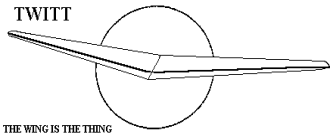
No. 345 MARCH 2015

T.W.I.T.T. NEWSLETTER

This is a more commercial version of the type of models built by Bob Hoey and others experimenting with radio controlled birds. See page 2 for more on how to go about doing these types of designs.
Source: http://fpvlab.com/forums/member.php?1713-Hans&tab=visitor_messaging&page=6

T.W.I.T.T.
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

The number after your name indicates the ending year and month of your current subscription, i.e., **1503** means this is your last issue unless renewed.



THE WING IS THE THING (T.W.I.T.T.)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis.

T.W.I.T.T. Officers:

President: Andy Kecskes (619) 980-9831
Treasurer:
Editor: Andy Kecskes
Archivist: Gavin Slater

The **T.W.I.T.T.** office is located at:
Hanger A-4, Gillespie Field, El Cajon, California.
Mailing address: P.O. Box 20430
El Cajon, CA 92021

(619) 589-1898 (Evenings – Pacific Time)
E-Mail: twitt@pobox.com
Internet: http://www.twitt.org
Members only section: ID – **20issues10**
Password – **twittmbr**

Subscription Rates: $20 per year (US)
$30 per year (Foreign)
$23 per year US electronic
$33 per year foreign electronic

Information Packages: $3.00 ($4 foreign)
(includes one newsletter)

Single Issues of Newsletter: $1.50 each (US) PP
Multiple Back Issues of the newsletter:
$1.00 ea + bulk postage

Foreign mailings: $0.75 each plus postage

Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.75	1.75	1.00
12oz/12	11.00	12.00	8.00
24oz/24	20.00	22.00	15.00
36oz/36	30.00	32.00	22.00
48oz/48	40.00	42.00	30.00
60oz/60	50.00	53.00	37.00

Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive (#1720), east side of Gillespie or Skid Row for those flying in).

TABLE OF CONTENTS

PRESIDENT'S CORNER

This month we have a nice exchange of information on radio controlled bird models courtesy of Bob Hoey and David Riedel. David provided his CAD drawing and Bob his dihedral spreadsheet so you have more than just words to guide you through the discussion. My thanks to Bob for including us in his message traffic with David.

Next month I will start an undated *(probably 1984)* paper on the Preliminary Results of Experimental and Analytical Investigations on the Tumbling Phenomenon for an Advanced Configuration. This was written by Raymond Whipple, Mark Croom and Scott Fears.

The abstract states, “A sustained autorotative pitching motion usually call ‘tumbling’ has been observed during dynamic model tests of the X-29A configuration.”

I think you will enjoy this but I will have to do it over two issues so you will have to wait to see some of the figures being mentioned in the paper since they are not imbedded in the text but included as additional pages at the end. Sorry about that but it is the way the paper is constructed and it would be difficult to chop out the individual figures and include them in order.

I hope those of you in the west are starting your flying season, but knowing those of you in the south and east are having a hard time of it with t he cold and snow.

Andy

LETTERS TO THE EDITOR

(ed. – In November 2014 I published a letter from Jason Wentworth asking about 3-views of the Genesis flying wing model once produced by Peck Polymers in El Cajon, CA. While it has taken some time I was finally able to send the following to Jason:

"I realize it has taken some time, but Gavin, our archivist, provided the following information tonight. So it appears there are no 3-views which would explain why we couldn't find any in our records. I will follow-up with Gavin on whether there is more information we can get about the project from Keith and let you know if I think it will help with your project."

From Gavin: With the help of Frank Allen and Sandy Peck I was able to contact Keith Schwimmer who designed the Genesis RC flying wing sailplane. We had an interesting conversation.
He did the design work on mechanical drafting equipment and passed this on to Bob Peck. One of the employees redid some of this for the production run. Keith said there were no 3 views done as far as he recalled.
I think his story about this would make a good newsletter article.)

