Second Wind 90-1

The Newsletter for soaring gods in a "winged arrow" world

The LOVESONG . . . Mightier Than Ever!

Or . . . Why are other kit designers still tripping over the wrong airfoils?

Well, the results of Selig, Donovan and Fraser Princeton wind tunnel tests are in! They are available as Soartech 8 from Herk Stokely, 1504 North Horseshoe Circle, Virginia Beach, VA 23451 for a US price of $15.00. While this is exciting news in the erudite world of nerd-dom, if you really want to see what the results mean to the real sailplane flyer, get David Fraser's Sailplane Design 3.3 computer program (Sailplane Design - 1335 Slayton Drive, Maple Glen, PA 19002). It includes all the Princeton data, will run on IBM compatible and PS/2 systems and costs only $35.00. This program dramatically shows you in visual terms how the different airfoils actually compare performance-wise on any model you plug into the system. All of the airfoil plots shown in this newsletter are based on the Princeton data and are done totally with Sailplane Design. I am most impressed with the immense power that this program puts at your fingertips. Immediately you can see the mistakes that kit designers are making in airfoil choices etc. All of the pompous rationales for choosing a particular airfoil don't mean didily in the harsh light of reality when the actual performance figures start drawing the telltale curve!

One truly great thing that came out of the Princeton tests is that they actually did work with tripping some of the airfoils. One airfoil that really benefited from the trip was the Eppler 214. In fact with the trip, the Eppler 214 yielded about the best performance of any thermal airfoil. This gives it comparable performance to the new and much thinner (thus much harder to build and adequately structure) super airfoils like the SD7032 (See plot on page 4). The trip on the E214 consists of a strip 1/8 wide and .020 thick made up of layers of tape. It is located at 20% of the wing chord from the LE. For example, at the wing root, where the wing chord is 10, the front of the trip would be placed 2 from the wing LE. A spark plug feeler gauge can be used to get the correct thickness. David Fraser cuts two layers of colored duct tape (each layer is .010 thick) and stacks them. If you use striping tape, it may take four or five layers to achieve the .020 thickness. Some of you say didn't you used to put a turbulator at 20% of the chord on the Camanos and K-minnows with E214 airfoils? We found from field research that the early Camanos (with the mid stab) and the K-minnows (with a T tail) had a tendency to abruptly fall off when circling on the verge of a stall. While we were experimenting with performance enhancing turbulators, I noticed an unexpected result. The turbulator instantly turned the glider into a smooth and gentle flyer in the turns. This was such a boon to the handling performance of the gliders that I included it in the building instructions to be made a part of the building process. Our trip was only one layer of trim tape high and 1/16 wide but it had a profound effect on handling. After we came out with the Windsong in 1982 and discovered that it appeared to handle as well without the trip as it did with it, we did not incorporate the trip on the Windsong. The question continued to bother me why did the Camano and K-minnow need the trip and the Windsong did not? They were, after all, using the same airfoil! Finally it hit me. The main difference in design that the Windsong had was a low stab. I concluded that the Camano and K-minnow were experiencing stab stall rather than wing stall. The trip was changing the airflow over the wing enough so that the stabs were operating in cleaner air and thus no longer stalled before the wing did. With this theory in mind, I revised the Camano to give it a Windsong look and a low Windsong style stab. I gave the T tailed K-minnow a new fuselage based upon the new Camano and renamed it the Pixy. It worked! Now both planes handled well at all speeds including slow speed turns. Since I had

perceived the primary benefit of the trip on the E214 airfoil as the cure for a handling problem that no longer existed, I took the trip out of the building instructions. From a performance standpoint, it was really hard to determine if the trip was of benefit or not. Since my trip was only one layer of striping tape it was much thinner than the trip used in the Princeton tests and therefore may not have benefited performance appreciably. At any rate, I was only about .015 away from greatness and I didn't even know it! (Sandy, my partner and spouse, thinks I missed it by a little more than that.) When I started running Sailplane Design on my computer, I was immediately struck by two things: how good the tripped E214 airfoil was and how much better the performance curve for the Lovesong was than the performance curves for all the other new state-of-the-art thermal competition ships! I was so amazed that I sent David Fraser copies of my plots to see if they were correct or if I had goofed somewhere. To my near disbelief, he assured me the plots were correct. He went on to say that the performance curve of the Lovesong is why he is building a new one to replace his defunct Windsong. It appears clear that some airfoils are flat-out poor choices if you are going for state-of--the-art performance. All of the glowing designer jargon about how great the airfoil is they used, vaporizes and disappears into the atmosphere when blasted by the harsh reality of the wind tunnel test data as is shown by the plots. One airfoil that seems to be an obvious poor choice is the 54061, as is used on the Ultima, the Phoenix, the Mariah, etc. It is probably OK on built-up wing gliders like the Prodigy and Orbiter (since covering sag between ribs changes the airfoil anyway) but it is bad news on accurately built foam core wings, according to the performance plots. For example, the Phoenix has about the same general design specs as does the Lovesong and yet it has a maximum L/D of just over 22 to 1 (about the same as the smaller Falcon 880) as compared the significantly more efficient L/D of nearly 26 to 1 for the tripped Lovesong. The choice of airfoil is probably the most important choice that a designer makes. It is interesting to see how many mistakes have been made in this major area while great detail is paid to wing tip design, which has little or no effect on performance! (See Design Insights from David Fraser.) What is obviously happening, when erstwhile over-enthused designers perceive amazing benefits from wing tip shapes and add-ons, etc. is that they are altering the wingspan? The performance benefits, if they actually exist, are a result of the increase in wing span and/or aspect ratio . . . not from some mythical wing tip design, angle or shape!

