No. 275 MAY 2009

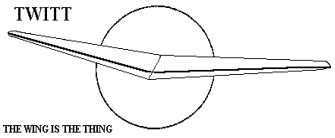
T.W.I.T.T. NEWSLETTER

Pioneer III fuselage under construction by Jim Marske. First test flights may occur in May or June depending on how the weather cooperates for doing the finishing work. Beautiful lines. Source: http://www.marskeaircraft.com/flyingwings.html

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., **1005** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, May 16, 2009, 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.

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Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.75	1.75	1.00
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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).

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PRESIDENT'S CORNER

Most of you in the US know that the postage rates are going up by 2 cents on May 11, 2009. I am glad to announce that this will not necessitate a rise in subscription fees since I have been able to control some of the production costs. The same will apply to those issues mailed overseas.

It was nice to have a lot of material to choose from when putting this issue together. It sure makes this aspect of my job easier. As I mentioned before, Jason Wentworth has contributed a lot of material on a number of subjects that will be inserting in future issues.

For those of you on the west coast, I have seen the speaker line up for the ESA Western Workshop that will be held over Labor Day weekend. Bruce Carmichael and his team have put together another stunning program of subjects and speakers. If you are interested in learning more about regenerative soaring, aircraft design , electric flight and solar power, then is the place for you. Since it held at an active FBO, Mountain Valley Airport (L94), you will also be able to get an aero tow if you have a ship or go for a rental ride over the Tehachapi valley. There is usually a small contingent of ultralight fans who do car tows in the morning and evening hours after the FBO operations are complete. Something for everyone.

I don't know where the time has gone, but I am almost caught up again to the point where I can start on the next installment of back newsletter on the website. My goal is to have everything posted by the end of the year, or sooner if I can. I hope you all enjoy going over back issues or reading them for the first time.

Andy

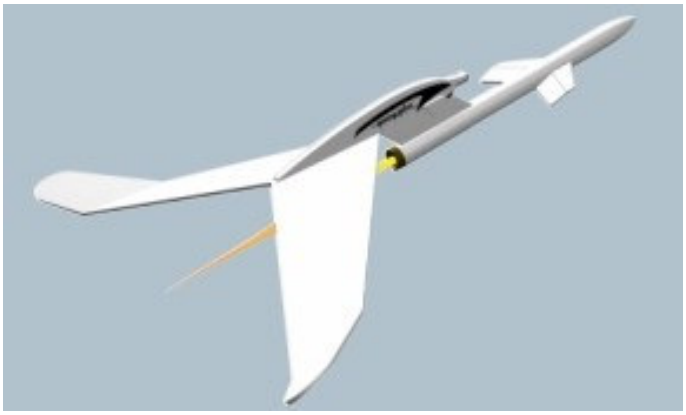
LETTERS TO THE EDITOR

March 26, 2009

I have arranged for several Flying Wing model kits to be sent to you. Please feel free to use them however you wish (building them yourself, or giving them out at TWITT meetings as raffle prizes, etc.).

Starlight Model Rockets is sending you a Sparrow kit and a pre-production Zoomie kit. *(ed. – see the March issue for more about these kits.)* This kit will come with an upgrade parts kit that will allow it to also be flown as a Hand-Launched Glider (HLG) *and* a Catapult-Launched Glider (CLG).

Also, Semroc Astronautics Corporation www.semroc.com is sending you a Nighthawk kit.



This kit does NOT come with instructions, but the instructions are online here www.spacemodeling.org/jimz/k-34.htm and here www.oldrocketplans.com/estes/estK-34/estK-34.htm . Semroc's listing for it is here www.semroc.com/Store/scripts/prodList.asp , and here are two reviews of the kit www.rocketreviews.com/reviews/all/sem_nighthawk_xkit.shtml . Semroc recently stopped manufacturing the Nighthawk kit because Estes (which owns the trademark on the Nighthawk) told them to stop. However, Semroc continues to manufacture and sell all of the Nighthawk kit's separate individual parts (Estes does not own a trademark on the individual parts since they are "generic"). The glider portion of the Nighthawk would also be a good model to fly with the Czech-made Rapier motors (www.rapier.cz and www.shortysbasement.com/index.php?act=viewCat&catId=5).

