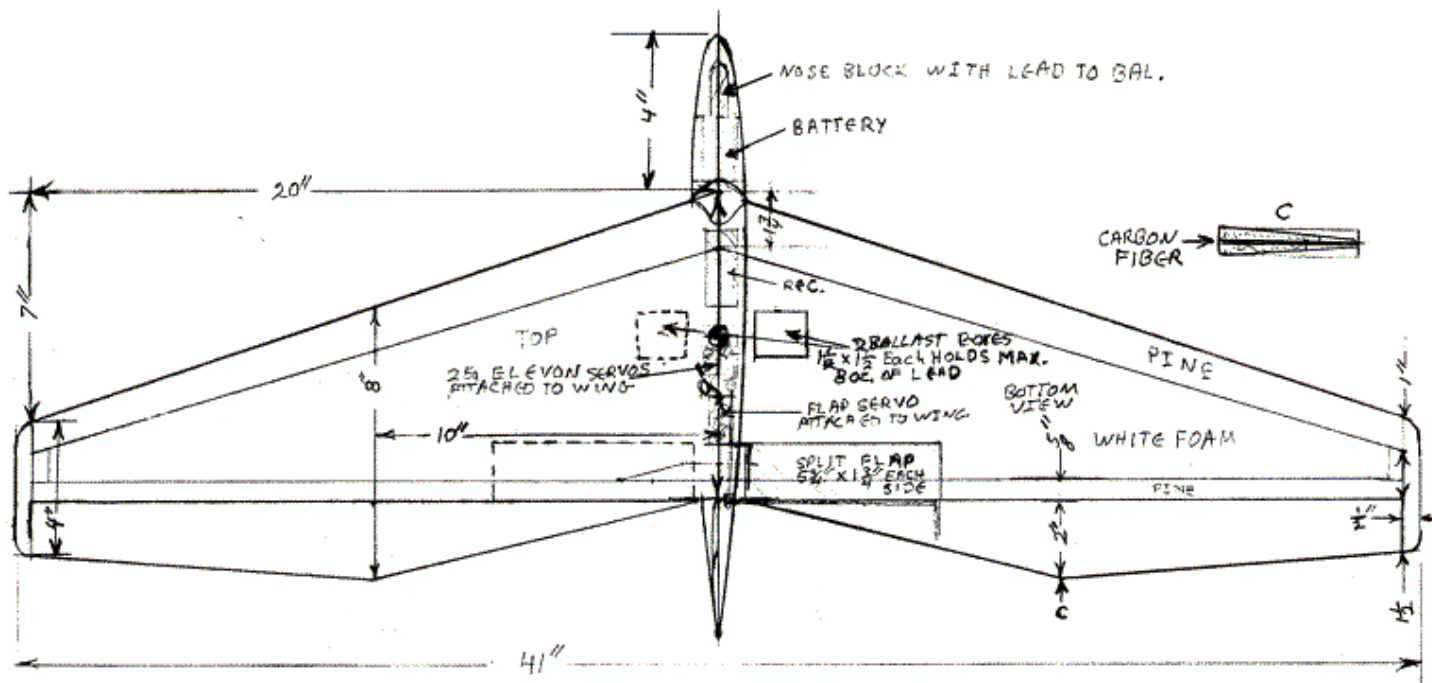


# T.W.I.T.T. NEWSLETTER



This is a portion of the line drawing of Allan Morse's modifications to the "Thing 1" that was published as a smaller picture in the letters section. It looked so good as a separate image, I had to add it to the cover.

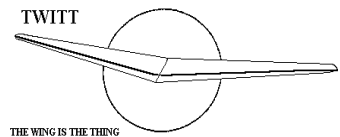
## T.W.I.T.T.

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., 0511 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, November 19, 2005, 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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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**

**W**ell, we are approaching the end of another year but we haven't seen a lot a new activity in the world of flying wing development. From all the Nurflugel bulletin board items I have posted over the past months it is obvious there is a lot of interest by a small group of people. However, the number of flying wing aircraft in the sport flyer arena hasn't seemed to increased that I have heard about. It sounds like there are those who would like to build but don't have the skills to do the complete package from design to final construction.

I made a small note in the program announcement about no having one for this month and what we might do in the future. I would appreciate any feedback from the group about how you feel about there not being very many programs each year. Obviously, most of you can't attend them so all you get is the information I can impart through the meeting recaps in the newsletter. In some respects it would be just as valuable to put in first hand articles on specific subjects, but I need the group to provide them since I don't have the expertise to write such material.

I apologize for not getting to the web site updating that I mentioned last month. I didn't anticipate my work schedule would take so much out of what I consider my spare time. But being an independent service provider means doing what it takes to get the job done within the specified time period quoted to the client. Hopefully, this is going to relax a little in the weeks ahead as some of the short-term deadlines disappear and I my free time might be my own again.