The performance curve of the Tripped Lovesong versus the Falcon 880 and the Phoenix clearly shows the impressive maximum L/D advantage (about 14%) that the Lovesong has over both of these highly touted designs. At normal flying speeds, 17 to 25 mph, nothing can touch the Lovesong! It is not until speeds of over 30 mph are encountered that the Falcon 880 can match her. In reflex, the Lovesong is nearly comparable to the Falcon 880 even at high speeds! The Phoenix cannot match the Lovesong at any speed shown on the plots, although the 54061 can be improved, somewhat, with a trip at 45% of the chord!

The Tripped Lovesong and the Lovesong with the TE reflexed a -3 degrees versus a Falcon 880. Notice how that with reflex the Lovesong's high-speed performance is improved to the point that it nearly holds with the Falcon 880. As you can see, the Lovesong's maximum LID is 14% better and its sinking speed is lower (by 1/8 of a foot per second) than the Falcon 880.

Even the endless wave of media hype (I call the saga The Falcon and the Snowman) on the Falcon 880 cannot disguise the fact that it only has an L/D of just over 22 to 1 (compared to the nearly 26 to 1 of the Lovesong) and a sinking speed of over an 1/8 of a foot per second faster than a Lovesong. Another surprise is that while the Lovesong can cover much more sky than its competitors at normal flying speeds (with its 14% better L/D) it nearly matches the performance of the Falcon 880 at the high- speed end of the spectrum when the flaps are reflexed! This means that with no lift in the F3B distance course, the Lovesong will get more laps than a Falcon 880 and it will nearly match it in the

speed course. With no lift on the six minute duration event, the lower sinking speed of the Lovesong will allow it to have 45 more feet of altitude at six minutes. This translates into 45 more seconds of air time, at the Lovesong's amazing sink rate of under 1 foot/second. The question is if the Lovesong is as good or better at multitask flying than the Falcon 880 and it has much better performance in both sinking speed and L/D in thermal flying, who would choose to fly the Falcon 880 in thermal competition? Only people who are more influenced by hype than reality. Why anyone would want to fly a glider with a foam-core 54061 airfoil (like the Phoenix or Ultima, with a 14% poorer Maximum L/D than a Lovesong and poorer performance at the high-speed end too) is beyond comprehension. With the numbers in, relative glider performance is taken out of the mythical designer wonderland and put into cold hard facts that can be clearly seen in a performance curve. And, if you're the kind of guy who likes curves, you will love the Lovesong's curve!

The Pixy with the tripped 5214 is the clear winner here. We did not have the exact specs on the Mariah so we plugged its S4061 airfoil into the Pixy data. The tripped E214 is clearly the better airfoil. The Prophet, with its light wing loading, has a very slight edge over the Pixy in minimum sinking speed but it is totally blown away in L/D and in the higher speed end.

Speed Conversion Chart for Airfoil Plots Ft/Sec = MPH

10ft/sec = 6.8 mph

20ft/sec = 13.6 mph

30ft/sec = 20.5 mph

40ft/sec = 27.3 mph

50ft/sec = 34.1 mph

60ft/sec = 40.9 mph

70ft/sec = 47.7 mph

80ft/sec = 54.5 mph.

Naturally, the tripped E214 is as good an airfoil on the Pixy and Camano as it is on the Lovesong, keeping them the performance leaders in their size classes. However, as Sailplane Design clearly shows, there is no substitute for larger wing spans and higher aspect ratio wings like the Lovesong has. The performance curve of the Lovesong is significantly above that of the Camano and Pixy both in L/D and minimum sinking speed. You do pay a price for smaller designs. This is also one reason (airfoil aside) why the Lovesong plot shows considerably better performance than does the plot for the (smaller) Falcon 880.

As you can see, the TE reflex of the Pixy is a true gift in the high speed end! The Sagitta 600 is an approximation based on the geometry of the prophet and the 5205 airfoil used on the Sagitta 600 (I do not have the exact specs on the Sagitta 600 but this performance curve should be pretty close).

The Sagitta 900 is clearly no match for the Tripped Camano. The Camano matches it in minimum sinking speed and leaves it in dust in maximum L/D. Once again, you can see the value of the full TE reflex at speed.

Design Insights from David Fraser:

I first met David Fraser at the 1985 Nationals where he was the Field Marshall of Soaring. Since that time, David has developed his outstanding Sailplane Design program and been an active participant in the Selig, Donovan and Fraser Princeton wind tunnel tests. He supplied 183 much of the custom built instrumentation used in the Princeton wind tunnel tests. Needless to say, David was the first to incorporate the complete Princeton data into a sailplane design program.