One other tidbit about the Flying Wing model kits that are coming to you: the Starlight Model Rockets Zoomie kit (originally developed by Holverson Designs) and the Semroc Astronautics Corporation Nighthawk kit (originally developed by Estes Industries) both have diffuser tips with angled break-lines (which converge at an imaginary point ahead of the nose). These "oblique-cut" diffuser tips provide both washout (for pitch stability) *and* directional stability. (The Starlight Model Rockets Sparrow kit has diffuser tips whose break-lines are parallel to the model's centerline.) Tim Van Milligan at Apogee Components has written a technical report that covers diffuser tip-equipped Flying Wing boost-gliders, see: www.apogeerockets.com/Education/downloads/Newsletter15.pdf .

By the way, Doug Holverson (the Zoomie's designer) is mentioned on page 7 of the May 1999 TWITT newsletter in connection with diffuser tip-equipped boost-gliders! (Small world, eh?) Also, if you would like to launch these models under rocket power, Estes starter sets (containing a rocket kit, a launch pad, a launch controller, recovery wadding, and 2 or 3 model rocket motors) are available for only $15 - $20 at Wal-Mart stores as well as at most hobby shops. Just add 4 "AA" batteries for the launch controller and you're ready to launch!

Jason Wentworth
<blackshire@acsalaska.net>

(ed. - Thanks for all the material and the arrangements for the models. I know we will have some fun with them in the non-powered mode once they are built. We have now received 4 models as a result of Jason's connections with these hobby vendors. Please take a look at their websites and thank them for the freebies by buying one of their wing projects. You don't have to do the rocket-powered version since some of them can be hand launched. I will let you know how ours turned out when we get a chance to glue them all together.)

Has Pat Oliver ever published a book of his paper airplane plans (especially the Flying Wing ones)? If not, does he have a "loose leaf" compilation from which I could purchase photocopies?

If he would like to produce a book, Lulu.com www.lulu.com is a good self-publishing service that has no hidden "gotchas." (I am using them to publish my equine autobiography, and I chose them after researching the various self-publishing companies.)

Jason

(ed. – I answered with the following: Pat has a lot of drawings that he did on an old Apple computer and continues to play around with numerous ideas on all types of flying machines. Unfortunately, he doesn't have a working e-mail address so I can pass along your suggestion. However, he will read this with his next issue so the word will get to him that way if I don't get a hold of him before that time.

It sounds like you are having a good time going through all the old newsletters. I think I am going to have some time next month to get another couple of years added, which will only leave 3 more years to finish having all of them available on-line.)

March 30, 2009

Here are my member dues and subscription renewal plus a little extra for all your patience, and once more for "carrying" me after my subscription had run out.

Also here is the aviation section in my fun collection of erroneous predictions and noteworthy observations for your future use as filler or as you otherwise see fit. I predict if you run any of them, somebody else out there will have fun adding to the list.

(ed. – I have included a couple of Larry's one-liners below and will include others over time as filler as he suggests.)

> "The only time you have too much fuel, is when you're on fire."
>
> "When one engine fails on a twin-engine airplane, you always have enough power left, to get you to the scene of the Crash."
>
> "Airspeed, altitude and brains. Two are always needed to complete the flight successfully."
>
> 'The Piper Cub is the safest airplane in the world; it can just barely kill you.'
> - Attributed to Max Stanley (Northrop test pilot)
>
> 'You know that your landing gear is up and locked when it takes full power to taxi to the terminal.'

Here's some old news that may be new to you and some of the readership to tide you over.

http://boeingnews.web.boeing.com/archive/10_06/102706/061027p_bwb_photo.html is link to nice photo of BWB on the ground below.