One more issue to go for 2005. I will start looking for more material that includes pictures to help with the text, which just didn't work for this issue. I know pictures always add a great punch to the issue and I try to make sure they are there for next month.



**NOVEMBER 19, 2005  
PROGRAM**

I regret to say we still do not have a program put together for the last meeting of 2005. I put out some feelers, but haven't heard anything back that I can hang my hat on for a sure thing. It is an unfortunate thing that programs are getting so hard to come by, but part of this has been our longevity as an organization and the dwindling resources in Southern California to approach for doing a program.

We are going to probably have to rethink our approach at having meetings, even quarterly. There is a smaller group of members in the area to attend meetings and in many cases the subjects have been somewhat off-topic from time-to-time. I will let you know what we decide in my column next month.

I hope everyone has a great Thanksgiving holiday with their families.



**LETTERS TO THE  
EDITOR**

October 12, 2005

Hello-

Something weird happened I'd like to pass on. I received the TWITT Newsletter yesterday and after reading James McLellans response to Douglas Russell-White tried to access the TP on the NASA Technical Reports server. The PDF opened with the title page of what, according to the tool bar, was an eighty page document. The page then froze and I had to reboot. I went through this twice. Today I searched the document and according to NASA it does not exist.

Lets see what tomorrow brings.

Regards,

Henry Whittle  
gulfrose@juno.com

*(ed. – Here was my reply that should have solved the problem.*

*"I see your problem. I tried again just using 1324 in the search window and the 32nd listed item was the paper.*

*I downloaded the PDF file but it is 5 megs so I didn't figure Juno would allow it through to your box. Hopefully you can find it the same way I did and then download it for viewing."*

*If anyone else was having this difficulty, I hope this gets you to the file.)*

October 16 2005

Hello TWITT:

I have been trying for two weeks to locate anyone that has built a wood/fabric constructed U2 Mitchell Wing. I want to build one, but have questions concerning plans and instructions. I have built model planes with better instructions. If there is anyone out there that can help please contact me.

Thanks to whomever.

Russ Roy "Russ" Russom  
olcdog@pngusa.net  
Ph# 706-624-1720

*(ed. – For some reason I didn't answer Russ to find out if he was having trouble getting a hold of Richard Avalon to help work out his questions on the U-2 plans. If anyone out there can help him with some first hand experience with the plans and/or the actual construction, I am sure he would appreciate hearing from you.)*

October 21, 2005

The Horten/Selinger book Nurflugel has been sold out for a long time in this country. A few used copies are available on Amazon for \$ 125 and up.

I am pleased to announce that I now again I have a limited supply of the sixth printing of Nurflugel available for only \$ 65 including S&H.

A Check or Money order for \$ 65 will get it to you before Christmas.

Jan Scott  
12582 Lutheran Church Rd  
Lovettsville VA 20180  
<flycow3@msn.com>

*(ed. – This should be some good news for anyone out there that has been wanting a copy of this book and couldn't find one.)*

November 5, 2005

I am 6 months into a new facility at Lakeport, CA's airport. We do model UAVs, glider repair, etc. I still have a new WESLAKE 80 hp engine I will give to a wing project with a future. We can build molds here, just need a committed labor force.

Howard Allmon  
<howardallmon@netzero.net>

*(ed. – Sounds like there is a good deal for someone building a flying wing that could use an 80 hp engine. If you are in that position or know of anyone who fits the bill, please let them know of this offer.)*

**From the Nurflugel bulletin board:**

October 6, 2005

Phil Docktor created the new cancellation for Edwards AFB. Looks like he's a YB-49 fan with five of them in the art.



Bob Storck  
<bstorck@sprynet.com>

<http://www.bellx-2.com/sightings/index.html>

October 7, 2005

Subject: Ho IX / 229 V3 Restoration

I have just heard that David Myhra plans to write a book about the restoration of the Ho IX V3. So it seems that finally the restoration is becoming concrete now. Does anybody have more information? Where will the restoration take place, when will it start, and who will be involved ?

Maik Swoboda"

<ErzwoD2@hotmail.com>

So what is news about the restoration? Is it really going to be restored... or is this just talk? If so - are they going to attach the set of wings that survived the war ... or restored just the main fuselage?

Sam van Rensburg  
<jugger\_nautus@excite.com>

Sorry, unfortunately there seems to be nothing more than the plans to write a book about the restoration - but no decision has been made so far regarding the restoration. So there's no real news about it. :-)

Maik

I believe that the Smithsonian Horten is the prototype for the long-range bomber/high altitude fighter ordered into mass production by Reichmarshal Göring. I know that a set of wings, which were probably designed for this nürflugel jet survived the war. So it is possible to have a complete, authentic Ho 229.

