaking contact with the motor.

2. The foot switch is mounted on the base board so there is only a small chance of stepping on it while getting ready to launch. Notice that it is mounted on the side opposite the drum...keeping the line away from the operator's foot. The line can be dangerous during back lashing, and could tear your shoe off, and cause burns to your foot or leg.

3. Two metal stakes are used to keep the winch from turning on the ground during hard zoom launches. If it turns, you'll get the biggest backlash you ever saw. (This sounds like experience speaking...JHG).

4. Notice the two small strips of wood to keep the battery from rubbing on the winch motor and drum. I've seen damage to battery cases because of the drum grinding a hole in the case, causing the acid to leak out.

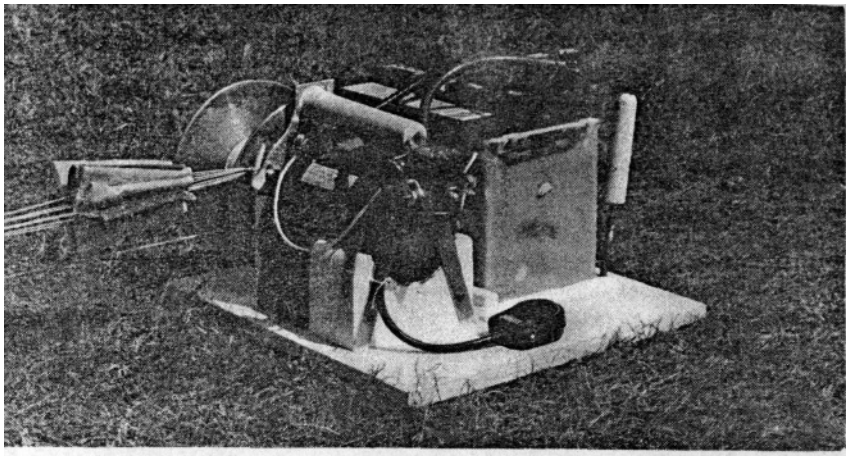
5. Notice the parachute - it is thy type that appeared in the last RCSD. It works real well and can stand the stress of hard zoom launches. Also, the tow ring doesn't get tangled up, because it is loose on the strings from the top of the 'chute canopy.

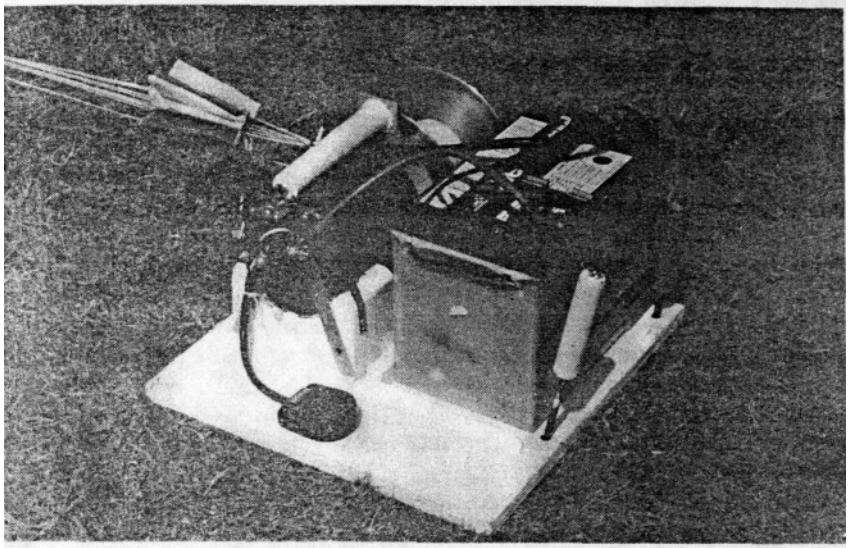
"I've been expending my time building a Bob Dodgson Camano 100 Standard Class sailplane. It is my first aileron sailplane...construction is balsa sheeting on foam cores, which is also new to me. Now that I'm getting familiar with it, I'm finding it is a great performer and is easy to fly. The large flap with elevator compensator works very well, producing a steep glide path (without spoilers) that makes for good spot landings. The control system is a bit complicated but not too difficult and certainly worth the little extra effort. The wing and tail are very smooth, producing good aerodynamics - which I like very much.