Boeing to begin ground testing X-48B BWB concept

In cooperation with NASA and the U.S. Air Force Research Laboratory, Boeing Phantom Works will soon begin ground testing its X-48B Blended Wing Body concept in preparation for flight testing early in 2007. (Bob Ferguson photo)

Larry Witherspoon
<larry.d.witherspoon@boeing.com>

(ed. – This also in from Larry on the X-48B as of 4/17/09.

The Boeing X-48B Blended Wing Body demonstrator lifts off for the 50th time at the NASA Flight Research Center at Edwards Air Force Base, Calif. (NASA Photo by Carla Thomas)

X-48B Blended Wing Body demonstrator makes 50th flight

Boeing Research & Technology engineers and technicians in California earlier this month successfully flew the unmanned, remotely piloted X-48B Blended Wing Body flight-research vehicle for the 50th time, marking another milestone in the company's effort to explore and validate the aerodynamic characteristics of the BWB concept.

"With each test flight, we become even more confident that the BWB design can be flown as safely and reliably as any other large transport aircraft with a conventional configuration," said Bob Liebeck, BR&T's BWB program manager.

Since July 2007, when the X-48B flew for the first time, Boeing and NASA researchers have been methodically pushing the research aircraft to test

and validate the BWB data and flight-control system, and gather detailed information on BWB stability characteristics throughout a variety of flight regimes, including stalling and recovering the aircraft in flight. Last September, the X-48B was stalled and recovered in flight for the first time. About 25 more flights are planned for this year at the NASA Dryden Flight Research Center at Edwards Air Force Base, Calif.

"For a cutting-edge X-plane to fly 50 times without a significant mishap is a testament to the talent, dedication and methodical approach that our combined team has taken in preparing for each flight," added Mike Kisska, X-48B project manager.

With a 21-foot wingspan, the 500-pound airplane is an 8.5 percent scale model of a heavy-lift, subsonic airplane with a 240-foot wingspan that possibly could be developed in the next 15 to 20 years for military applications such as aerial refueling and cargo hauling.

Unlike a traditional airplane design in which a tube-like fuselage is fitted with wings, the BWB merges the fuselage with the wing. The result is a cross between a conventional aircraft and a flying wing such as the B-2 stealth bomber. The blending of the wing into a wide, flat tailless fuselage helps to get additional lift with less drag than an airplane with a circular fuselage.

Boeing and NASA researchers believe the design offers such potential benefits as increased volume for carrying capacity, efficient aerodynamics for reduced fuel burn and reductions in noise due to propulsion integration options.

The X-48B flight-research is a collaborative effort of BR&T's Enterprise Strategic Growth organization, NASA and the U.S. Air Force Research Laboratory.

Larry

April 10, 2009

I have been looking back at old emails and found yours. Just in case you have not looked at my website lately, Don Westergren and I have teamed up to show all available photos and the true history write up on the 71X project (Rohr 175), which will be eventually turned over to the San Diego Air & Space Museum. If you or any of your members have any factual data that we have not been able to retrieve, I would appreciate hearing from you all.

http://www.fraseraerotechnologycompany.com/Rohr_2-175_Fan_Jet.html

Richard Fraser
<rcfraser@pacbell.net>

(ed. – This was included in the July 2008 issue, but I thought it worth posting again since from what he said in this message, there may be more information on the web site than a year ago. Take a look, since it is the largest collection I have seen of pictures and other supporting documentation for this program.)

April 11, 2009

I am enjoying your newsletter work -thank you.

Do you know anything about a book Al White was writing about his North American Aviation test work including B 70 flight-testing? It is almost a flying wing (Delta)! I read an excerpt but he died in the last year or two. Extremely interesting stories of ingesting leading edge parts at high speed...