The idea to trip the E214 comes straight from the Princeton tests. As you can see from the enclosed plots, the difference is quite dramatic, and I have satisfied myself by using it on the Windsong that the difference is real. Remember, this is actual test data, not computed. My trip was .020 inch high, 0.125 wide and was 20% chord over the entire wing. I made it from duct tape, which is .010 inch thick and now comes in a range of colors to match the covering. I used two layers. Possibly the best indication of how effective it is came from a contest I won a few months ago. It was a solid overcast day with absolutely no lift and zero wind. The only thing to do was simply to fly at minimum sink. The CD had set the tasks at 3, 6, 9 and 12 minutes with landings. Well, nobody even got close to the 12 minutes except me with the Windsong - I got the full time, which clinched the contest. But it took both the E214 and the trip to do that. In the 1988 season I flew the Windsong without the trip; it was good, but not that good. I not only agree with you that the E214 is a great airfoil, I think with the trip it's probably unbeatable at thermaling. Keep up the good work, Bob, you make great airplanes. I asked David if the 20% location of the trip was measured to the LE of the 1/8 wide trip or to the center of it. He replied: The location for the trip was measured to the leading edge of the trip, although since the wing chord is 10 inches wide the difference is only about 0.6% if you use the center of the trip instead. I doubt it would have any perceptible effect one way or the other. It is the height that is important, not the width. One sixteenth or 3/16th would probably work as well. Like you, I found [the trip caused] a change in the trim condition. After receiving my copy of Sailplane Design and running it on my computer, I could not believe the performance curve of the Lovesong vs all the other hi-tech kits. I thought I must be doing something wrong so I asked David to confirm the validity of my plots. I also congratulated him on his powerful design program. His response was: Thank you for your very kind comments on Sailplane Design. Let me say for the record, I feel the same way about the Windsong/Lovesong; it's a truly great sailplane, and I enjoy every minute flying it. Let me see if I can answer your questions. First, the graphs are real; certainly in the comparative sense, if not in the absolute one. Some people say I'm crazy,

Bob, but nobody says I'm stupid; when the Windsong broke I bought a Lovesong. I bought it because I really don't think it can be beaten at a thermal duration contest by any other production airplane, and that's what the graphs show. (And besides, it's a fun airplane with no vices.) In fairness, the Falcon 880 is a smaller airplane and the performance advantage of the Lovesong at low speeds is due in part to the lower induced drag that goes with the larger span, and in part to the airfoil. The S3021-S3014 airfoils have lower camber and, as the graphs show, do better at higher speed than the un-reflexed E214. The other thing that doesn't show on the graphs is that the Falcon could presumably reflex its trailing edge down at low speeds (did Mark make this Possible? I don't know) and pick up some additional lift. But still won't be as good at thermaling because it simply doesn't have the wingspan of the Lovesong. The Phoenix is another story. Basically it has a poorer airfoil - it doesn't work as well and it is thinner. And even though it looks as though it has as good a minimum sink speed - about 1 ft/sec - as the Lovesong, it probably doesn't. The Data for the tripped E214 wasn't taken at 60K, whereas the data for the tripped 54061 was, so the 54061 graph starts at lower speeds than for the tripped E214. Take a look at dataset 1 and see if you have airfoil 34, the E214S. If you do, try it for the Lovesong. I made up this airfoil as a combination of the tripped E214 data from 100k up and the un-tripped data for 60k because I wanted to see what the full speed

range would be. It shows the minimum sink speed to be about 0.95 ft/sec instead of 1 ft/sec. You can use this airfoil like any other. Strictly speaking it's not exactly correct to do it this way, but it's pretty close. To summarize, I think the Lovesong's advantage is as great as Sailplane Design shows. I didn't write the program to prove the Windsong/Lovesong is good, that's just the way it comes out. Ain't it nice when the best design program available shows you've got the best airplane available?

You got that right David! With the present preoccupation with Schumann planforms, modified Schumann planforms and special rounded leading edge wing tips, etc., asked David to comment on the performance value of such endeavors.

As you know, given the assumptions of full-sized aerodynamics (primarily that the profile drag is independent of Reynolds number), the ideal wing planform from the standpoint of drag is elliptical, a la Spitfire. Unfortunately that isn't true for models, because the profile drag is highly dependent on Reynolds number, so what may be gained in reduced induced drag is more than lost in the increased profile drag of a narrow tip Chord. The second point is that on large aspect ratio wings, which is really anything over about 10, the difference in induced drag between a rectangular wing and an elliptical one is only about 2 - 3%. Since the induced drag, even at thermaling speed, is only 50% of the total drag, the saving would be only about 1 -1.5% of total drag and then only at low speeds. What is more, a straight taper with a taper ratio of 0.7 provides induced within about 0.5% of fully elliptical.

The long and short of it is that taper is a very minor contributor to gliding performance. Personally (and I'm not alone here) I think any benefits of the Schumann planform are unproven. Nothing I've seen, including Schumann's original article has demonstrated its advantages in either full size or models, and there is no theoretical reason to believe in it either. There have been several articles trying to explain its advantages, but they're all flawed.

So my feeling is this: do what you did with the Windsong; use a straight taper of about 0.6 to 0.8 and let it go at that. If, for building reasons, 183 you want to use a double taper, then fine, just keep the tip from getting too narrow because the Re (Reynolds number) gets too low. To show you what I mean, I've plotted the performance of the Windsong with a single airfoil and then plotted the performance again with the wing broken into 4 sections, each 25% of chord but all with the same airfoil. In other words it's physically the same airplane but the computer takes into account the effects of the taper with the second design by using 4 different Re's for the wing instead of a single average. As you can see, the difference is virtually nil, and if you try other designs you will see the same thing. This insensitivity to taper was something I discovered some time ago, but it's fully consistent with theory. Most people haven't noticed this, so you see wild claims for various planforms.