This Horten has been rotting away in the Garber facility for decades now, along with numerous other treasures and trophies of war. Are we going to have to wait another lifetime for restoration? At least have the aircraft put on display 'as is' -or- even better, send it BACK to Bonn, Germany in honor of its builders, Reimar and Walter Horten. I am confident that it will be restored in a hurry then :-)

We can dream, can't we?

Sam van Rensburg

Sam,

If that is the Ho-IX V3, then I believe it is somewhere between a prototype and a pre-production version of the Go-229 (Go-229A-1?) which would have been the single seat day-fighter version. Others that have visited the Garber have also commented that the wing set associated with the center-section appear to be roughly covered in plywood, lacking slats and other features, and that this was apparently done post-war as part of the exhibiting of German "war trophies". I believe it was our own Reinhardt Stadler that made the point that this particular aircraft was still a "work in progress" and could really not be considered as any kind of a definitive aircraft. The V7 two-seater radar night-fighter center section was, AFIK, photographed at Gotha post-war, but was not preserved.

As an example, the Me-262's that were used as models for the Stormbird project, while still low

production, \*were\* series production aircraft, fairly stable in construction from one to the next, with definite controls, flight characteristics, etc. Even the Do-335 was closer to a series production aircraft than the Go-229. Also, it must be remembered that this is a military aircraft design - the design, construction, and testing parameters are significantly different from those of a private or commercial aircraft.

I don't believe the long range bomber design ever got any further than that - a design, probably with some scale models built for wind tunnel testing, possibly a partial mock-up of a cockpit or defensive turrets - but nothing more since the war ended shortly thereafter. If anything survived, it was probably destroyed later in post-war "clearing actions".

I think it might be possible to do some restoration or at least arrest the further deterioration of the center section, but making a full exhibit aircraft out of it? That would be nearly impossible. I had corresponded with Reinhardt on this several years ago when I had a dream of building at least a large scale flying model of the Ho-IX, but he had finally convinced me that this was something that would be out of the reach of a casual builder - it would take a full research and factory group to finish the design and testing that would still have been needed to make this a production aircraft that was reasonably safe to fly.

Edward C. Regal  
<eregal@skypoint.com>

Unfortunately, a museum audit back in the 80s concluded that the aircraft is incomplete, especially the wings, and no evidence exists as to which drag rudder scheme was selected (a major point) and what drawings exist are largely contradictory. Also, a lot of the details you quote are based on printed speculation, not fact.

The majority of the items have been restored, or are on the schedule. It doesn't pay to rush things, and make mistakes or do sloppy work. Rotting is a harsh word, and conservation is a prime objective, whether restored or not. I'm delighted to see the He219 near complete, and would love to see the Bv155 done, even though it also was never completed.

Bob Storck  
<bstorck@sprynet.com>

I have been told that the fuselage was about 75% completed when it was captured. Although looking almost complete from outside it was still lacking essential components, like the radio equipment. The wings have been captured at a different site, more than 100 off Friedrichroda and these have obviously been

far behind the constructional status of the fuselage and also very much incomplete. The aircraft has been "completed" and painted in the US for exhibition. Even the swastikas must have been applied in the US. Gotha did a lot of changes to the original Horten design. Noone really knows how the finished V3 would have looked like in Detail, even though a lot of blueprints survived.

The best way to restore it, would be to bring it back to a conserved unpainted 75% completed status. Everything more would be fiction.

Maik

October 11, 2005

Subject: Marske Seminar and Workshop:

I hate to make this look like an advertisement which it probably is. But several times a year we have put on a flying wing workshop, which covers composite design and aerodynamics. This session will be held in my home workshop and we will discuss wing design including the Graphlite carbon rod wing spar. This is the strongest carbon yet developed made by a special process. Design of composite structures and types of materials will be well covered. My all composite 15 meter Pioneer 3 flying wing sailplane is near completion and may be viewed. If you are interested in attending the seminar check out our website at [www.marskeflyingwings.com](http://www.marskeflyingwings.com) and [marske@marion.net](mailto:marske@marion.net) for further details. It is scheduled for October 28 and 29 in Marion, Ohio.

Jim Marske  
<marske@marion.net>

*(ed. – I included this one even though the workshops will be over by the time this newsletter reaches you. However, you can keep an eye on Jim's website and see when the next set of workshops will be held so you can register early and be assured a spot.)*

*(ed. – This tread is really quite long, but I have decided to include most of it since there is a lot of information included in all the messages.)*

October 13, 2005

Subject: Looking for book

Just wondering if anyone knows where I might be able to get a copy of Tailless Aircraft in Theory

and Practice , by Karl Nickel and Michael Wohlfahrt.  
 Either the 1994 or 1997 edition would be great.  
 New or used but hopefully inexpensive ;-]

Dave  
 <Gnat@Shaw.Ca>

ABE has several copies, all close to \$150. Didn't know my copy was worth so much!