Thanks

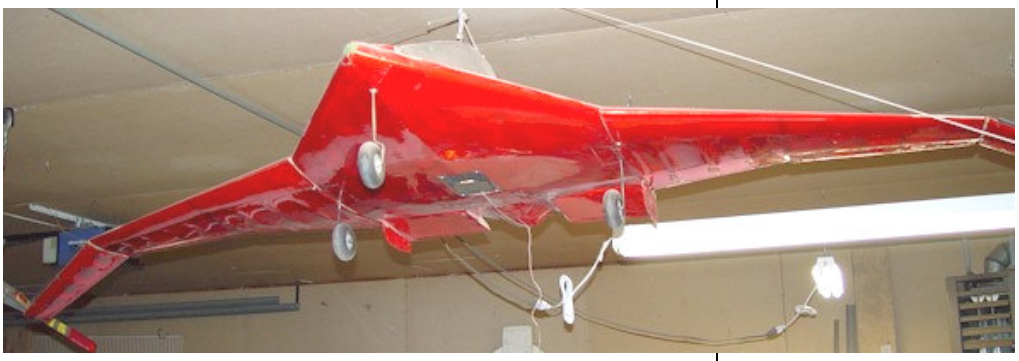
RCDave
<rcdave@webprecision.com>

(ed.- We don't have any information relative to Al White so perhaps one of our members might know of Al's work and what has become of it if he has passed away. If so, please contact Dave and include TWITT in your message.)

April 14, 2009

Reading the posts in the latest newsletter regarding Nurflugel threads on Northrop wing slots, by Mike Thompson and Al Bowers, thought I might offer some comments for the Newsletter.

Designing my next project (started back in 1985-90) which closely resembled what a few years later Boeing began referring to as a blended wing body, I ran into the flying (swept) wing's problem of varying roll and yaw moments which, I then discovered in Hoerner Fluid Dynamic Lift, p. 14-8, the moments change as the lift coefficient (AOA) changes.



With the math assistance of my son Timothy, we patented (5,078,338) a simple mechanical variable geometric dihedral device that maintained the design roll and yaw stability moments by linking them to the lift coefficient... one way being to just link them to the pitch trim. We offered the patent to the manufacturers of swept wing aircraft, but the bean counters have a policy of not buying ideas from outside the corporations, and prefer instead to use complex, expensive quadruple-redundancy to attain artificial stability.

For high Cls the geometric dihedral needs to be reduced, and for lower Cls, increased. If this seems counter-intuitive, I suggest watching some (relatively tailless) chimney sweeps hunting bugs at dusk... swooping around with negative dihedral. I built this into a quarter-scale electric-powered RC and it seems to work. (See attached).

Regarding the wing slots in the YB-49, I had the pleasure of interviewing Chuck Tucker, the last remaining Northrop Wing test pilot, a few years ago, for my book. He offered some opinions on his 100+ hours of flying the #1 YB-49 Wing (after the #2 crashed and AF pilots refused to fly the tests.) Chuck flew the tests, including through all the AF's radical aft CGs of 30%-plus, and even recovering the huge bomber from a spin. Chuck thought the slots didn't contribute much to the wing's stall characteristics, but then all the Wings had slots, and none didn't. I'll check my copy of the XB-35's Erection and Maintenance instructions to see if the slots could be locked closed ... and if so, then will e-mail Chuck to see if he ever did stalls with them locked closed. Chuck is still interested in airplane design, and has built and test flown a quarter-scale RC version of his 10 ft. by 10-ft. Vortex, what his friends call a 'flying manhole cover', which performs beautifully, as recorded by a mini-camera on board.

Terrence O'Neill
<troneill@charter.net>

(ed. – Thanks for the insight and the picture of your design, which definitely has the BWB look.)

April 16, 2009

Well, I emailed Lindsay Olen about a month ago about Facet Opal, so far without response. Also had emailed Al Backstrom to get his latest thinking on Flying Plank, and no response there either. Maybe this new Gmail address of mine is having problems with sending. Otherwise, if you hear anything from Lindsay Olen, or were email him for more Facet details, I'd sure like to be in the loop.

Bart
<bartbrown08@gmail.com>

(ed. – I did a follow-up e-mail to Lindsay but have not heard anything back from him either. It is strange from the standpoint that Lindsay made the initial contact through our guest book. Perhaps he just out of touch for this period and we will hear from him soon.)