Teat-illating Typo, or . . . Another Moooooving Innovation by Bob Dodgson?

by George Voss - OK

Bob Dodgson has done it again! Just when you thought Lovesong technology was the epitome of soaring, Bob shows you how you can bring udder destruction to the competition. The Lovesong brought you a 30% stronger airframe, rigid fiberglassed trailing edges, a superior aircraft. But now, you can have the most sophisticated flying machine in the soaring industry. In 1982 Dodgson Designs shook the soaring world with crow landing capability (up ailerons and down flaps). Bob Dodgson, not satisfied with being the best in the business, now introduces COW!! Yes, you now know why when he says floating out still air times are no problem, he means it! You too can milk any

thermal either on or off the field. Now you know why Cad guru and pontificator Geoff Almvig stated the Falcon 880 was teats up compared to the Lovesong!!! Now don't expect everyone to know about Bob's new secret weapon. Only those privileged enough to receive the 1st production run of Bob's new 1989 catalog will be graciously shown the way. And to Dave Banks, the jugs up now fella, we've found your secret and someone else's picture will be on Dodgson's cover soon! Don't just fly a Lovesong, Camano, Pixy, or any other multichannel sailplane. Let's face it, if you're going to be tops in today's soaring world, you've gotta HAVE A COW!!!

Hamlet -- On The Wing:

by J.J. Johnson - TX and Bob Dodgson

Vacillating like Hamlet, trying to decide whether to build a 2 Meter or Standard class sailplane, I stumbled upon a sentence in your catalog - you can even use the Pixy 2-meter wings on the Camano fuselage (if you shim the Pixy wing rod tube in the Camano fuselage)! Voila! I can both be and not be simultaneously, with little additional time and expense; or, as Hamlet's foe/ally Laertes observes, A double blessing is a double grace. However, ever like the young Danish price, I have one more question - Why not supply Pixy wing kits with Camano size wing rod tubes? Then your catalog, and your pleasure-doubled customers, could stop all this tragic parenthetical nonsense.

--J.J. Johnson

Alas, there is a tradeoff when using the same fuselage for the Camano and Pixy wings. We use a smaller diameter and shorter wing rod on the Pixy to save weight and optimize its performance potential. However, this is no problem when using the Pixy wings on the Camano fuselage. All you need to do is to zap 4 strips of wood 1/16 x 1/16 x 1-3/4 long parallel to and equally spaced around the center of the Pixy wing rod. Now sand the wood down so that the rod snugly fits into the Camano fuselage receiver tube and you are done! The big problem with using both wings on the same fuselage is that the Camano requires a larger (and consequently heavier) stab than does the Pixy. While you can fly the Pixy with the larger Camano stab just fine, the plane is several ounces heavier than it would be with the Pixy stab (due to the extra weight of the stab and the added ballast required to offset the weight). Therefore, to achieve optimum performance from both planes, you really should change stabs when you change wings. Unfortunately, changing stabs shifts the C.G. Now, you have to change wings, change stabs and change the nose ballast when converting between a Pixy and Camano! Most of us find, it is really much better to just have one plane or the other or both planes. In this case, the seeming double blessing can lead to double trouble for most people. If you are willing to fly the Pixy with the Camano stabs, there is little problem other than the significant weight gain in the 2 meter configuration, otherwise it may be more trouble than it is worth.

--Bob Dodgson

Don't Be a Dickey!

An excerpt from the December 1989 CASA Newsletter by Tom Dickey (Sent in by Ken Troxell - MD)

Other flyers keep asking me when are you going to build a flat wing? And in a moment of weakness I actually bought a Lovesong kit. Happily, after a week or so came to my senses. The kit was sold out of state so that none of my friends would become infected. There is just something that makes me a bit hesitant to build a glider that requires two VCR building tapes, a 14 page instruction booklet, a three page pamphlet on A.F.A.R.T., and three plan sheets that don't show a full view of anything.

I don't think we should get excited about the Lovesong just because it beat us black and blue in the landing circle all season long. I think we should go to the Woody Blanchard corn stalk landing approach. If it ain't vertical when it stops flying, the landing won't count. I wonder how many of those suckers we would see then?

Titillating Tips: From Fellow Dodgson Designs Glider Flyers

Flap Linkage Soldering from Terry Goodman - OR

Terry has a solution for those who have trouble keeping the solder out of the flap bearings when they solder up the L-2 (Camano and Pixy) or the HDL-2 (Lovesong) flap linkages. Rather than using the brass solder sleeve supplied with the kit (Terry cuts a new one, of the same diameter) that extends across the full width of the fuselage. He then makes new brass bearings (5/16 long) which are the next diameter larger than the solder sleeve. Prepare for soldering as normal by tinning etc. Now when you solder, you have the flap arm in the middle of the solder \C@3 sleeve with a brass bearing next to it on either side. This keeps the bearings out of the way while you perform the soldering process. Heat the solder sleeve, one half at a time and wick the solder in from the ends. File off any excess solder and slide the bearings into place and epoxy them into the holes in the fuselage sides as shown on the plans.

To aid in aligning the two flap arms prior to soldering, Terry suggests rotating them up so that they are above the fuselage turtle deck. You then sandwich them between a piece of spruce on the bottom and a piece on the top, running between the two arms and across the top of the turtle deck. Clamp them together with clothes pins. Adjust the arms so that the spruce pieces running between them are parallel to the wing rod, both horizontally and vertically.