<http://www.abebooks.com/>

Bob Storck  
 <bstorck@sprynet.com>

I got a new one from AIAA (10/2003, \$84.70 on my check). They had just printed them. If you have already checked with them, then I presume they sold out. That was the only source I could find at the time, other than \$150 from abebooks; and I ordered it with the expectation that it would be available in a few months, which turned out to be over a year.

Interesting item: above the copyright (1994) it says, "Transferred to digital printing 2003." It'd be nice of books like this could be accessed online, downloaded, or reprinted on demand (for a reasonable fee, of course!).

Donald E Haselwood  
 <dhaselwood@verizon.net>

Thanks. I have contacted AIAA but haven't heard back. I located a few copies on Amazon for \$134 for the 97 edition. And a couple more all around that price. When I searched AIAA they didn't even show a listing for either.

Dave

I heard that the price had gone up. Bummer, heavy sigh even. See if your local library can borrow it from somewhere else. In the US we have over 150,000 libraries. I got my first look at "Nurflugel" through interlibrary loan and it came from the Wright Pat AFB library. Being a smaller country, population wise, Canada doesn't have as big a pool to draw from but it's worth a try. If you're in southern Ontario Stefanie Brochocki might have a copy that she'd be willing to share unfortunately I've misplaced her phone number. Some of the formulae got mangled in translation so when you get a copy of the book you should also get the errata from Serge Krauss. He e-mailed it to this list but I haven't been able to find it in the group archives or my own. As I understand it the new high priced books are printed to order so the

corrections may be in the text but it's always a good idea to check.

Norman Masters  
 <nmasters@acsol.net>

Unfortunately I'm in the wild, wild west in BC (its not the end of the world but you can see that from here...)

I found 3 copies out east in Ontario and Quebec so I'll try to get one through the intra library loan thing first.

I did email AIAA but no response at all going on a week. No idea if that normal or not either. I did find other sources that claimed to sell the book but their prices were \$110 and \$135US. With exchange and tax I have to add about 40% to those prices to get the equivalent in Canadian peso's.

I'm about half way through the archives I've seen a few mentions of the updates but I don't think I've seen any post with a list. I'll keep an eye out for it though. Just thinking there was mention of it being uploaded to the files section when the list was hosted by Onelist.

Dave

Well it looks like my options for getting this book have about dried up. I talked to AIAA, the regional and other libraries (for loans), as well as a couple of chain bookstores and no one seems to have a copy of the 94 or 97 edition.

If anyone has one sitting on the shelf collecting dust let me know or if you can help drop me a note off list to [Gnat@shaw.ca](mailto:Gnat@shaw.ca)

Dave

The list of corrections that I printed out and put in my copy shows them being posted on this list by Serge Kraus, around Nov. 25, 1999.

Don Stackhouse  
 <djaerotech@erinet.com>

Here's the link to the message of 11/25:

<http://groups.yahoo.com/group/nurflugel/message/900>

That's only the last 1/3 of the hard copy I have. The first part, with most of the math corrections, seems to be missing from the group archive. My own archives go back to '97 but they're spread out over three HDDs, each with a different OS, in different locations. Hopefully SK will send it again but, just in case, I'll see

if I can find the text file with both e-mails. If worse comes to worse I'd be glad to send a photocopy.

Norm Masters

Found it. Msg #900

Dave

And the other 2/3

<http://groups.yahoo.com/group/nurflugel/message/852>

Norm Masters

**O**K guys, here's what I have. These are copied from e-mails dated up through 2/2000 and presumably cover what I knew at that time. These are probably not all of the possible corrections, but include all that I'd found. Karl Nickel was very generous and concerned that any discrepancies be cleared up and provided most of these. Al Bowers also advised me on some parts that were unclear to me at that time. So what follows may not be the whole story, but it's probably most of what you need to know. The first two lists (including what has been cited here recently) were posted to the Nurflugel List:

Serge Krauss  
<skrauss@ameritech.net>

The first set sent to Nurflugel list:

Format - page/line: "current version" ---> "revision"

35/18: "negative or tail heavy" ---> "negative or nose heavy"

39/ formula (2.1.6): " ... = -4 (...)" ---> " ... = +4 (...)"