Bob (Hoey):

I was reading and trying to compare some calculations you did in regards to dihedral / sweep calculations. You reference a dihedral factor table of constants that I cannot find anywhere. I am trying to use your method to work on one of my pterosaur wing designs, but no luck without this info.

Can you help?

David Riedel

(ed. – The following is the exchange between Bob and David that resulted from this original e-mail.)

David,

Be glad to help, if I can.
I have published several papers over the last few years and don't know which one you are referring to that referenced a "dihedral factor table". In an early paper I did describe a crude calculation that attempted to establish a boundary for the spanwise distribution of sweep and dihdral that would allow a stable starting point for flight test. (I will attach that paper).

(I found a minor error in the resulting spreadsheet just recently, so let me know if you want to use it.)

Bob Hoey

Bob,

The one I refer to is this: http://www.twitt.org/HoeyCalcs.html, specifically Defining the Wing Dihedral Effect, specifically the table of dihedral factor of constants. I have attached the wing design (and pteranodon 3 view) *(see following page)* I am working on for your comment. I was also wondering on washout. I am using the airfoil you used in your Turkey Vulture, but with a flat bottom for better penetration. I was thinking of 4 deg, per your talk on the Albatross, but I am not sure over the whole span. I was also considering spoilers for turning in the center of the span.

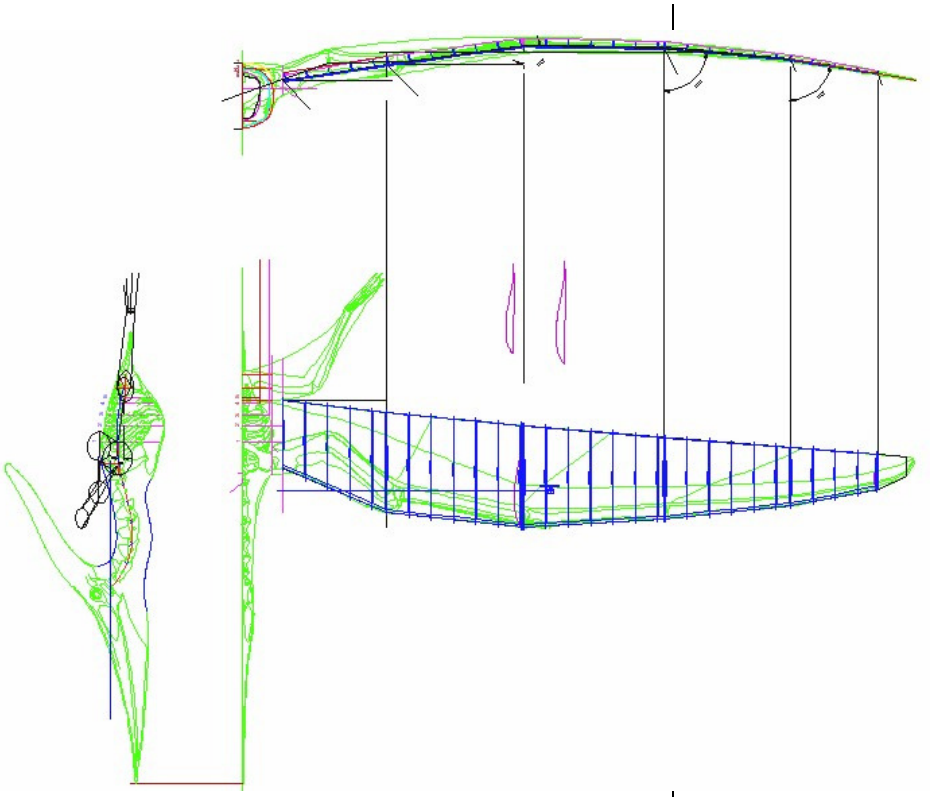
Thanks for any help,

David

David,

I have been through 3 computers and 3 different data storage devices since I started this work 20 years ago. I have not been able to locate the original spreadsheet for the "dihedral factor". It was basically a method for distributing the lift load across the span, and was based on an elliptical lift distribution (plus some other minor stuff that I don't remember). I used this same factor, distributed across the half span, for all of my bird model analysis, and I'd suggest you do the same. It will allow you to compare the "dihedral effect" values for different airplanes, or variations of your own design. The absolute magnitude of this term is not important in itself.
I took your values of dihedral and sweep and copied them into the spreadsheet table (see attached).
(You have to be careful of the signs of the individual dihedral and sweep segments. The inboard sweep and outboard dihedral should have been negative.)