Inverted Flap/Aileron Cut from Bill Hansen - WA

To simplify making a vertical knife cut when you are cutting out the flaps and ailerons, Bill suggests that you invert the wing and have it resting upside down in the top cradle. The bottom surface of the inverted wing is nearly parallel to your work surface which may make it easier to judge when the knife is vertical while making the cut. Keep in mind that to make a good clean and straight cut, you should not try to cut deeply on any one pass. It should take several passes to cut through the wing.

Zap Your Nose Ballast from Steve Cameron - WA

Have you ever been flying in a contest and noticed that your perfectly tuned Lovesong, Camano or Pixy is suddenly flying in a ragged and unfamiliar manner? If the answer is yes, then you have probably been the victim of the missing nose skid! If the front nose skid comes out (through no fault of the gentle landing pilot I'm sure) and you don't know that it is no longer in place, you can lose ballast out the hole. This sudden rearward shift in C.G. is what you noticed as the plane not handling right. After getting his glider perfectly trimmed and fine-tuned, to prevent this potential loss of ballast, Steve Cameron squirts in Zap through one of the front landing skid holes. With the shot zapped together, it cannot fall out of a landing skid hole. On the down side . . . you cannot remove shot if you wish to fly with a more rearward C.G. so you should have the plane perfectly trimmed first!

Flap Setting Guide from David Stone and Rusty Rood - FL

Prior to painting the fuselage, with the wings in place determine the position at the flap TE when the flaps are at exact neutral (the flap gauge works well for determining the exact neutral position). Mark the point on the fuselage where the flap TE is at neutral. With the point of a knife, etc. make a divot in the fuselage at the mark. Now, even after the fuselage is painted you will be able to see if the flaps are at the proper neutral position by seeing if the TE of the flap is at the divot.

David Stone further suggests that you cover the outside of the Lovesong wing tips with 1/64 Plywood to help make them more ding proof. He used Epoxy to apply the plywood. David went on to report that the first flight on his new Windsong/Lovesong was 11 minutes. In fact, he only had 3 flights on it before he flew it in his first contest. He won both it and the next contest!

Just how high are you . . . Miles? from Miles Moran - CA

Miles, who is famous for being the CD of the Master's Tournament (among other things), was the first one to alert me to the new Casio altitude watch. Last fall he stopped in to pay me a visit (after my Second Wind article on the master's Tournament). When he showed up, I knew E@3 that my life was over and that he had located me to even the score for the article. Much to my relief, Miles is a man of wisdom with a great sense of humor and I really enjoyed his visit . . . I lived to tell about it!

The Casio altimeter, barometer watch costs from $70.00 to $150.00, depending on where you get it. Miles says that the watch has a memory and records altitudes every 9 seconds. The beauty is that you can put the watch in your plane and when it lands see exactly how high it was at various points during the flight. You can also tell exactly how high you are getting on tow, using various launch techniques and tow hook positions, allowing you to maximize your launch height. Some people don't even put the watch inside the plane; they put the strap around the fuselage. It is easy to see that this is a break though item that can lead to new contest events, etc. I envision a contest event with a 3 minute max in which the score is based upon the highest altitude attained during the flight. This event would reward the flyer who can find a thermal, center up fast and climb out fast and efficiently. As I see it, the flight would have to be short or else some of the flyers could easily sometimes climb out of sight. Good luck with the Master's Tournament this year, Miles.

Flap Strap from Tony Palethorpe - CA

It seems that I have had a problem with flap flutter on both my Windsong and my Camano. After stiffening pushrods and supporting them in the middle, I would still experience flutter sometimes. After studying the problem for a while I have come up with a cure that has worked for me. The cure I used was to set up the model for flying and turn it upside down. Set the flap setting for full reflex (about 6 degrees) and while holding the flap firmly against the trailing edge of the wing, place about a 1 1/2 inch piece of plastic tape spanwise across the flap wing-gap at each end of the flap. Since I have done this I have not had any problem with Flutter.

Now I can make those nice high speed dives from altitude to the landing zone without that nice loud hum as the model passes overhead. My theory is that the lace hinges allow the flap to move before and after so much that it sets up the flutter. So by not allowing the flap any before and after movement the problem is cured. As Hunter says on T.V., It works for me.

Putting the Collar on AFART from Dean Almvig and Bill Hanson - WA

When installing a 3 channel AFART in a Lovesong, Dean Almvig prefers to use the black nylon pivot and clevis with the 4-40 bolt installation, as is used with the standard 4 channel AFART, rather than using the sliding rod through the AFART shaft hole. To achieve the sliding effect, Dean uses an E-Z link at the servo-arm with the rod siding in it. You then solder the stop washer on the servo end of the rod rather than on the other end.

Bill Hanson installs the 3 channel AFART, as is shown on the drawings, but rather than using the soldered-on stop washer, Bill uses a wheel collar with a set-screw. This type of stop could also be used on Dean's arrangement above.