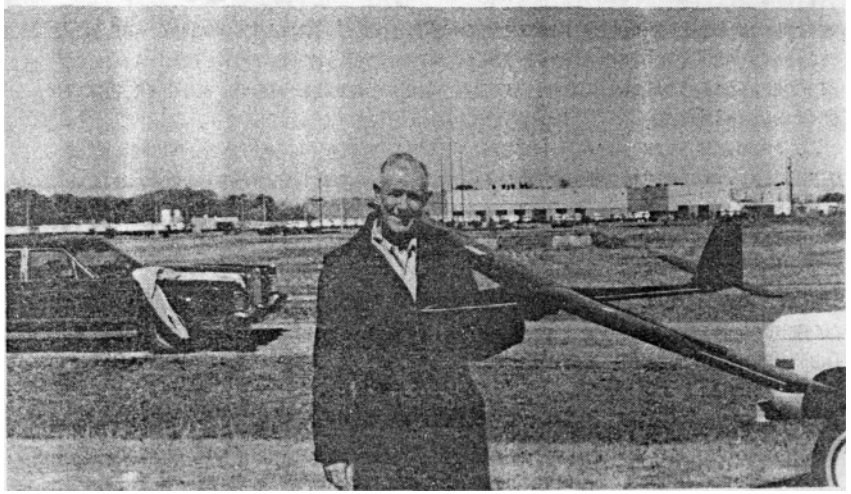
"The contest season will be getting started this month - hope to attend some down in S.C. later this month. Maybe we'll get together in NY as I'd like to attend those up on Long Island."

Editor's Comments

Bob, it's good to get your inputs, and that Camano 100 sure looks super with its chocolate Monokote wings and contrasting fuselage. The winch also seems like a first-class job. Maybe we will get together one of these days...I'd sure like to. For some time, now we've wanted to come to southern Virginia to meet you and Woody and Herk and the rest of the crew. Who knows? Maybe 1985 will be the year. Thanks so much for keeping in touch.







COMMENTS ON SLOPE SOARING.....NIC WRIGHT

THE FOLLOWING WAS TAKEN FROM A LETTER BY NIC WRIGHT TO TONY BECKETT, BOTH OF ENGLAND, AND BOTH GOOD FRIENDS. TONY AND I HAVE HAD A LONG CORRESPONDENCE, AND BY THE TIME YOU READ THIS WILL PROBABLY HAVE MET IN TONY'S HOMETOWN OF SEATON. NIC'S COMMENTS, PLANS OF HIS DESIGNS - THE NIC832, NOTABLY - ARE WELL RECEIVED AND MAY FORM THE BASIS OF A NEW SAILPLANE IN THE STANDARD CLASS TO BE FLOWN BY YOUR EDITOR.

"I HAVE BEEN FLYING SLOPE AEROBATICS FOR 10 YEARS, AND IN THAT TIME I HAVE FLOWN ON SAND DUNES AND SLAG HEAPS, TO NEAR-1500 FT. VERTICAL CLIFFS. WITHOUT DOUBT IT IS FAR EASIER AND FAR MORE SATISFYING TO FLY AEROBATICS ON THE LATTER; HOWEVER, IT IS FAR MORE DIFFICULT AND POSSIBLY MORE REWARDING TO FLY GOOD AEROBATICS ON A POOR SLOPE. BEFORE I CAME TO LIVE IN SCOTLAND, MY LOCAL SLOPES WERE THE SMALL FAULT SCARPS IN THE CHESHIRE PLAIN. THE SLOPE LIFT ON THESE HILLS WAS ALWAYS TURBULENT AND DID NOT EXTEND UP VERY HIGH. WHEN FLYING AEROBATICS YOU HAD TO MAKE CONTINUOUS CONTROL CORRECTIONS TO FLY A STRAIGHT COURSE IN THE CHOPPY AIR. ONCE YOU HAVE MASTERED FLYING IN TURBULENCE, FLYING IN SMOOTH AIR IS EASY.