(David's Comment) I was aware of this, but my CAD program only worked in absolutes. I forgot to annotate it before I sent it. Sorry!



The "dihedral effect" value turned out to be -2.36 compared to 10 to 18 for my successful bird models. I duplicated the table (to the right on the spreadsheet) and added 5 degrees of dihedral, and 3 degrees of sweep across the semi span. This got the "dihedral effect" value up to 10.24, which would probably be a good starting point. I would suggest you make structural provisions for altering the dihedral and sweep after you have started to fly. I do that by using an aluminum plate as the carry through member to mate the two wing panels. I can bend, or remake the plate as necessary without altering the basic structure.

(David's Comment) Many thanks! I will try this with the small model first.

I have considered building a pteranodon model but was always turned away by the obvious lack of any means of providing lateral or directional stability. I don't believe that the anthropologists have properly identified the flying configuration of the animal. I suspect that the head was probably doubled back over the body (like a Pelican) which would help some.

(David's Comment) I have been in regular contact with a couple of paleontologists and a paleo artist /flight specialist. They agree that the neck of the pteranodon makes it impossible for it to double back like a pelican, although many modelers do this in their models. The examples I have been given is that it is like geese in flight or a heron. (for what it is worth - Winkworth's pteranodon model flies, but is pretty inaccurate.)

Also, I used to sell R/C pterosaurs that a guy in Germany used to make (fiberglass / Kevlar gliders), they included a pteranodon (attached). The method for getting it to fly was similar to your wing, but the inboard of the wing was positive incidence, and the outer wing's airfoil had an up curve at the end. You flew it with the head off, until you got it trimmed (prevented damage to the head), then added it and did a final trim.

The Turkey Vulture airfoil with a flat bottom should work fine. Washout for the outer quarter of the span is probably a good idea. Most of my models evolved into a hat-shaped lift distribution rather than the original assumed elliptical. Spoilers on the top of the wing should work for lateral control, or you could chop off the outer 15% of each wing tip and use a span wise pivot to produce a tip aileron (like my seagull).

(David's Comment) Thanks for the info on this.

I would also suggest you assemble a simple profile model from 1/32" and 1/16" balsa with a span of about 8 to 10 inches. (I did that with the pteranodon, and never got one to fly). You can learn a lot about basic stability and controllability in your own living room!

Experimenting and trying something new is the fun part. Good luck and let me know how it works.

(David's Comment) I am looking forward to it!

