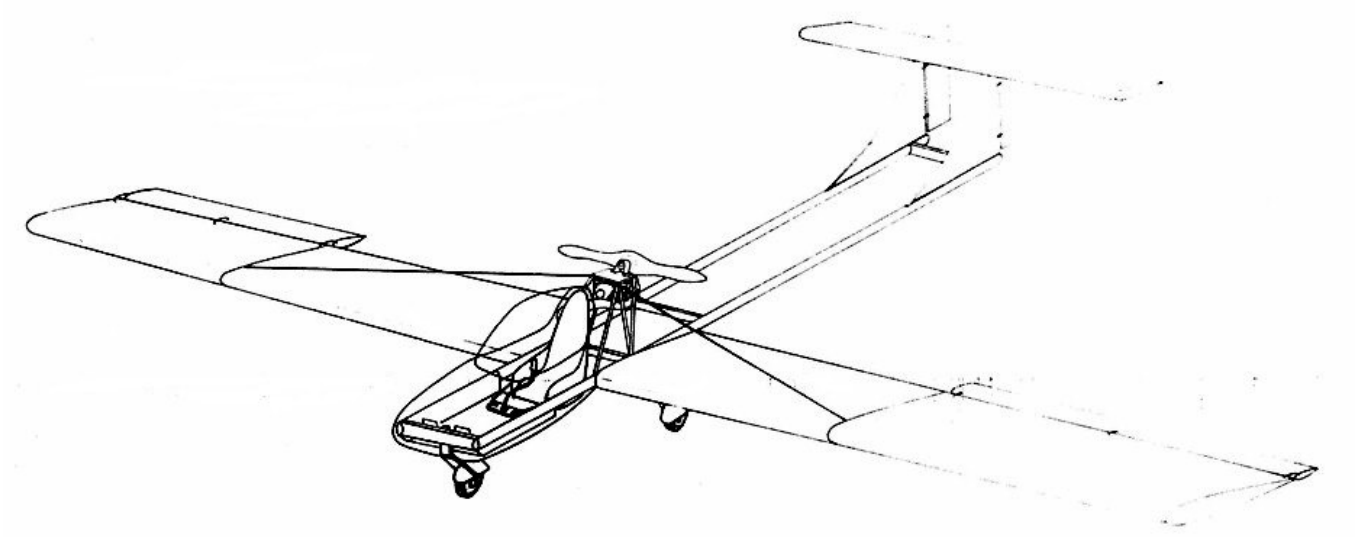
No. 211 JANUARY 2004

T.W.I.T.T. NEWSLETTER

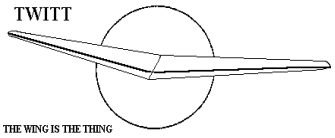


This is a Mitchell P 38 that used to be included in the sales package offered by Don Mitchell years ago. I found it in the material sent to the TWITT archives by Eugene Turner several months ago.

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., **0401** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 17, 2004, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



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. is affiliated with The Hunsaker Foundation, which is dedicated to furthering education and research in a variety of disciplines.

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

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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

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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).

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PRESIDENT'S CORNER

Well, by now you have determined that this newsletter is drastically late. Just before Christmas I had another round of eye surgery that set me back at least four to six weeks in recovery time. I am now at the point where I can get some new glasses to correct the disparity between my two eyes, but they won't be here until next week. So this issue is also shorter than normal, since it extremely difficult for me to work on the computer with only one focusing eye.

I anticipate that all will be normal for the February issue, since this surgery was of the major kind that should provide for a permanent solution. The doctor did say that eventually I will need cataract surgery, but that has become routine and should be able to plan it around my various publishing deadlines.

There haven't been any volunteers for the officer positions that are now open, so we do need to start making a concentrated effort to identify several people to take over these positions. The Vice President position is mostly a ceremonial one, with the primary duty of filling in for the President in the event he can't make a meeting, while filling an important board position for administrative actions. The Secretary position is very similar since we have very little correspondence, other than letters to the editor, and the editor prepares the meeting recaps for the newsletter. The Treasurer position really needs to be filled by someone in San Diego, but it is relatively painless, since the only routine expenses are the newsletter and postage each month. So please consider running for one of these positions and helping the organization to continue with a full board of officers.