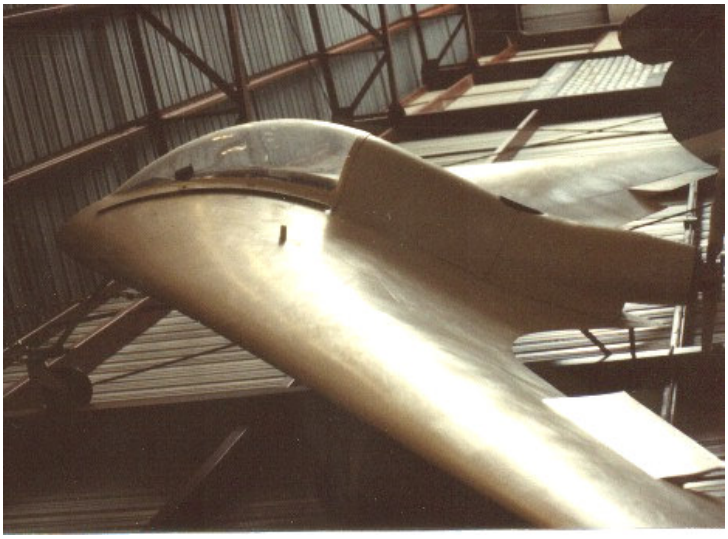
I am looking for any in-depth info anyone can offer on the SA-882. I just was pointed to an online article at TWITT about it, I'm looking for 3-view or whatever you have!

Thanks

Jarrett Johnson

(ed. - Although Rod Shapel is a member of our group and comes to meeting days once in a while, he is very

cautious talking about this design and any of its details. I assume this has something to do with his contractual obligations with the owners. I seem to recall that it has been removed from the Planes of Fame museum at Chino by its owners and is now in Arizona or Texas for possible continuation of project development. That was about all we could get out of him the last time he visited.)



April 19, 2009

Thank you for the most interesting information. I had a couple of questions for the group with respect to the SA-882. The first of which is : did it ever fly? Secondly, is it a Horten derivative?

It looks beautiful. It is also clear that Rod has overcome a whole series of challenges in getting it to the stage it was in 1985.

Is there any information on who is continuing the investigation /development?

Regards

John
<johntenhave@yahoo.com>

April 15, 2009

I am not sure if this isn't already on the TWITT web site; here is the web site for the Paperang www.paperang.com paper airplane, which is a Flying Wing. The Paperang is said to be the highest-performance paper airplane.

Jason Wentworth

March 28, 2009

On page 3 of the January 2005 TWITT newsletter there is an illustration of a late-1940s British Flying Wing jet airliner (which originally appeared in the February 1947 issue of "Fortune") that was under development at that time. This airliner is shown with *no* air intakes for its four jet engines, and this was no mistake on the part of the artist.

The designers' plan was to use a boundary layer suction system to achieve laminar flow over 100% of the wings. The jet engines' compressors would act as the "vacuum pumps" for the boundary layer suction system, and the system's numerous tiny openings in the wings would serve as the air intakes for the jet engines. The two Armstrong Whitworth A.W.52 Flying Wing research aircraft were built as "N9M style" sub-scale test vehicles for the airliner. Here is a link to a 3-view drawing of the A.W.52 (see: www.aviastar.org/pictures/england/arm_aw-52.gif), and below are links to photographs, specifications, and historical information on the A.W.52 (including a YouTube video of its first public flight!). Here they are:

www.aviastar.org/air/england/arm_aw-52.php
www.airbornegrafix.com/HistoricAircraft/FlyingWings/AW52.htm
http://en.wikipedia.org/wiki/Armstrong_Whitworth_A.W.52

Here is a 4 minute, 19 second long YouTube video of the British Armstrong Whitworth A.W.52 jet Flying Wing making its first public flight in November of 1947: http://www.youtube.com/watch?v=7H1tyMRtcho . After a series of spectacular flight sequences culminating in the landing and the test pilot's brief post-flight remarks to the press, several of the spectators are shown

rubbing their hands together inside the openings of the A.W.52's still-hot jet engine tailpipes! (It *was* a cold November day, after all...)