Bob

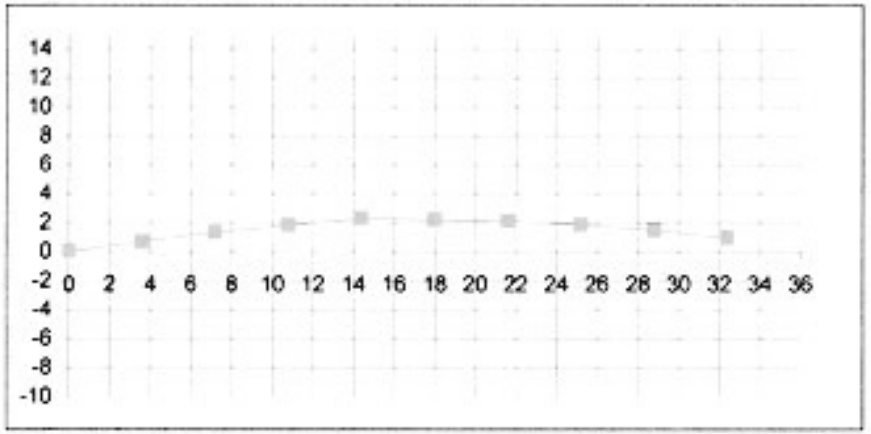
David,

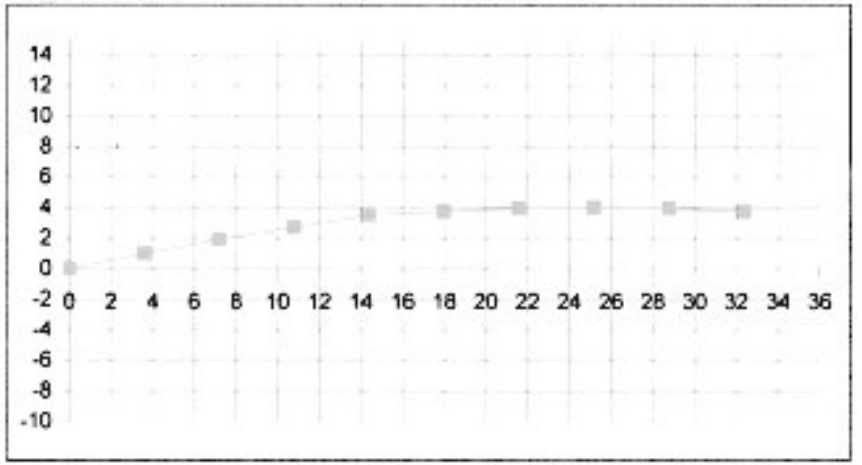
Probably correct about the head and neck. The puzzle remains! The depicted aerodynamic configuration is dramatically unstable in the lateral directional axes. Certainly these instabilities could be controllable with the right control surfaces and brainpower, but the lack of appropriate control

Dihedral/Sweep Calculations

Pteranodon

Station %	Dihedral deg.	Sweep deg.	Dih. + Swp. deg.	Dihedral Factor	Roll
0.025	10.3	-19.1	-8.8	0.02411	-0.21
0.075	10.3	-16	-5.7	0.07159	-0.41
0.125	7.8	-6	1.8	0.11684	0.21
0.175	7.8	-6	1.8	0.15822	0.28
0.225	-1.6	1.3	-0.3	0.19387	-0.06
0.275	-1.6	1.3	-0.3	0.22146	-0.07
0.325	-4.2	2.3	-1.9	0.23787	-0.45
0.375	-5.9	3.4	-2.5	0.23821	-0.60
0.425	-8.3	5	-3.3	0.21281	-0.70
0.475	-10.8	7.2	-3.6	0.10008	-0.36
		Dihedral Effect		=	-2.36





Dihedral Effect for Successful Bird Models

Model	*Dih. Effect*
Raven II (drag flaps for lat. Control)	14.68
Raven III (wing-tip ailerons)	10.91
Seagull (wing-tip ailerons)	16.14
Turkey Vulture (drag flaps or wing-tip ail.)	21.86
Pelican (wing-tip ailerons)	18.21

Station	z %	b=72 y in	z in
0	0	0	0
0.05	0.008939	3.6	0.64364107
0.1	0.017879	7.2	1.28728215
0.15	0.024664	10.8	1.77582245
0.2	0.031449	14.4	2.26436274
0.25	0.030054	18	2.16385225
0.3	0.028658	21.6	2.06334175
0.35	0.024996	25.2	1.79970362
0.4	0.019857	28.8	1.42967765
0.45	0.012639	32.4	0.91003334
0.5	0.003271	36	0.2355097