I hope everyone had a Happy New Year celebration and that at least one of your resolutions is to finish your current flying with project.

Andy

JANUARY 17, 2004 PROGRAM

We are going to try something different this month. I have a videotape of Jim Marske reviewing his beginnings in developing flying wings, but he also discusses some the concepts and design decision behind the new Pioneer III. I have lost track of who provided the video, but I believe it was one of the Pioneer II owners we feature on the website. As we watch this video, the audience can ask questions directed to Jim concerning the relevant matter in the video. We will then forward these questions to Jim and see what answers we get back.

This approach will allow us to sort of have a renowned speaker without him actually having to be at the hanger. It will be interesting to see how it all works out, but if all goes well we should have some good material to pass along in future newsletters as Jim provides the answers.

LETTERS TO THE EDITOR

December 17, 2003

TWITT:

I enclose $30 as payment for one year's subscription. I very much look forward to your newsletter, as your website is excellent.

Yours in anticipation,

James A.D. Boswell
The Lodge Enterkine
Ayrshire, Scotland KA6 5AL
jamesauchinleck@aol.com

(ed. – Welcome to TWITT. We hope you enjoy the newsletter as much as you seem to have the website. This is a shorter issue than normal, but I should be back on track for the February issue.

If you have any special interests in the area of flying wings, or have some information you would like to contribute for a future issue, please get in touch with me through e-mail.)

December 20, 2003

TWITT:

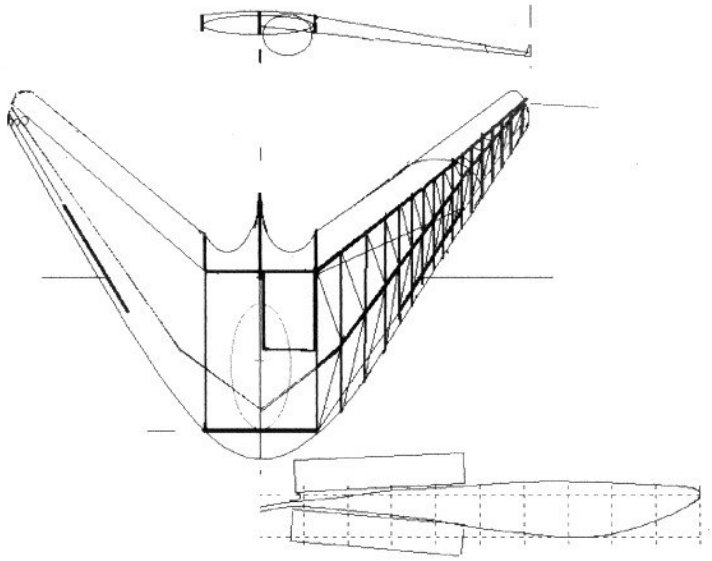
Hello – Please find enclosed the amount of $20 to cover the fee for annual membership in TWITT. I've perused the site for years; 'bout time I joined you.

Sincerely,

Henry E. Whittle
POB 10717
Bradenton, FL 34282-0717
gulfrose@juno.com

(ed. - I would also like to welcome Henry to TWITT. I am pleased to see that there are still people out there looking at the website from time to time, even though I haven't had a chance to update it in quite a while.

Henry also included the following on his letter with no explanation, but it sort of looks like a Horten Parabola. Perhaps he will tell us more for next month?)



January 4, 2004

(ed. – Richard Avalon, of US Pacific – dealer for Mitchell Wings – sent along a piece that looks like it comes from the pages of Sport Aviation. It starts with the top ten reasons Mitchell Wings don't have tails (with apologies to David Letterman). It was written by Richard Anderson or Good Hope, IL. I have included only the top ten portion of the article since the list could apply to just about any flying wing aircraft.)