"I SUSPECT THAT YOUR HILLS ARE NOT VERY STEEP, WHICH POSES DIFFERENT PROBLEMS. WHEN THERE IS A GOOD WIND, YOU PROBABLY HAVE TO SPEND A LOT OF TIME GAINING HEIGHT, AND THEN - DURING THE MANEUVER - THE PLANE WILL BE FLYING IN AIR FLOWING AT A SHALLOW UPWARD GRADIENT. WHEREAS AN INEFFICIENT MODEL CAN PERFORM IMPRESSIVE MANEUVERS IN A STEEP UPWARD GRADIENT, IT WILL LOOK DECIDEDLY UN-IMPRESSIVE FLYING IN A SHALLOW GRADIENT. AN EFFICIENT MODEL WILL CLIMB HIGHER AND QUICKER IN A SHALLOW GRADIENT, ACHIEVE A HIGHER SPEED IN THE DIVE, AND CONSEQUENTLY DO LARGER AND FASTER MANEUVERS. I WOULD CLASS THE RIDGE RACER AS A FAIRLY INEFFICIENT AIRCRAFT BECAUSE IT HAS AN AIRFOIL SECTION WHICH IS DRAGGY AT HIGH SPEED/LOW LIFT COEFFICIENTS. IN MY EXPERIENCE TO DATE, I HAVE FOUND THAT SECTIONS BETWEEN 9 AND 12% THICKNESS, WITH BETWEEN 0 AND 2% CAMBER ARE THE BEST. I PERSONALLY PREFER AN EPPLER-LIKE SHAPE, BUT THE NACA 4-DIGIT SHAPE IS ALSO VERY GOOD.

"THE CHOICE OF AN AIRFOIL SECTION FOR AN AEROBATIC MODEL IS VERY HIT AND MISS IN THE ABSENCE OF GOOD WIND TUNNEL TEST DATA, HOWEVER IT IS POSSIBLE TO CHOOSE AN IDEAL GEOMETRY AFTER MANY YEARS OF DESIGN AND FLYING EXPERIENCE. SIMPLE RULES WORTH KNOWING ARE: 1) BIGGER MODELS ARE MORE EFFICIENT, AND 2) HIGH ASPECT RATIO WINGS ARE MORE EFFICIENT AT HIGH LIFT COEFFICIENTS/LOW FLYING SPEED, AND GENERALLY ROLL QUICKER DUE TO LESS WING INERTIA.

"A PROBLEM WITH BIGGER MODELS IS THAT THEY NEED TO BE FLOWN LIKE BIG MODELS...AND THIS MEANS BIG MANEUVERS...OR THEY JUST LOOK SILLY. IN SHALLOW-GRADIENT SLOPE LIFT THERE IS AN OPTIMUM MODEL SIZE TO SUIT THE CONDITIONS, WHEREAS IN STRONG, EXTENSIVE LIFT I WOULD RECOMMEND AS BIG A MODEL AS IS PRACTICAL TO BUILD AND TRANSPORT.

"FOR CONTINUOUS MANEUVERS IN LIGHT LIFT AND CONFINED LIFT, I WOULD RECOMMEND A MAXIMUM WING SPAN OF - SAY - 80". IF YOU ARE CONSIDERING USING THERMAL LIFT TO GAIN HEIGHT, THEN A SLIGHTLY LARGER AND POSSIBLY LIGHTER MODEL WOULD BE NEEDED. SOME OF MY FINEST DAYS FLYING AEROBATICS HAVE BEEN WHEN FLYING HEAVILY-LOADED THERMAL SOARERS FROM SMALL SLOPES IN LIGHT WINDS, AND RELYING ON PASSING THERMALS FOR GAINING HEIGHT. ONE DAY WHEN I HAVE TIME, I WILL BUILD A LARGE MODEL FOR JUST THIS TYPE OF

NIC WRIGHT ON SLOPE AEROBATICS (CONTINUED)...