	0				
dih+5 deg	sweep+3 deg				
5	3				
15.3	-16.1	-0.8	0.02411	-0.02	
15.3	-13	2.3	0.07159	0.16	
12.8	-3	9.8	0.11684	1.15	
12.8	-3	9.8	0.15822	1.55	
3.4	4.3	7.7	0.19387	1.49	
3.4	4.3	7.7	0.22146	1.71	
0.8	5.3	6.1	0.23787	1.45	
-0.9	6.4	5.5	0.23821	1.31	
-3.3	8	4.7	0.21281	1.00	
-5.8	10.2	4.4	0.10008	0.44	
				10.24	

Station	z %	b=72 y in	z in
0	0	0	0
0.05	0.013193	3.6	0.949875
0.1	0.026385	7.2	1.899749
0.15	0.037462	10.8	2.697266
0.2	0.048539	14.4	3.494783
0.25	0.051504	18	3.70827
0.3	0.054469	21.6	3.921757
0.35	0.055167	25.2	3.972018
0.4	0.054382	28.8	3.915475
0.45	0.051504	32.4	3.70826
0.5	0.046451	36	3.344484

surfaces is baffling. Increased dihedral would help (and the gliding value is probably not well predicted by the paleontologists), but this leads to Dutch Roll oscillations and, again no obvious control surface for control. Wing washout would help by unloading the tip, and could also provide lateral control without adverse yaw, but the advantage of the high aspect ratio would seem to be lost.

I seem to remember seeing an Albatross model being flown in the Netherlands (or somewhere) awhile back. Are you familiar with that?

Bob

Bob,

I am not familiar with the albatross, but would like to see it.

We are also working with something that flapped (mostly), but one we have never seen. The best one is Paul MacCready's Quetzcoatlus. Are you familiar with that one? Complete flapping pterosaur with very long neck. In the Smithsonian now, I think.

The other thing is that it is possible that the feet were webbed (many paleontologists think this, and that is how the pterosaurs I used to sell were setup). I have included a photo of an Eudimorphodon which has no large lateral surfaces, but flew like it was on rails. The one with the crest is called Tapejara. There is also a surface that is still subject to interpretation that I think worked like a leading edge slat or change in the camber of the wing, the pteroid bone (near the wrist area, pointing inward).

I really have wanted to make this work for most my life. The first (real) version is a 10ft model (essentially a juvenile), the second would be full size, 23ft (if I ever get that lucky).

Thanks for all the help,

David

Dave,

I am familiar with Paul McCready's pterosaur. He used the only vertical surface available for directional control - the head and crest. Since it was forward of the cg, he used a complex accelerometer feedback system (at fairly high gain) to move the head as a rudder in order to create artificial stability. I doubt that the real creatures were doing that. I considered something similar when laying out my Pelican model. However, when Pelicans are fishing they move their heads down, right or left with no obvious changes in other control functions, so I abandoned the idea. A small addition to the dihedral allowed me to at least obtain neutral lateral stability.

I admire your tenacity! Keep at it, and good luck!

Bob

Mitchell U-2 Threads

Does anyone know if there is a flight simulator for the Mitchell Wing U2, if so where and how accurate is it?

Ryan Derot

I know of something better than a flight simulator. I'd suggest finding someone with a Mitchell T-10 and get a couple of hours of dual. I'd offer to take you up myself but my T-10 was shot so full of holes with multiple shotgun blasts by vandals several years ago that it will never be repaired by me. I've never flown a U-2 but I'm sure even though the T-10 is a high wing as apposed to a mid-wing it's still far better than a simulator.

The T-10 and the A-10 flew much alike although I felt the T-10 was a bit more conventional feeling while flying. They are different from planes with tails but not enough that I feel it's worth mentioning. On landing in a high cross winds I've almost dragged a wing tip a time or two and I wonder if this would be worse in a U-2 with the wing even lower to the ground?

The guy I learned how to fly Mitchell Wings from was out in Kansas. He lived in an old underground Missile Silo. Ed Peden had purchased the Mitchell Wing company and moved it underground in his missile silo where he still lives. He may still know of a guy or two that have T-10 two seaters and that's where I'd suggest you look to get an idea as to how they handle. The links below will tell you a little more about Ed Peden.