39/figure 2.1.6, right: "dcm/dn" ---> "- dcm/dn"

41/7: "(tail-heavy negative)" ---> "(nose-heavy negative)"

41/3 from bottom "in flight direction" ---> "in flow direction"

44/formulae (2.2.5) to (2.2.8): "F" (in denominator) ---> "S"

45/1: "(h(y) = 0)" ---> "(h(y) = h(u))" (retain 3 bar equivalence symbol, as given)

45/formulae (2.2.9), (2.2.12), and (2.2.3): "F" (in denominator) ---> "S"

48/figure 2.2.3, lower part: Reverse signs on "n": n = -20 deg. becomes n = +20 deg., etc. (positive above and negative below horiz. axis)

50/formulae (2.2.15), (2.2.16): "F" (denominator) ---> "S"

51/formula (2.3.2): delete last "dy" only

51/formula (2.3.3): "F"(denominator) ---> "S"

72/5: "aicraft" ---> "aircraft"

76/formula (2.7.5): "2P(1 + 2Z)/(1 + Z)" ---> "2P(1 + 2Z)/3(1 + Z)"

88/11: "formula (2.5.1)" ---> "formula (2.2.10)"

93/formula (3.3.2): Add to right hand side the term "h(0)"

96/5: "to be taken inot account" ---> "to be taken into account"

116/8 from bottom: "at slow speed" ---> "at high speed"

185/13 from bottom: "not even be invented" ---> "not even been invented"

187/2 from bottom: "must have been sounded" ---> "must have sounded"

281/3: "for ith many" ---> "for many"

289/11: "This leads than" ---> "This leads then"

289/17: "wich" ---> "which"

294/10 from bottom: "Section 6.2" ---> "Section 5.2"

295/7: "is is" ---> "it is"

298/1: "till" ---> "of"

321/6 from bottom: "functions as elevators" ---> "functions elevators"

353/7: "Is is possible" ---> "Is it possible"

377/8: "nose-heaviness" ---> "tail-heaviness"

398/14: "damping arond" ---> "damping around"

400/18: "(instictively)" ---> "(instinctively)"

408/2: "formula (2.4.2)" ---> "formula (2.3.2)"

428/15: "rope lengts" ---> "rope lengths"

429/7 from bottom: "stiffer then" ---> "stiffer than"

The second set sent to the Nurflugel List:

1) On p.99 line 3, "h(y) = 0" becomes "h(y) = h(0)", as on p.45 (line 1).

2) On p.74, "F" in the denominators of equations (2.6.1) and (2.6.2) becomes "S", as on pp.44 and 45. ... during translation, the letter "L" inadvertently became the symbol for both lift (as in line 6 of p. 41) and a "reference length" (as in line 11 of p. 41). Dr. Nickel suggests using L followed by a raised asterisk (\*) or the subscripts "R" or "ref" for the reference length. For clarity, such changes may be made to the L's found in the following:

Page/Line

41/13 from the bottom (twice)

41/9 from bottom

42/6 twice

44/in formula (2.2.8)

45/in formulae (2.2.12) and (2.2.13)

91/6 from bottom

91/4 from bottom

92/1  
 92/10  
 93/1  
 93/9  
 93/14  
 93/21  
 93/7 from bottom  
 96/7  
 96/formula (3.3.1)  
 369/16  
 369/17  
 369/18  
 369/19  
 369/22  
 369/10 from bottom

-----  
 Most recent musings [as of 2/2000 - SK]:

p.59 / Eqn. (2.3.2): delete the last "dy"  
 p.60 / line 9: does he mean (2.2.4) instead of (2.4.1)?  
 p.61 / 13 from bottom: typo: "this it not"  
 p.80 / line 5: 2.7.43 ----> 2.7.4  
 pp. 81, 84 / figures 2.7.3 - 2.7.5: vertical scales should be labeled  
 "y/s,  $[x - l(0)/4]/2P$ "  
 p.77 / 12 from bottom: "l/-line" unclear.  
 p.80 / line 15: typo "an elliptic..."  
 p.80 / line 9 on: x positions DO depend on sweep.  
 p.86 / lines 2, 8: spelling "tailless", "another"

-----  
 Other questions/concerns I had at about that time:

"On p.42 (fig. 2.2.2),  $h(y)$  is defined in reference to a y-axis through the root leading edge. Revisions at the tops of pp. 45 and 99 (and other places) change " $h(y) = 0$ " to " $h(y) = h(0)$ " for plank-type wings. This would be OK if it weren't for further discussion (tops, pp.45, 99) concerning equations like (2.2.8) on page 44 and (2.2.12) on page 45, in which it appears to me that integrals are supposed to drop out for plank configurations.

QUESTION: Shouldn't " $h(y)$ " in equations 2.2.8 and 2.2.12 be changed to " $[h(y) - h(0)]$ "? ...or would it be better to just run the y-axis through the (local) neutral point of the root chord, defining  $h(y)$  as the distance behind this point and making  $h(0) = 0$ ? ...or am I just not understanding?

ANOTHER (RELATED?) QUESTION: On p. 77 - 12th line from bottom - in a statement apparently relating to the equations on p.74, the expression "l/- line" is used. Does this refer to " $h(y)$ " here, instead of " $l(y)$ "? Does

the "/" refer to the division by whatever is the total "loading" factor? Are these equations affected by the discussion above?"

... food for thought.

That, to the best of my knowledge is how far I pursued things.