FLYING, LIKE AN F3B TYPE MODEL, BUT WITH A LESS CAMBERED AIRFOIL SECTION. FOR COMPETITIONS WHERE MANEUVERS HAVE TO BE PERFORMED MORE OR LESS IN SUCCESSION, THE IDEAL MODEL SIZE IS DICTATED BY THE STRENGTH AND EXTENT OF THE LIFT. I HAVE CHOSEN 72" WINGSPAN FOR COMPETITIONS. IN LIGHT, CONFINED LIFT, I HAVE FOUND THIS TO BE JUST ABOUT RIGHT. IN STRONG, EXTENSIVE LIFT, A BIGGER AND HEAVIER MODEL WILL LOOK MORE IMPRESSIVE AND PROBABLY DO BIGGER AND FASTER MANEUVERS. HOWEVER, A 72" MODEL DOES NOT LOOK TOO BAD, ESPECIALLY WHEN LOADED UP TO 24 OZ./SQ.FT.

"IN YOUR LETTER YOU MENTION USING HIGHLY-CAMBERED AIRFOILS ON CONVENTIONAL AEROBATIC MODELS TO IMPROVE LIGHT LIFT PERFORMANCE. PERSONALLY, I HAVE NEVER AGREED WITH THIS, AS IN MY EXPERIENCE THERE IS FAR MORE TO BE GAINED BY IMPROVING THE GEOMETRY; I.E., HIGHER ASPECT RATIO, BIGGER WING, AND KEEPING THE WEIGHT DOWN.

"THE NIC832, IF BUILT ACCURATELY AND LIGHT, WILL GIVE A LIGHT LIFT PERFORMANCE SECOND TO NONE FOR PLANES OF SIMILAR WINGSPAN. THE MODERATELY SMALL T-TAIL MAKES FOR AMAZING PITCH RESPONSE, WHICH ENABLES LOOPING AND BUNTING (OUTSIDE LOOPS...JHG) AT FAIRLY LOW SPEED.

"SEVERAL COPIES OF NIC832 HAVE BEEN MADE UP HERE, AND THERE IS A NOTICEABLE DIFFERENCE IN PERFORMANCE. THE MAJOR DIFFERENCE BETWEEN THESE MODELS AND MINE IS THAT THEIR WINGS HAVE NOT BEEN CONSTRUCTED QUITE SO ACCURATELY, ESPECIALLY NEAR THE LEADING EDGE. FORMING THE CORRECT LEADING EDGE RADIUS IS ESSENTIAL FOR LOW DRAG AT BOTH HIGH AND LOW LIFT COEFFICIENTS. (EMPHASIS ADDED BY EDITOR...JHG).

"REGARDING THE RUDDER/ELEVATOR PYLON MODEL FEATURED IN THE MAG, THIS STARTED LIFE AS A 100" ,ODEL. HOWEVER, AFTER SEVERAL CRASHES AND REPAIRS, IT IS NOW ONLY GOOD FOR PYLON RACING. THE WING SECTION IS E392 AND MINIMUM WING LOADING IS 16 - 30 OZ./SQ.FT. ANY THERMAL TYPE SOARER WILL FLY FAST IN STRAIGHT AND TURNING FLIGHT AT THESE SORT OF WING LOADINGS...THE PROBLEMS START AT THE LANDING STAGE.

"AS FOR CHS'S ENTHUSING OVER ROLLING ABILITY, AGAIN MOST R/E MODELS WILL ROLL AXIALLY WHEN WEIGHING 9 POUNDS AND FLYING AT 100 MPH PLUS.