Jason Wentworth

(ed. – I included this since the YouTube link also contains the ability to view several other videos of flying wings, like the N9M, Horten and Horton (Wingless). There is a listing to the right side of the page that will show you which videos are available.)

Nurflugel Bulletin Board Threads

H IX V2 film

I think there is some footage of the H-IX V2 and hopefully some of it will be on TV this year. There was a video on YouTube last year (gone now) that had a few seconds of what looked like the H-IX V2 with the root extension painted white. We talked about it on the Homebuilt airplanes bulletin board.

<http://www.homebuiltairplanes.com/forums/design-structures-cutting-edge-technology/2742-lifting-body-discussion.html#post17454>

There's an announcement in this issue of Air & Space Smithsonian that a show about the Ho-229 will air on the National Geographic channel on June 28 (History Canada for you guys up north). Apparently the Northrop/Grumman model shop made a full-scale radar range mockup and tested it against period radar. I don't care about that because any stealthiness would have been coincidental, I'm just hoping to see some old pictures and maybe some film. I hope the producer, Michael Gorgensen, got some good leads from the request for assistance that was in the TWITT newsletter last January or February.

Norm Masters

Nice article on the Ho 229 on page 8 of A&S this month. Northrop Grumman is building a full-scale replica of the Ho 229, to do radar visibility testing.

They're using period radar to determine how stealthy or not the design was.

A film, "Hitler's Stealth Fighter", will air on the National Geographic Channel at 9:00 p.m. ET on June 28.

Wonder what's going to happen to the replica afterwards? Since it's not an actual airplane, the Smithsonian probably wouldn't be interested (but it would make a nice side piece to the actual plane, wouldn't it?). I hope some museum somewhere gives it a good home.

Doug Holverson

I have seen minimal footage of the Ho9-V1 being towed, and a few seconds of it landing. It was initially identified just as a Horten glider and was in a bunch of WWII films being reviewed at NASM in the 70s. A whole bunch were considered unstable and dangerous due to their nitrite content, and stored in a concrete bunker at Silver Hill ... not the NASM facility, but adjacent land run by the photo group. It was always contentious due to the fire risk and cost of maintaining. Several fires occurred while attempting to review films.

Remember, this was long before digital copying, and those schemes were difficult, dangerous and expensive. I know a photog with file cabinets of aviation pix in a hangar at Montgomery field. When he died, some one got concerned about the old film, and the fire marshal just jumped in and burned them all.

Bob Storck

R/C Park Flyer Wings

Are there any?

Doug Holverson
<dholverson@cox.net>

If you are into foam, the world is your oyster, everything from 24" almost pocket size wings up to 9' and 10' wings. Balsa is not so common, with only a few park size plans that I know of. The Wingthing and the Soslo are two that are talked about on R/C groups.

Rob
<robnurflugel@gmail.com>

The only things you need for slow flight are low wing loading and a fine pitched prop. Large control surfaces are good too. With modern equipment it's easier than ever to keep the wing loading down. A few years ago some guys started converting the little 22" SimiAir N-9M to RC. See top left column on next page.

http://www.rcgroups.com/forums/showthread.php?t=404501

At the time the components seemed tiny but since then I've seen planes with motors about the size of a cigarette butt

Norm Masters

You can check out the one I made here, 60" span electric.

http://www.rcgroups.com/forums/showthread.php?t=687359

There is also a smaller diesel powered one I designed that would make a good electric conversion

http://www.rcgroups.com/forums/showthread.php?t=704384

I have plans for both these if I can dig them up, if you are interested.