10. Took so long to build wing, just said forget it, and went flying.
9. If other designers were any good, their planes wouldn't need tails either.
8. Superior stealth configuration fools FAA inspectors.
7. Last page of plans was missing.
6. Pilot is so skillful, doesn't need all that junk out back.
5. Built wing, ran out of money, said forget it and went flying.
4. Only hanger available was real short and real wide.
3. Tails are for tail wheels.
2. Had a tail until that last real hard landing.
1. Makes them look so damn cool!

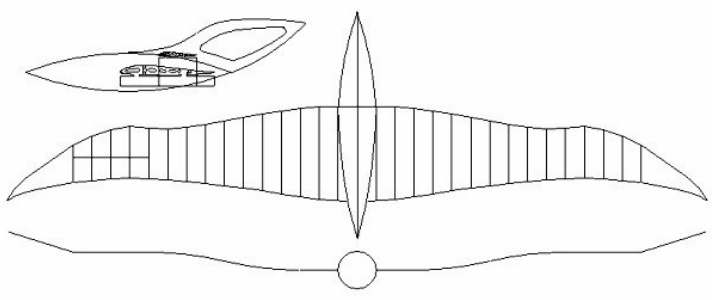
SPIKE

By Pete White

A 2m curvilinear rear sweep ellipsoid gull wing. The airfoil section is EMX07, a reflex section with a near zero pitch coefficient suitable for plank and minimum sweep.

The ribs are parallel to the root and scaled accordingly for the varying chord length. As it is a gull-wing the ribs are produced with a stub attached at two points to the lower surface, these stubs hold the rib above the building board surface (datum line) at the designed height to achieve the curving gull-wing.

Two main spars are produced in situ by constructing a 'U' channel from rib to rib at the maximum depth position top and bottom and a sub spar top surface only which lines up with the hinge line. Each spar is laid up with 120k carbon tows.



The ribs in the control surface area are aligned vertically so that the hinge line is straight and horizontal, this allows for top hinging.

Two brass joiner tubes are set in the wing from R1 to R3 and are strengthened by the carbon spars. A carbon filled brass tube becomes the joiner rod to provide a slop free connection from wing to wing thru the fuselage.

1.5mm sheeting is used to partially sheet the wing, leaving an attractive open framework in the center. The sheeting is applied in sections from rib centerline to rib centerline, the grain is parallel to the leading edge and with care can be wrapped around the leading edge to give a smooth profile. The control surfaces are sheeted in position and then cut away to be completed later, which ensures accurate fitting.

1mm x 28mm ply strip is cut to shape to follow the trailing edge curve and attached to the lower surface to give a sharp, strong trailing edge

Once the upper surface work is complete the wing is sliced from its stubs and removed from the building board. The lower spar can now be laid up and the bottom sheeting completed after fitting the servo and wiring. The control surface is finished off in a similar manner as the wing.

Each wing turned out at about 650gm, I always weigh all my wood stock and divide it into two equal piles, one for each wing. I also make sure the heavier stock is used towards the root. This does make a difference in that there is less discrepancy in the wings when dynamically balanced (something I learned from balancing rotor blades).

The fuselage is still in the process of being built and may well be rebuilt, as I'm not entirely happy with it at present. I'm hoping to produce a sharp tipped elongated rugby ball type of shape, maybe!

All the ribs and fuselage parts were drawn on TurboCad and produced on a Step Four 540 milling machine. The milling machine is a joy to work with and provides the opportunity to produce very accurate results.

Drawings and building notes are available for this and other models if anyone is interested. Though, of course, this one hasn't flown yet!

Pete White
Peter2shaz@yahoo.com

(ed. – These designs by Pete don't look like birds, but you have to admit he is giving Bob Hoey a run for his money in constructing unusually configured wings.)

(ed. – The following items were extracted from the Nurflugel mailing list based on the overall general interest of material being discussed.)