Bless our happy missile silo - nateferguson.com
http://www.nateferguson.com/silo.html

And here is his current business: Missile bases,

communication bunkers and underground properties http://www.missilebases.com/ - !about-subterra/cda7

Have a great day,

Brad Camden

Crosswinds affect tailed aircraft in several ways and can be more of a challenge in a tail dragger type hence people who have never flown a flying wing may tell you that since you don't have a tail you will not be affected by crosswinds. Don't believe them. Consider it this way; You are flying in a parcel of air that is moving relative to the ground like a boat navigating a river with current. So long as that parcel of air is not moving exactly parallel to the runway centerline, then you are drifting sideways regardless of whether you have a tail, no tail or are a dust mote.

You can compensate for that sideways drift in different ways. One way is to simply adjust your heading into the wind a little until you observe that your actual track along the ground is in line with the runway which is called crabbing. The problem with that is now your wheels are out of alignment with your direction of travel which is going to make things interesting when you touch down (especially if you're flying a tail dragger) In order to avoid that problem you can fly with one wing low on the upwind side called a sideslip which keeps your wheels headed down the runway but brings that wingtip close to the ground.

In my Swift side slipping is not an option and I would assume the same for the U2, (perhaps Guy can comment). In that case a crabbing approach and then a little last minute rudder to straighten it out is the only safe way to go. It would be well advised to avoid the temptation to fly in any crosswind situation until a good number of hours are on the pilot/wing combo and a good feel for the controls is obtained. Then starting with the smallest crosswind component and building the skill gradually to stronger crosswind component as experience is gained.

Joe Street

Problem with the U2 I am finding is that there is not a lot of info out there, there is a few videos on YouTube but there is no real info on the characteristics of the U2. I hope around April/May time to possibly start flying circuits in my U2 and there is really nobody out there except Guy that can give first hand experience and info on flying the U2 as he seems to be the only one who currently flies or has flown the U2 - everyone else has lots of knowledge but nothing is as good as first hand experiences.

My questions are:

- On take-off, do we let the aircraft lift off itself before we start to pull back on control stick to climb (standard planes we pull back on the controls at a specific speed to lift off but I was told the U2 you do not do that)

- How stable is the U2 in flight, some aircraft I have flown are like trying to balance the plane on a piece of string requiring constant adjustments.

- How do the controls respond? Are they sluggish or does the plane react smoothly and quickly at control inputs

- How is the U2 in the dreaded crosswinds, you can crab in and then bring the nose straight on landing like conventional planes but with the wings so low it requires caution closer to the ground. Obviously you avoid crosswinds but sometimes they creep up on you.

- Is it recommended when doing flight training to attempt stalls to see how the plane reacts and feels (flight training is all about emergency procedures, recognizing stalls etc etc and getting out of them) is it recommended to climb to 3,500 ft and stall the plane or just know the stall speed?

- In the back of my head there is so many what ifs as can be expected, will the plane actually fly, will it crash, will it be stable in flight, will it be fun to fly or super scary etc etc. How did Guy react or respond to these feelings with his first flight, everyone has to have them for a brand new plane that has never flown. People say wear a parachute, but the U2 cockpit is really tight and I don't think one could get out of the cockpit in an emergency, and first flights are at low circuit height altitudes so I don't think there is time or room in an emergency to bail out.

I know the U2 is not like tail or pull prop aircraft, and I plan to take flying lessons in gliders, in pusher prop ultralights to get as much experience and preparation as possible before the first flight.

Ok that's my babbling for now, hopefully Guy can shed some light on this and help or anyone else with info could help :-)

Ryan

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

My book containing several thousand annotated entries and appendices listing well over three hundred tailless designers/creators and their aircraft is no longer in print. I expect *eventually* to make available on disc a fairly comprehensive annotated and perhaps illustrated listing of pre-21st century tailless and related-interest aircraft documents in PDF format. Meanwhile, I will continue to provide information from my files to serious researchers. I'm sorry for the continuing delay, but life happens.