Don't Get Stabbed from Bob Dodgson - WA

In case you are ever in a situation where you lose elevator control or where your elevator comes off the plane, do not panic if you are flying a plane with full flap control. If the elevator physically comes off the plane, apply positive flap and allow the plane to go inverted. With no stabs, the CG shifts forward and makes for a fairly stable flying wing in the inverted position. Use the flap control to stabilize the glide path, just as you would use the elevator, except down flap will pull the nose up and up flap will pull the nose down. Very small trim changes make a big difference because you are flying a short coupled flying wing! Once you get F@3 the glide path level and the speed reasonably slow, get off the flap control and use the ailerons to make wide gentle turns to keep you over the field. Plan your landing approach so that it will be straight with no turns and just fly the plane in and gently land inverted. You should suffer little or no damage at all.

If the stab is still in place but the elevator control is dead, try different flap settings to try to stabilize the glider, either inverted, or right side up. It all depends on the position that the stab is locked in. Once you get the plane stabilized, land it similarly to the method described for no stab. Flap control has saved many multichannel gliders from sure destruction, including one of my own.

Letter Rip: August 22, 1989

Dear Sir, Just yesterday I received your Second Wind for the first time and I am as well pleased with your publication as with your Lovesong. It is a perfect point in time because I am transferred back to Germany and tomorrow (8-23-89) I'll take the big 747 to move. Now, my experience with your Lovesong. In your files you can find that I bought it this spring. Although I had some questions while building it (and called you), I really enjoyed every step of constructing this beautiful bird. I have to admit, it is just my second RC model, the first one was an Electra which I had built to learn RC flying basics. Since mid-July, the Lovesong's construction is completed and --as you would expect-- it is flying great. This combination of performance and beauty is overwhelming. I received initial flying assistance from Walter Higgins (Houston) who is a Lovesong flyer too, which I appreciated very much. But without challenging all the capabilities of this nice bird I think it is relatively easy to fly and especially to land. I was and I am still amazed about the flap performance, landing is so much fun that sometimes longer flights are really not necessary. Now I am looking forward to flying the Lovesong in Germany's hill countryside (the German airline Lufthansa will carry the Lovesong very carefully in its Jumbo jet). Do you have customers in Germany? With my excitement I think I will find some. What I do not like with the German kits (as far as I know it from my view point from the US) is that they are ready or almost ready to fly. During German fall and winter season (wet and cool) building one of your gliders should be a suggestive use of time. After being resettled in Germany and

after having some experience flying the Lovesong on hilly countryside I think I'll order another one of your gliders. --George von Hantelmann - West Germany December 18, 1989

Dear Bob, my grandson Ben Owens, of Hayden Lake, Idaho, also trophied at the NATS flying a Camano. (I goofed! I did not know who Ben Owens was. I knew Cliff Mink's grandson was at the NATS flying my gliders but I had never heard Cliff refer to him by name so I never knew who he was. Sorry Ben! --Bob D) He took third place in Standard Class, Junior. He had never flown a Camano until the first flight of the contest. He had flown Windsongs and Pixys. The Camano was set up just like his Windsong and Pixy and flown with the same transmitter as the Pixy. He was in seventh place with two flights to go. He maxed the next flight and was in fourth place. The last flight was one second over and in the circle as were all his landings that day. At the awards banquet, Tom announced the wrong set of winners for that event. I thought Ben would have a fit. They finally got the correct list and Ben got his trophy. Ben will be in the senior class this year, as he will be 15 in March. He is just 60 years younger than I am. --Cliff Mink - WA (Cliff Mink is one of founding fathers of the Northwest Soaring Society from back in 1972. He is also the namesake for its prestigious Cliff Mink Service Award. Best of all, Cliff has been a flyer of Dodgson Designs multichannel gliders since the early 1970s and the TODI days! --Bob D) September 19, 1989

Dear Bob, I am writing to inquire as to the current exact price of the Lovesong (with pre-built fuselage) so that I may remit the proper amount with my order, which will probably come quite soon. I am currently flying my second Windsong and my Pixy; after 10 years of flying, I have retired my old Camano (original straight-vertical fin type). I have often said that the Windsong is the type of sailplane you get out and fly when you're tired of fooling around and really want to out-distance the competition. My Pixy (going on about 6 years old) has really flown well this year, and actually has out-flown all my other sailplanes this season. I have a Prophet 4, Prophet 941, Ultima, Quasoar, Prodigy, Flamingo Contest, Crystal, Alpina and two 2- meter homebrews. I think the Pixy is a very under rated sailplane. Thanks for the newsletters. --Conrad Lesh - IN September 2, 1989

Dear Bob, I received my Second Wind a week or so back. Great stuff, but twice a year isn't enough! How about quarterly? The purpose of this letter is an analogy of something I've learned in my 30 years on the earth. Several years ago we decided to buy a car. I really liked what the Lincoln MK6 had to offer, but the price was a bit more than I was willing to let go of. So, I searched for a suitable substitute. After a 6 month long search, and a mind debate, the thought occurred to me that if I was comparing every car to the Lincoln, then I obviously would not be satisfied unless I bought the Lincoln. It seems to me nearly every hi-performance multichannel sailplane is compared to the Lovesong/Windsong. Your sailplanes have been around for many years, yet lots of new sailplanes now have the features your ships have. Doesn't it seem logical that if everything is compared to the Windsong/Lovesong, that that's the ship to own? IT DOES TO ME!!! --George A. Voss – OK January 18, 1990