Serge Krauss

**S**erge, thank you very much for collecting the errors that inevitably creep into any publication and providing them to the Nurflugel list. Prof. Nickel and Michael Wohlfahrt's book is an invaluable reference and your efforts to make it more comprehensible are much appreciated.

Russ Lee  
 <russlee\_99@yahoo.com>

**I**n looking more closely through my AIAA version of \*Tailless Aircraft in Theory and Practice\*, I noticed a bookmark on which I had scribbled more revisions and questions. Having read the more theoretical exposition, I had begun to tackle the rest more methodically, having skipped around previously. Apparently I had gotten to page 241 in my more thorough reading, when I took a (long, it seems) respite from that study. I have never checked any of the following with anyone else. Anyway minus notes on grammar (translation) and other typo's, here are the notes I had made on the bookmark, transformed to the format "page/line: original --> revision/concern":

159/5: "rear-up" --> "rear-down" or "nose-up" [this is before the parenthesis]  
 174/4: "Section 2.3"--> "Section 2.5" [?]  
 238/6: "F" --> "S" in denominator of coefficient of integral  
 240/4 from bottom: "5/9" --> "4/9" and the "more than" would not be true (this is based on dividing the right side of the above equation by the right side of 6.3.3 and the assumption that the above equation is correct)

Apparently I had not examined some of the remaining pages after p. 241.

I hope that this will help and that those who read further before I do will also post any helpful clarifications.

Serge

**I** urge all enthusiasts - especially swept wing or Horten enthusiasts - to order a copy of the



Horten/Selinger \*Nurflugel\* from this batch. It is undoubtedly the best book on the subject and the highest quality publication of its type. Knowing our ages, especially those of the publisher and surviving author, this "soon shall pass". We often in our youth come to expect important or profound expressions to endure. Those who have viewed our political and artistic climates in our maturity know the fragile nature of even the most profound of expressions.

"Names and numbers - get your programs here!"

In all seriousness, this may be your last chance to obtain one of the best historical and technical publications on flying wings. NOTHING is perfect, but do not expect great stuff to stay alive without your participation/investment. I recommend the book.

In the same spirit, I recommend that everyone get Jim Marske's booklet \*Experiment in Flying Wing Sailplanes\* while it is available. A much more modest book, it still contains wisdom, and I believe that Jim has gotten it right. His ideas deserve to survive and to manifest themselves in a true state of the art flying wing competition-class sailplane. Read his history and technique, and encourage him to record his more recent work!

Support those who have done the work and can furnish the wisdom and historical perspective to perpetuate the art.

Serge

**M**y question is (not knowing the book) how does this compare to "Tailless Aircraft" by Horten/Wolfarth for technical/design information?

Dave

First, let me comment that having re-read my post, I am inclined not to write late at night. Enthusiasm sort of overcame accuracy in expressing my opinions - to say the least. I certainly didn't mean to imply that Peter, Jim and I are ready to hit the hit that final sky trail, and I can also see that my comments on the books' merits were unclear. But in answer to your question...

First, the books in question are the following:

- 1) \*Tailless Aircraft in Theory and Practice\* by Nickel/Wohlfart
- 2) \*Nurflugel\* by Horten/Selinger
- 3) \*Experiment in Flying Wing Sailplanes\* by Jim Marske

#1 is the most technical, mathematical, and theoretical. It does however concentrate on swept-wing designs and is perhaps dismissive of the potential of reflexed "plank" and mildly swept concepts. Low aspect-ratio designs and lifting bodies are not addressed. It does contain a wealth of information, much of it concerning applications and historical results. It is liberally illustrated with diagrams, line drawings, scale drawings, some photos, and graphs. Including the index, the AIAA version is 495 pp. long. It is sometimes referred to as the "bible" on its subject.

#2 contains a wealth of historical information and technical specs concerning the entire output of the Horten brothers. It is printed on glossy paper and well illustrated with photographs and scale drawings, with some line drawings, diagrams, and graphs thrown in. The main text is in German-language sections, followed by either sometimes condensed English translations or, in two instances, by English-language articles written by Dr. Horten "on the same subject" that the translator (Jan Scott) felt to contain equivalent information. Perhaps Peter will comment on this, since he has long been a member of this group. There is discussion of what was tried (illustrated and specs given) and how it worked through the development of the Horten designs. The book also opens (14+ pp.) with Dr. Horten's view of history preceding the Horten series. The last appendix "Zur Theorie des Nurflugelflugzeugs" ('To a theory of wing-only airplanes') remains untranslated and covers the mathematical theory of Horten's "Bell-Shaped" lift distribution. Mr. Scott in his "translator's Notes" states that "Some of the aircraft descriptions and all of the last two chapters contain Dr. Horten's design philosophies. These were also deleted, since the cost of their inclusion was not justified by the small number of readers they were likely to benefit. The complete German text is retained in this edition..." I think this is literally correct - just the latter translations missing? The book contains 240 pages.