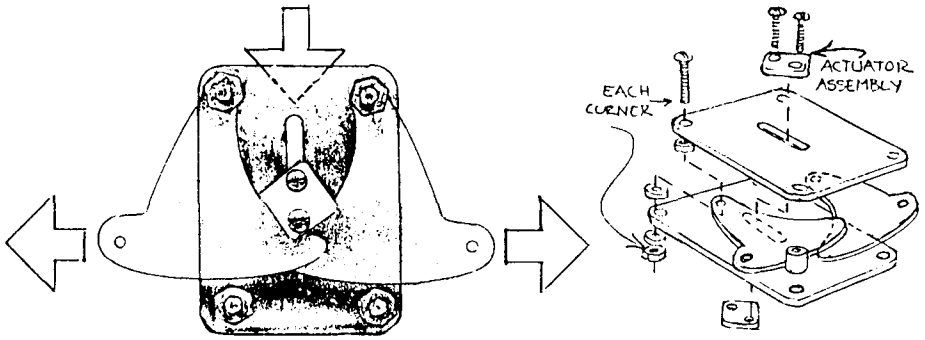
"AS YOU WILL NOW BE AWARE, A GENERAL THEME OF THIS LETTER IS FLY EFFICIENT AND HEAVY FOR EXCITING AEROBATIC PERFORMANCE. HOWEVER, YOU NEED STRONG AND EXTENSIVE LIFT TO DO THIS, AND MODELS NEED TO BE STRONG AND EASY TO LAND.

"IN LIGHT LIFT, EFFICIENCY IS STILL THE KEY, BUT KEEP THE MODEL LIGHT. LOADING UP MODELS TO FLY IN CONFINED SHALLOW GRADIENT LIFT DOES NOT WORK.

"IF YOU INTEND TO FLY THE NIC832 AT HIGH WING LOADINGS FREQUENTLY, IT WOULD BE A GOOD IDEA TO PUT AN AILERON IN EACH WING AT ABOUT MID SPAN TO INCREASE THE HORIZONTAL RIGIDITY OF THE AILERONS AND HENCE REDUCE THE CHANCE OF FLUTTER."

EDITOR'S COMMENTS:

WHILE SOME OF THESE COMMENTS SEEM RUDIMENTARY, THERE IS AN UNDERLYING SOPHISTICATION THAT DOES NOT AT FIRST MEET THE EYE. FOR EXAMPLE, THE BUSINESS ABOUT LEADING EDGE RADIUS BEING ACCURATELY MADE FOR BOTH HIGH AND LOW SPEED PERFORMANCE IS MOST INTERESTING. I KNOW MODELERS, MYSELF INCLUDED, WHO DO NOT PAY MUCH CLOSE ATTENTION TO ACCURATE LEADING EDGES. A TEMPLATE WOULD BE MANDATORY TO DO IT RIGHT. NIC'S IDEAS ABOUT HEAVY THERMAL SOARERS FOR USE ON THE SLOPES IS ALSO VERY INTERESTING, AS ARE HIS REMARKS ABOUT AIRFOILS AND CAMBER.



MOTION TRANSFER DEVICE.....PAT BARRY, HAMBURG, NEW YORK

THIS NEAT DEVICE WAS DESIGNED (AND A PROTOTYPE MADE) BACK IN 1975 - NEARLY 10 YEARS AGO. AS FAR AS I KNOW, IT HAS NEVER BEEN USED ON A SAILPLANE, SAD TO SAY. IT COULD BE USED FOR SPOILERS, FLAPS OR OTHER DEVICES IN WHICH A LINEAR MOTION IN ONE DIRECTION IS TRANSLATED INTO A LINEAR MOTION IN A DIRECTION AT RIGHT ANGLES TO THE FIRST DIRECTION. IT IS NEAT, COMPACT, AND WORKS VERY SMOOTHLY. THE ONLY DRAWBACK IS THE NECESSITY TO HAVE THE FLAPS, SPOILERS, OR WHATEVER IS BEING MOVED, SPRING LOADED SO THAT THE RETURN MOTION WILL BE GUARANTEED. IT MIGHT BE POSSIBLE TO OBTAIN DOUBLE POSITIVE ACTION BY MODIFYING THE UNIT. BY THE WAY, THE UNIT IS QUITE SMALL AND COULD BE MADE EVEN SMALLER, IF NECESSARY. THANKS PAT, WHEREVER YOU ARE.

WANTED:

PLANS FOR FOX BUZZARD 54 SAILPLANE. WOULD LIKE A COMPLETE PLANS SET, OR WILL PAY TO HAVE COPY MADE. PLEASE LET ME KNOW. JERRY BAILY, 1810 SHELBURNE LANE, SARASOTA, FL 33581.