Enclosed are two big ones so's I don't miss a single issue of 1990's biannual newsletter. In an August letter to Sailplane (the NSS publication), I opined that the reason for the society's high rate of membership non-renewal was partly due to the washed-out nature of the articles and letters in the magazine. I suggested that the editor study the riveting style and substance of Bob Dodgson's Second Wind. Not only did I receive no reply, I also received no more issues of Sailplane, and no membership renewal notice. Mention of your name certainly does have a powerful effect on people. --J.J. Johnson – TX

Tip - UFO works great for bonding wood, fiberglass cloth, etc. to foam wing cores. You can even seal the LE sheeting to the foam with it. Tip sent in by Gary Barrington - FL (In general, Use Slow UFO)

Advertisements:

BALLAST, ETC. - 1/2 inch Lead filled brass tubes. With wood spacers, half set $12.50 (10 oz, approximately) Full set $20.00 (20 oz. approximately). Sets are based on 8 Inch wing tubes, as specified in Dodgson's kits. Also, a used Camano plus Pixy wings and stabs - all for $450.00. Bill Hanson, 5518 172 Street SW, Lynnwood, WA 98037 (206) 742-4150

LOVESONG COFFEE MUGS - If you're the proud owner of a Lovesong or just admire them, then you'll like this quality 10oz. white ceramic mug with blue artwork (Lovesong in clouds). Available for $9.95 postpaid check or money order from Craig Aho, 23307 45th Avenue W, Mountlake Terrace, WA 98043 (206) 778-7650

Short-Coupled Schumannizers: by Bob Dodgson

From what I have read in many articles by designers and would-bees is that some of them feel that the Schumann planform allows them to fly with a more rearward CG on their glider. This allows them to have less weight in the nose and thus have a lighter wing loading. You read such profound sounding elucidations as I chose this airfoil and planform because it allows a CG position of 45%. In most cases these observations are the dribblings from a mind that has been building too long in a work room with too little ventilation! It appears that many of these Zip-Kicker Sniffers figure the CG location relative to the chord at the wing root, rather than relative to the center of lift of the wing. On the Schumann style wing, with the LE (leading edge) angling back toward the TE (trailing edge) as it works its way out to the tip, the center of lift is moved aft. Hence if you locate the CG relative to the root chord, it appears that you are flying with an aft CG. In effect, all that you have done is shift the wing back toward the tail end of the fuselage so that you have a shorter tail moment and a longer nose moment than it would appear. Therefore, to have a comparable tail moment to that of a conventional wing, you need to have a longer fuselage tail section aft of the Schumann wing TE. If you want a shorter tail moment for squirrely handling, you do not need the Schumann wing, you can use the conventional double taper wing and just move it back on the fuselage! You get the same effect and it is easier to build!

Hot News Items!

Josh Glaab - 3 Time Winner!

For the third time in five years, Josh Glaab has won the ESL (Eastern Soaring League) Season Championship. Josh won the 1989 award flying his Windsong/Lovesong and Pixy (as in previous years).

Partially Pre-built no More

I am sorry to report that we can no longer supply our partially pre-built fuselages for the Pixy, Camano and Lovesong. We thank those of you who took advantage of this service while it was available. Dave Banks was doing these fuselages for us and he is no longer able to continue. Dave has undergone an exciting career change involving night school along with his full time job. Congratulations Dave! By the way, we no longer have any Windsong to Lovesong conversion kits.

We carried them for 1-1/2 years to give everyone an opportunity to get one. I am sorry if you missed out on them while they were available.

Kit Price Increase

Due to a shortage of lightweight balsa and a subsequent steep price increase, we have had to up our kit prices as of October 15, 1989. The Lovesong price is $235.00, the Camano price is $175.00, the Pixy price is $165.00, the Pivot price is $80.00 and the Orbiter price is $70.00. The price of the wing sheeting tape has also increased to $6.00 per roll. A few of the parts prices have increased also. We have not raised our prices for several years but we could not hold the line any longer.

Ready-made Lead Ballast tubes

Bill Hanson sells 1/2 O.D. brass tubes filled with lead that has been melted and poured into them. The set that I have came with two 4 long ballast sections and four 2 sections. Included are also two 4 long dowel spacers and two 2 long dowel spacers. This combination allows you to add 5 oz of ballast, 10 oz of ballast or 20 oz of ballast. See ad for details.

The Lovesong Mug shot

Craig Aho has some nice quality Lovesong mugs available for $9.95 each. See ad for details

Orbiter Kit Review

LeRoy Satterlee is writing a kit review on the ORBITER, to appear in the April or May issue of R/C REPORT magazine, if all goes according to his plans. When we went to press, he had it constructed but still had not flown it.

Total Energy Probe (Everyone wants one!)

For those of you who use (or are interested in using) a thermal Sensor, you should read LeRoy Satterlee's February 1990 Soaring column in R/C Report. It shows how Joe Wurts converts an Ace R/C Thermal Sniffler so that it measures total energy, making it immune to thumb thermals. It seems that this simple modification greatly increases the value of the input from the thermal sensor. If the plane is ballooning, it is losing airspeed and the probe will not indicate lift (the downfall of ordinary thermal sensors). If however, the plane is climbing, due to the presence of lift, the airspeed does not sharply decrease and the probe signals a thermal! This is another great idea from the pilot with the most prodigious (but Wurts [worst?]) probe in soaring!