Chris Doughty
<chris.doughty1@grouply.com>

Nurflugelers,

In the last year, I've been able to photograph three of the surviving Hortens and get the images accepted at airliners.net (a feat in itself). With Russ Lee's help, last October I was able to photograph NASM's Horten IIIh and Horten VI V2 at Udvar-Hazy and in March I photographed the Horten IVb at the Planes of Fame Museum. My photos are here:

http://www.airliners.net/photo/Horten-IIIh/1510852/L/
http://www.airliners.net/photo/Horten-VI-V2/1429868/L/
http://www.airliners.net/photo/Horten-IVb/1517817/L/

As you can see in these photos, the VI V2 is in the best shape of the three. The IVb looks neglected, but hopefully will get some attention in the future.

David Lednicer
<dlednicer@yahoo.com>

Great pictures!! But sorry, the Horten flying wing at Chino in the Plane of Fames Museum is a Horten H IV, not a H IVb . It is that machine, flown by Rudi Opitz in the early fifties at the US Soaring Nationals and later evaluated by Dr. Raspet and Györgyfalvy. But this
plane later had been changed, compare the lower part of the center section to the H VI in NASM, both had a similar shape behind the skid.

The sole finished H IVb has been destroyed in the fatal accident at Göppingen Jan 18, 1945 when Hermann Strebel lost his life due to flutter. The series production had been started near Rottweil (Eastern Black Forest) but no machine could be finished until May 8, 1945.

Peter Selinger
<Peter.F.Selinger@jocki.org>

Can anyone shed some light on "the coefficient of lift" Please? I have the formula for coefficient of lift, viz:

9.81 * Weight in Kilogrammes / 0.5 * 1.225 * Velocity(M/s^2)* Wing Area(M^2).

For the average flying wing this comes out at 0.2 -0.3 approx. at an airspeed of 30-40mph or 13.4 M/s - 17.88M/s to kep to the metric system. As the speed rises the C.L. decreases obviously as the velocity is placed on the bottom line. Now I frequently see figures of 0.4 - 0.6 quoted? In order to work out the required washout for a wing we are told to use the C.L. at cruise so where do we get such high figures for the C.L?

My calculations for the wings I have designed have assumed a mass of 1.5Kgs, one lower and in the future possibly 2.5Kgs so this will give a top line in the formula of 1.5 - 2.5 * 9.81 to give Newtons!

Obviously I have missed something somewhere!

Ken B. Bristol, U.K.
<kenbaker_roegate@yahoo.com>

Pioneer III

Jim *(Marske)*, would you give us an update on the P III. I'm still hoping to buy plans for it some day.

Mike Thompson
<MikeT52@roadrunner.com>

Work is progressing on the P-3 cockpit. Also installing a tail ballast box in case it's needed. The forward canopy hinge needs a little rework. Then it's a lot of sanding and painting on the wings. So if the weather co-operates and we get the work done expect first flight in late May or June.

Jim
<jim@marskeaircraft.com>

Is anyone on the list involved with any of the current UAV designs? It is interesting to see the military return to lower speed efficient aerodynamic design.

http://www.popularmechanics.com/technology/military_law/4254321.html?link=rel&dom=mil&src=syn&con=art&mag=pop

Killer Bee UAV First Look: Raytheon Fights Boeing in Drone Race

Nick Sturm
<grindelsturm@yahoo.com>

Interesting. Placing the rudders below the CG increases the yaw-to-roll coupling, which is already high in a swept wing design. I wonder what they achieve by that. Maybe no ailerons are needed.

Bill Daniels
<bildan@comcast.net>

I recently saw video of this development with the split "wingletrons", which clearly draws on the wingtips of birds for inspiration.

http://technology.newscientist.com/article/dn13573-wings-with-elbows-allow
http://www.aer.bris.ac.uk/research/morphing/wingletrons.html

Rick Page
<rick-page@shaw.ca>

(ed. – You have to see the videos to get the idea on this one. I couldn't get an image to satisfy your curiosity.)

Practicalities

To digress a bit from the aerodynamics of Nurflugels, I'd like to discuss some mundane things like pilot placement. I think we'd all agree that the pilot needs unrestricted visibility to whatever degree that is possible.