Serge Krauss, Jr. skrauss@ameritech.net
3114 Edgehill Road
Cleveland Hts., OH 44118 (216) 321-5743

Books by Bruce Carmichael:
Personal Aircraft Drag Reduction: $30 pp + $17 postage outside USA: Low drag R&D history, laminar aircraft design, 300 mph on 100 hp.
Ultralight & Light Self Launching Sailplanes: $20 pp: 23 ultralights, 16 lights, 18 sustainer engines, 56 self launch engines, history, safety, prop drag reduction, performance.
Collected Sailplane Articles & Soaring Mishaps: $30 pp: 72 articles incl. 6 misadventures, future predictions, ULSP, dynamic soaring, 20 years SHA workshop.
Collected Aircraft Performance Improvements: $30 pp: 14 articles, 7 lectures, Oshkosh Appraisal, AR-5 and VMAX Probe Drag Analysis, fuselage drag & propeller location studies.

Bruce Carmichael brucehcarmichael@aol.com
34795 Camino Capistrano
Capistrano Beach, CA 92624 (949) 496-5191

VIDEOS AND AUDIO TAPES

(ed. – These videos are also now available on DVD, at the buyer's choice.)

VHS tape containing First Flights "Flying Wings," Discovery Channel's The Wing Will Fly, and ME-163, SWIFT flight footage, Paragliding, and other miscellaneous items (approximately 3½+ hours of material).
Cost: $8.00 postage paid
Add: $2.00 for foreign postage

VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.
Cost: $10.00 postage paid
Add: $ 2.00 for foreign postage

VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (Brochocki,Kasper,Bodek) as related by her father Stefan. The second part of this program was conducted by Henry Jex on the design and flights of the radio controlled Quetzalcoatlus northropi (pterodactyl) used in the Smithsonian IMAX film. This was an Aerovironment project led by Dr. Paul MacCready.
Cost: $8.00 postage paid
Add: $2.00 for foreign postage

An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.
Cost: $5.00 postage paid
Add: $1.50 for foreign postage

VHS of Paul MacCready's presentation on March 21,1998, covering his experiences with flying wings and how flying wings occur in nature. Tape includes Aerovironment's "Doing More With Much Less", and the presentations by Rudy Opitz, Dez George-Falvy and Jim Marske at the 1997 Flying Wing Symposiums at Harris Hill, plus some other miscellaneous "stuff".
Cost: $8.00 postage paid in US
Add: $2.00 for foreign postage

VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.
Cost : $10.00 postage paid in US
$15.00 foreign orders

FLYING WING SALES

BLUEPRINTS – Available for the Mitchell Wing Model U-2 Superwing Experimental motor glider and the B-10 Ultralight motor glider. These two aircraft were designed by Don Mitchell and are considered by many to be the finest flying wing airplanes available. The complete drawings, which include instructions, constructions photos and a flight manual cost $250 US delivery, $280 foreign delivery, postage paid.

U.S. Pacific (559) 834-9107
8104 S. Cherry Avenue mitchellwing@earthlink.net
San Bruno, CA 93725 http://home.earthlink.net/~mitchellwing/

COMPANION AVIATION PUBLICATIONS

EXPERIMENTAL SOARING ASSOCIATION

The purpose of ESA is to foster progress in sailplane design and construction,which will produce the highest return in performance and safety for a given investment by the builder. They encourage innovation and builder cooperation as a means of achieving their goal. Membership Dues: (payable in U.S. currency)

United States	$20 /yr	Canada	$25 /yr
All other Countries	$35 /yr	Pacific Rim	$35 /yr
Electronic Delivery $10 /yr		U.S. Students	Free

(Students FREE if full-time student as defined by SSA.)

Make checks payable to: Sailplane Homebuilders Association, & mail to Murry Rozansky, Treasurer, 23165 Smith Road, Chatsworth, CA 91311.