Reflex, Ballast, Trip and the Eppler 214: by Bob Dodgson

The Princeton wind tunnel test results have another surprise in store for Dodgson Designs E214 flyers. The high speed performance of the E214 is better when the flaps are reflexed 3 degrees than it is when they are reflexed 6 degrees! Settings in between these two flap positions were not tested so it is possible that the optimum lies between the 3 and 6 degree reflex. So, from looking at the plots of the performance of reflexed airfoils, for all practical purposes, I would advise that you never

reflex the flaps more than 6 degrees and that you should strive for a setting of about 4 degrees of reflex. Three degrees is so small a reflex that it is difficult set on a real airplane, given normal servo and control precision limitations. The Princeton test's performance curves on TE reflex may not be quite correct for Dodgson Design flyers anyway because the hinge line used at Princeton was at 22% from the TE. On our gliders it is at 20% from the TE. At any rate, the reflex figure of between 3 and 6 degrees should be a good safe range for you to work within.

As you can see, ballast definitely improves the High-end performance on our kits. Notice that the plot shows: first a tripped Lovesong with no ballast, then it shows the tripped Lovesong with 20 oz. of ballast in the wings. Observe how the L/D actually improves from nearly 26 to 1 to nearly 27 to 1. Interestingly, the minimum sinking speed does not increase much. Even with 20 oz. of ballast, the Lovesong's minimum sinking speed is better than the minimum sinking speed of the Falcon 880 with no ballast, while offering better performance in the high speed end too! The performance versatility of the Lovesong is clearly without peer.

Now, what about the trip? Does it really work on all Dodgson Designs E214 gliders? Does it change the trim? Does it have any disadvantages? Most people who have tried the trip, including David Fraser, O.L. Adcock and Dan Hessilius strongly feel that it offers a perceptible performance boost, just as the plots show. A few people, however, like Al Doig and Walt Voldhard, feel that it impairs handling and possibly has a detrimental effect on performance. So . . . what is the answer? It is possible that the trip is very airfoil-contour sensitive so if your E214 profile is not sanded to an accurate approximation of the exact profile that the trip will not work properly. In other words, it may not work on every Dodgson Designs glider that is flying. One thing appears certain. When you install the trip, you will probably need to re-trim your glider for best handling and to achieve the best performance. Remember, adding the trip is like changing the airfoil itself. It may take some time and effort to get the ship trimmed once again for maximum performance and good handling. This is a small price to pay, however, for a 10% boost in performance! The primary potential disadvantage is that the trip may slightly impair performance at extremely high speeds . . . like speeds over about 45 mph. For thermal duration flying, this is no problem. The enhanced maximum L/D at normal thermaling and cruising speeds is what gives you the best cruising range of any known R/C glider kit (not to mention, one of the lowest sink rates)! At the very least, you owe it to yourself to give the trip a serious try. You have nothing to lose and a possible 10% in performance to gain!

Servos, the Lovesong and the Futaba 9VA: From Dan Hessilius - CO

Dan has been using the Futaba PCM 1024A 9VAP Computer driven radio system in his Lovesong for some time now. Dan used this system at the 1989 NATS where he became both the senior F35 and senior unlimited class National Champion! Unofficially, Dan has flown 30 second F3B speed runs with his Lovesong. The interesting thing is that Dan has opted to only use four servos and to mount them in the fuselage as is shown on the plans. He even leaves the AFART system intact. (We have previously published a good 5 servo set-up for the Airtronics Vision system which would also probably work fine with the Futaba 9VAP.) The primary change that Dan made in the linkage was to eliminate Der Devastator elevator trim bar from the flap arm since he now mixes flap/elev. with infinite control electronically. Dan says: This system allows the pilot full Crow capability, super flap control with mixed elevator compensation, full span TE reflex controlled by one switch, and preset flap launch position. The best thing, however, is that this system uses only four servos! All of these capabilities are achieved by mixing the AFART mechanical mixer and the Futaba 9VAP radio system. This radio is not cheap but for the serious flyer I think the advantages gained by using it more than justify the $670.00 cost. I recommend the S9101 servos that can be purchased with the

radio. The servos are connected to the receiver so that the aileron servo goes in slot #1, the aileron reflex servo plugs into the #3 slot, the elevator servo H@3 fits into slot #2 and the flap servo plugs into slot #8. Now comes the fun part, programming your radio! Start by entering the edit mode then program your name, the name of your model and your security code into the transmitter just as the instructions tell you to do. Next, you set the servo reverses so that all of the surfaces move in the proper direction. After this, go to the program mix screen and set the mix screen according to the simulation of the LCD screen, as is shown below.

These settings are a good starting point but adjustments may have to be made because of differences in installations. You can set all other functions like dual rates and fail safes as you like.

You'll be surprised at how easy this system is to use. Elevator and aileron control are on the right stick, the aileron spoilers are activated by throttle stick and the flaps are controlled by the sliding switch under the right index finger. To get your launch setting, all you do is flip the channel 9 switch, for reflex, you flip the channel S switch. I believe that this control set-up, when used properly is the most useful and versatile control system that you can install in a Lovesong, Camano or Pixy. I hope that you like it as much as I do. I'm sure that after you get used to it you'll never go back to your old system. If you have any questions or comments, feel free to call me at (303) 499-0404. (I personally prefer to have the flap control on the throttle stick. -Bob D)

Email comments, questions or orders to dodgsonb@eskimo.com.

This page was created by Bob Dodgson of:

Dodgson Designs

21230 Damson Road Bothell, WA 98021