Swept back wings, at least for sailplanes, result in awkward cockpits with the pilot well back from the leading edge, which compromises the pilot's ability to see ahead and down. The Horten IV and VI used a kneeling, some would say praying, position that was uncomfortable and still offered limited visibility to the side. Most seated cockpits are well above or below the wing increasing frontal area. Swept forward wings allow for a more conventional reclining cockpit and pilot visibility.

If you add a pusher engine and propeller, that shifts the CG far enough aft that the cockpit can be farther forward to balance the engine but the combination significantly increases the polar moment of inertia about the pitch and yaw axis. Even with pusher engine(s) most swept wings have the pilots' eyes aft of the leading edge.

The pusher propeller also complicates the landing gear design, which must protect the prop arc from runway contact.

Discussion open.

Bill Daniels
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(ed. – I found it interesting that this didn't create any discussion beyond this one message. There was a lot of short blurbs on R/C designs, including swept wings, but nothing seemed to pop up bringing in this thread.)

EPB-1 Plans

Al donated the EPB-1 plans to the VSA many years ago.

I bought a set of the EPB-1 plans from the VSA about 5 years ago and still have them. They were photocopied versions, cost about $80. I'm guessing they still have the originals and are probably still for sale. If not, I'd be happy to send mine back to them to copy so they could sell more. You shouldn't scan them and put them on the web unless the VSA says that is ok.

They consisted of 8-12 sheets of E-size drawings and they expect a fairly decent level of engineering drawing interpretation skill as well as an understanding of wooden aircraft structure knowledge. Many details aren't shown at all (such as gussets in the corners of ribs), but at the time they were originally made, "everybody" just knew they were required. Now, that isn't true, at least for me. I talked to Al about them a few years ago and he gave me some clarification.

One problem with the copies is that there is a critical area, I believe of the pitch/roll mixer, that was completely illegible on the copy. VSA's was no better. If someone does have a more original copy of the plans, that would be a very nice thing to scan and pass along. If someone does have more original plans, please let me know. I'd find my plans (hard, since I just moved 2,000 miles and everything is in boxes) and let you know which drawing sheet and zone has the problem and I'd love to get a better copy. The bad area probably fit on a standard 8.5x11 or maybe an 11x17 sheet, so it would be easy to copy.

Dennis Olcott
< dennisolcott@hotmail.com>

I read the messages about drawings and was surprised especially the last from Dennis Olcott. The reason is following. My father, another member from VGC Germany and I would like to built a Horten Ib. The reasons for the Horten Ib are:

- There are no available drawings for the Horten I
- *Easy* to build you don't have to make a steel tube fuselage (my father is learned wood plane builder)
- Practical experience with this aircraft by Diego Roldan Knoellinger
- Next year we celebrate 100 years of Bonn-Hangelar home of the Horten brothers and bring back some history
- Because my grandfather worked at Horten

But I was surprised when I contacted Mr.Uden to purchase copies off of the whole drawings. The prize for them is about 500$ for them. (I got the whole drawings for our Scheibe Bergfalke for free). So I'm really surprised about the prizes for drawings when you buy them from VSA.

Joerg Schaden
<joergschaden@googlemail.com>

There might be some intellectual property payment in the price but the method of reproduction can really affect the cost. Just a few years ago we could only do 2 or 3 E size sheets on a plotter for $500. The large format ink jets have cut that cost to 1/5. But good old photocopies are still the cheapest way if the plans fit. If you value the time in construction at even $10/hr, $500 for a good set of plans is a small part of the investment. However, my Scots blood also cringes at paying $500 for something that might be free from another source.

I saw one estimate that less than 1 plan purchased in a hundred ever results in a plane that flies so seeing your level of commitment someone should offer you the plans for $5 ;)

Good luck and we all hope this project works out for you.

Rick Page.

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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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.

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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 $140, postage paid. Add $15 for foreign shipping.

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