#3 is a 54-page booklet summarizing the development of the Marske tailless sailplanes from the XM-1 into the early Pioneer II series. It is not theoretical in a mathematical sense, but does follow scientific method in Jim Marske's development of the Pioneer series. It tells what was tried, why, and what the results were. It also discusses Fauvel and Backstrom to the extent that they influenced his designs. It contains line drawings, photographs, 3-V scale drawings, diagrams and specs. I am very fond of this booklet and still have hopes that Jim will update it with the many things he has learned from development of the Monarch, Pioneer II, and Genesis II standard class competitor and what he discovers in testing the Pioneer III. He has a lot on his computer too, including

some tantalizing competition designs. I know that he'd like to have had a free hand in the Genesis II design. Oh, and his booklet contains 54 pages.

How do these compare? I think the descriptions reveal as much as I can. Each concerns a favored configuration. I believe that in addition to some excellent historical publications, EACH of these belongs in your library. Each is written by a designer and/or pilot with first-hand knowledge and considerable years of dedication to his subject.

So who's "right"? I like the Marske approach for its elegant simplicity and apparently efficient use of compromise. Al Bowers probably likes the Horten best - a lot of genius and original thought. He has posted here many scholarly technical insights into Horten designs. Within the limits of their scope, Karl Nickel and Michael Wohlfahrt have probably covered their theoretical and practical considerations about as thoroughly as anyone can reasonably be expected to do.

I'll add that Lippische's \*The Delta Wing\* would complete the best BOOK set of primary sources on tailless designs. Written by men who did the creative work and produced flying examples, these seem to stand-alone. There are of course myriad periodical pieces on Fauvel and many lavish books on Northrop. You should be aware though that I've listed around 400 creators of tailless aircraft, some quite good and well documented throughout the literature. My currently out-of-print Bibliography stands at about 6000+ items over 500 pages, with a lot of yet-to-be-entered hard copy items lying about here.

So these are far from the only sources of information on tailless aircraft. They are, however, classics and primary, core material for anyone's library on the subject, and I would not place one above another in value. That depends on your personal interests. All three of the original listed books above have distinctly different technical information. Nickel/Wohlfahrt has the most. Sometimes the practical information is just as important though; there have been more than a couple tragedies that could have been avoided through historical and/or practical knowledge, despite the considerable theoretical groundwork applied. If you can, get them all.

Serge

October 14, 2005

*(Koen Van de Kerckhove asked the following question with regard to the photos of Longshot in last month's issue.)*

"Just looked at your pictures of the Longshot. Hey, looks like a neat thing. I was wondering...with the engine placed there I guess the pilot will be either under the wing in a pod or sitting over the drive shaft with his family jewels near a turning part. Sure hope you have a seat that will not break. Well, it would make a operation no longer needed if you have all the kids you want."

Al replied with:

"Nope. We just placed the engine on a piece of scrap plywood on top of the core shucks for the shot, it will actually be inside the center section with a small fairing on top for the cylinder head and a small one on the bottom for the crankcase, pusher prop extending aft.

BTW, it's a UAV....no pilot. We built the GPS autopilot several years ago and have been poking along with the avionics (\$\$\$, slow going) but with the addition of the video down link last spring it is all complete. We test flew it several years ago in an old Northrop drone so we know it works.

The UAV has application for the USFS, I think they will like it with the long loiter times and it would please me no end to get a contract building them.

Now I absolutely need to go to Marske's seminar at the end of this month so we can learn how to finish the wings using his pultruded rod technique but I am not sure I can juggle my schedule.

More as it comes along."

Al-n-Palmer  
The Longshot folks  
<arobins1@midsouth.rr.com>

October 24, 2005

From: Subject: plank wings stability???

I have designed a small plank flying wing, but I cannot get a nice fly path. It goes nose up then nose down very quickly. What can I do? The GC is at 25% of the chord,

Edwin Zea  
Bogotá-Colombia, South America  
<edwinzea@yahoo.com.ar>

Is it reflexed?

Doug Holverson  
<dholverson@cox.net>

**D**oesn't it kinda have to be reflexed? ;-) But seriously, Edwin, The CG should be a bit forward of 25% say 24 or 23 maybe even 22 but no more. If it's a solid wing it would be easy to change the airfoil with sand paper. A while back I made a little plank with a solid wing to see what worked the best. This drawing shows four ways to make an airfoil more stable:

<http://users.acsol.net/%7Enmasters/temp/sabfoilmod.gif>

I found Mod B worked best for that model. Here are some links to the archive that say more about it

<http://groups.yahoo.com/group/nurflugel/message/2852>

<http://groups.yahoo.com/group/nurflugel/message/2862>

Norm Masters

Could you provide some context for the letters?

Doug Halverson

**I**t was in response to some guy named Doug Holverson 8-) who was wondering about using a Sig stabilizer blank inverted for the wing of a small glider. The original message is quoted at the bottom of one of my messages. You can also see the whole thread by clicking the Up Thread link at the bottom left of the message window.