On 03 Nov 2003 Nicholas Cafarelli wrote:

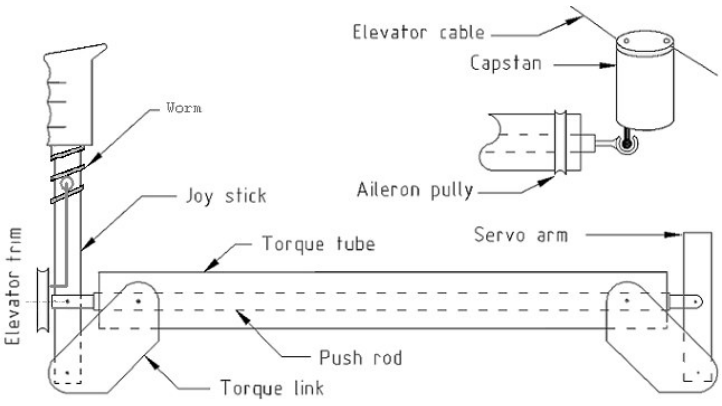
I would appreciate any referral to instructive images of very compact and lightweight control stick implementations.

Alternatively, if you have ideas about very light control systems please do weigh in. No pun intended.

My Plank is high wing and uses horizontal drag rudders and elevons.

Flying Plank control system feedback sought
Norman Masters <nmasters@acsol.net>

Here is a drawing that shows a compact control stick implementation that I adapted from a tandem control that I found in "Aircraft Detail Design Manual". It could easily fit under the armrest. I have drawn two options for the output end:



Either build it as if it were going to be in a tandem seating aircraft and leave the aft stick just a stub that you can use to run whatever mixer you're gong to install.

Or you can replace the servo stick with a capstan and put a pulley on the torque tube.

I believe that in spite of the initial cost of fabricating the capstan it's an economical way to get the control impulses from low in the cabin to a high wing because it replaces 4 pulleys or bell cranks i.e. Fewer moving parts, fewer mounting points and a simpler
frame to hold everything in place.

I added pitch trim by twisting the hand grip. There's not much movement available but if there's no slop in the control circuit maybe it would be enough to operate a tab

Have you looked at the drawings on the TWITT site? http://www.twitt.org/Patents.html The Schultz Surface Control System appears to be the simplest one.

Thoughts On The 100th anniversary...

Al Bowers <al.bowers@dfrc.nasa.gov>

I thought I'd drop in for a moment with a couple of words, thoughts, and an idea.

Last night, after work, I took my sons out into the field across the street from our house (I live at the end of a dirt road at the edge of Lancaster here in California's high desert, the nearest neighbor in that direction is the town of Gorman, about 50 miles distant). It takes me about an hour to get home, so the sun had already set, it was about 35F (near 0C) and getting colder, and it was already pretty dark. I didn't take the time to set up the high start, it would take too long and we'd probably lose the Zagi THL in the dark sky (wasn't it Doug Bullard that tried this at Elmira in '97? ;-). I took a stepladder, and we hand launched. Each of us got a few flights, the boys got about 5 flights each and I got two. The last flight of each, both boys were turning the Zagi back towards themselves. Light breeze, cold and dark.

But we did commit aviation on the 100th anniversary (it isn't often you can do things that teenage sons will think is cool, but they thought this was TOTALLY cool!)...

I watched the celebration at Kitty Hawk. I sent one of the aero engineers, Jennifer Hansen, to support the NASA activities (NASA Dryden only sent three people). Jenn ended up giving three presentations, and sat on the NASA discussion panel (one person from each NASA Center, Jennifer was the ONLY engineer that was on the panel). I felt a little sorry, though envious, of Dr Kevin Kochersburger, the pilot of the Wright reproduction from EAA/Ford/Wright Experience. I felt even more sorry for Terry Queijo, the pilot who was to make the second flight (and never got the chance). Nobody could have done a better job, and to have put a larger engine into the aircraft would not have made it a Wright reproduction. But it makes

the accomplishments of Orville and Wilbur Wright all the more impressive...