<http://groups.yahoo.com/group/nurflugel/message/2825>

Norm Masters

**D**o sweep forward wings have to have this kind of reflex as well? As I recall it the Pioneer did not have a radical amount of reflex.

Warren Bean

<warrenbean@cebridge.net>

**Y**es, but it took Jim Marske a lot of work and many years to develop it. I still have his original booklet about the XM-1, Pioneer, etc. It is an amazingly stable profile. I am using a derivate on my GE craft.

<msmprod@optushome.com.au>

From Norm's diagram at:

<http://users.acsol.net/%7Enmasters/temp/sabfoilmod.gif>

A, B, and D will work to make the pitching moment more positive, but we believe C will not - that C will in fact make the pitching moment more negative.

There's a formula, which computes pitching moment based on the angle of the camber line at the leading and trailing edge. This was presented by Dr Panknin at the MARCS Symposium in relation to the Eppler 222-230 series of airfoils. We can send the actual formula along in another message if anyone is interested. In essence, the camber angle at the trailing edge has about seven times the effect on the pitching moment as the camber angle at the leading edge. However, the formula infers that increasing the angle at the leading edge will make the airfoil pitching moment more negative.

In the case of Norm's airfoil, we believe cutting away the lower front surface actually increases the camber angle at the leading edge, making the pitching moment more negative.

Performing Mod D changes the camber line at the trailing edge, but because of the dramatically reduced thickness of the extension, which creates a sharp edge on the upper surface, it might not be too effective given the Reynolds number.

Mod A did not change the trailing edge camber line angle much, so its affect on the pitching moment would probably be small.

Mod B affected the trailing edge camber angle and was more aerodynamically efficient than the "trim tab" of Mod D.

An additional item of interest: The Schweizer 1-26 uses the NACA 23012 airfoil. During manufacture, the cusp on the lower surface at the leading edge was not maintained. This was done to ease the manufacturing process, but it did have an effect on the camber line and hence the pitching moment to a small extent.

Bill & Bunny Kuhlman (B^2)

<bsquared@themacisp.net>

**I**n some form, yes. The CM must be positive unless some sort of artificial stabilization is used. With the wing swept forward, that can mean the airfoil can transition from  $cm = \text{positive}$  at the root to  $cm = \text{negative}$  at the wing tip. (Airfoil pitching moments are reversed if the wing is swept back. If the airfoils are  $cm = \text{zero}$  throughout the span, then some amount of geometric twist must be used.) For our radio controlled models, we find a pitching moment of +0.025 works well.

Feel free to download our PDF on the "Kubiak parameters" - listed as Four Basic Concepts - from <<http://www.glide.dyndns.org/on-the-wing2/index.html>>. That series of articles explains what's needed and why.

Not a radical amount, but the standard Pioneer II-D does carry a very small amount of up trim in the elevator during straight and level flight. The airfoil used has a pitching moment near zero. The current

experiments they're doing with adjustable CG are yielding some impressive results in that the reflex in the elevator can be reduced when thermalling (high CL) and high-speed flight (low CL) requires less elevator deflection. This means less drag in most flight regimes.

Bill & Bunny Kuhlman

**T**hanks, that pretty well sums up my experience. That SIG blank is about 6% thick with a square TE. I couldn't tell that C had any effect but without any modification it nosed over so fast that I may have missed a slightly faster dive. A was insignificant by itself but I found it useful in combination with B because it effectively increases the TE thickness so when you sand down the top surface there is still some material to work with.

Norm Masters

**I**t is very difficult to control a flying wing with such a thin profile, especially if swept forward. The Cm will move with any minimal change of AoA.

<msmprod@optushome.com.au>

**N**ow I see where I went wrong with mod C. My intention was to move the maximum camber forward like an NACA 230xx. Which it did but with the side affect of a steeper slope through the LE radius. It looks like the LE slope could be corrected by sanding off some of the LE to make a fatter nose (mod F?). Do you suppose that's why 230xx are such blunt sections?

Norm Masters

**T**he 230XX sections do not have a blunt nose any more than the NACA 4-digit sections. That's because the 5-digit airfoils utilize the NACA 4-digit thickness distributions and leading edge radii.

The 230XX appears to have a more blunt leading edge only because the high point of the 3% camber line is so close to the leading edge, at 15% chord. The leading edge radius is actually the same as the NACA 0012, according to Abbott and von Doenhaff "Theory of Wing Sections."

When you fill in the lower surface cusp, the airfoil definitely appears to become more blunt, but the mathematically defined leading edge radius should remain the same if you're following established protocol.

Modified 5-digit sections were created with thinner and more blunt leading edges. These are noted by a T or B suffix in the section nomenclature.

Bill & Bunny Kuhlman

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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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