A nurflugel idea:

Most of us remember (and all of us are aware of) the space probes Pioneer 10, Pioneer 11, Voyager 1, and Voyager 2. These deep space probes were designed to visit the outer planets using the idea of Gravity Assist (GA) by picking up a little energy off of each planet that they would visit to sling themselves into a higher energy state (taking a little from each planet they visited along the way) to get along to the next planet. All four probes escaped the Solar System using this GA idea. It was one of NASA's proudest moments when all four probes worked beyond their expected lives and goals. The GA idea works best with large planets, which results in high gravity, large bending angles, and therefore gaining large amounts of energy from each planetary close encounter (though you have long transit times to get to the first large planet, Jupiter, you have to contend with heavy doses of radiation, and the alignment of the outer planets is a rare and far between event). GA doesn't work as well with small planets. The gravity is small, you can't get close to the planet because of the atmospheres on most of them, and so the bending angles are small (but transit times are short, and the alignment of the inner terrestrial planets occur often).

It's too bad there isn't a way to extract more energy from the inner planets. It's hard to increase gravity to increase the bending angles...

Or maybe not. What if the deep space probe looked like the X-43 Hyper-X class of vehicles, except of being optimized to work at Mach 7-12, what if they were made to work at Mach 30-60 (no, I did NOT miss a decimal place!)? The latest shapes of hypersonic wave-riders (an extreme case of a delta wing, which is just another nurflugel) can achieve L/Ds of 12-16 at Mach 40 or so. Then you make the deep space probe dip into the atmosphere of an inner terrestrial planet and pull G's DOWN to fly-by (gives new meaning to "planetary fly-by") and make LARGE bending angles and extract a LOT of energy from an inner planet (which is already moving pretty fast because the probe is so close to the Sun). This Aero Gravity Assist (AGA) idea is being promoted by Jim Randolph at JPL (he's been working on it for over 20 years). Some of the trajectories that Jim has calculated are very promising. A quick digression: Voyager 2 took 3+ years to reach Saturn (after the fly-by of Jupiter) and 12 years to reach Neptune (after fly-bys of EVERY large outer planet). Using an AGA maneuver in fly-bys of Venus and Mars get to Saturn in 25 months, or gets to Pluto in exactly 5 years. Even better, AGA may also allow you to slow down when you reach the planet. Also, a Venus AGA trajectory to Mars gets you to Mars in 4 months (might a manned flight to Mars, and back, take less than a year using AGA?). And the inner planets align about every 18 months for a mission to some large outer planet target of opportunity. Jim is going to come talk with us about his idea in about a month, because of our Hyper-X experience and our background in turning ideas into hardware.

Wouldn't it be something if the future of deep space interplanetary travel came from atmospheric aeronautics flight? With a nurflugel no less. Imagine the possibilities...

I hope everyone had a wonderful 100th Anniversary, where ever you are. And if I can't get back to all of you, have a Merry Christmas...

Wing On A Whim
Doug Holverson <dholverson@cox.net>

I'm in the early stages of designing a proof of concept RC 'wing, inspired by the Hortons (who else?). I'm going by instinct because I don't have that much of a clue yet. Sort of inspired by a couple of article in On the 'Wing. I have it sketched out in Compufoil.

1.2 m span. 30° LE sweep. 9 ribs 75mm apart. Eppler 168 foil. 1/16" ribs, 1/32" sheeting.
First panel from ribs 0-2, 300mm, root 200mm tip, no washout, kind of a beaver tail.
Second panel from ribs 2-4, 200mm root, 150mm tip, 2° washout.
Third panel from ribs 4-8, 150mm root, 50mm tip, 7° washout, the tailing 1/3 is elevon.

Any suggestions and improvements?

Carlo Godel <regiaero@acsol.net>

Doug,

The wing tip is very small (50mm) with a very small amount of area it will probably not work with only 7 degrees of washout. If you were working in cm it would but not at this small a chord, you might have to increase the washout by a substantial amount or reduce the taper. I am not familiar with the Eppler 168 airfoil but have used a number of
differing types developed by myself and Barney Wainfan for free flight competition both indoor and outdoor none of which have any significant numbers associated with them. their significance is they work in the mm scales you are proposing for your model. If you

would like I could draw up a few and submit them off list as .gif files for your use.

David Swanson <DavidRSw@bdumail.com>

Hi Doug,

How about looking at this a little differently. What would happen when this wing is at stall? Say the airfoil stall is at 13° AOA. Your design has the root at 15° aoa and the tip at 8° aoa (7° of washout). Rib 4 aoa is 13°. What happens to wing loading on the outboard wing area (ribs 4-9)(42% of wing area) when the inboard "half" (58% of wing area) stalls? It roughly doubles (same aircraft weight with only 42% of area lifting that weight). And what happens to the stall speed of that outboard "half" span when the wing loading is "doubled"? It increases. But the current airspeed hasn't increased.
So we have a stall on the inboard 58% of wing area and a progressing stall toward the tip. Is this a recipe for a spin? Now here's your question: would increasing the washout help this situation?

Carlo Godel <regiaero@acsol.net>

Simple Dave,

Don't stall. The washout is used for pitch stability more o than for stall propagation along the span, if the tip does not stall then you still have control even though falling at a higher rate allowing for the controls being at the tips of the wing where the have far more authority. With the very small chords being used the airfoils must be very thin to obtain reasonable lift/drag performance. Also the CG has to be fairly close to the leading edge of the wing at 20 to 25% MAC and closer to 20 the better for penetration in windy conditions. In a model of this size a sharp leading edge is essential for noticing the stall when it occurs, a thick leading edge softens the stall and it may be too late to recover if you don't see it happen. A sharp leading edge has a sharp stall that is very visible and is eminently better for recovery above ground level. I have never had a wing spin after a stall unless I was flying inverted and then it made one spin and nosed out of it. Forward CG is all and a good airfoil shape. His sweep angle, planform and washout angles are all within a reasonable set of dimensions and his model should fly with fair performance as designed.

Dug Hlverson <dholverson@cox.net>

So how could I improve it to get beyond fair performance, lets say good or even great performance?

AVAILABLE PLANS & REFERENCE MATERIAL

Coming Soon: Tailless Aircraft Bibliography Edition 1-g

Edition 1-f, which is sold out, contained over 5600 annotated tailless aircraft and related listings: reports, papers, books, articles, patents, etc. of 1867 - present, listed chronologically and supported by introductory material, 3 Appendices, and other helpful information. Historical overview. Information on
sources, location and acquisition of material. Alphabetical listing of 370 creators of tailless and related aircraft, including dates and configurations. More. Only a limited number printed. Not cross referenced: 342 pages. It was spiral bound in plain black vinyl. By far the largest ever of its kind - a unique source of hardcore information.

But don't despair, Edition 1-g is in the works and will be bigger and better than ever. It will also include a very extensive listing of the relevant U.S. patents, which may be the most comprehensive one ever put together. A publication date has not been set yet, so check back here once in a while.

Prices: To Be Announced

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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
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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

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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
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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
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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.

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NURFLUGEL

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By Karl Nickel and Michael Wohlfahrt

498 pages, hardback, photos, charts, graphs, illus., references.

Nickel and Wohlfahrt are mathematicians at the University of Freiburg in Germany who have steeped themselves in aerodynamic theory and practice, creating this definitive work explaining the mysteries of tailless aircraft flight. For many years, Nickel was a close associate of the Horten brothers, renowned for their revolutionary tailless designs. The text has been translated from the German Schwanzlose Flugzeuge (1990, Birkhauser Verlag, Basel) by test pilot Captain Eric M. Brown, RN. Alive with enthusiasm and academic precision, this book will appeal to both amateurs and professional aerodynamicists.

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