

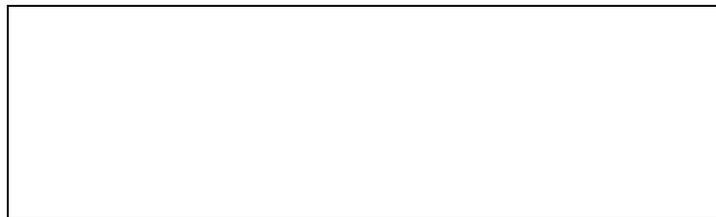
T.W.I.T.T. NEWSLETTER



Comparative shots of the Marske Pioneer 3 and Genesis prototypes at similar stages of development. We found the Genesis shot in the ESA archives and thought this made a great composite picture to see the differences between the fuselage and wing profiles.

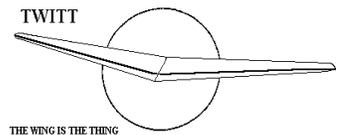
T.W.I.T.T.

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., 0605 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, May 20, 2006, 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:

- President: Andy Kecskes (619) 589-1898**
- Secretary:**
- Treasurer: Bob Fronius (619) 447-0460**
- Editor: Andy Kecskes**
- Archivist: Gavin Slater**

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

(619) 596-2518 (Hanger-No answer call evening number)
(619) 447-0460 (Evenings – Pacific Time)
E-Mail: twitt@pobox.com
Internet: <http://www.twitt.org>
 Members only section: ID – **twittmbr**
 Password – **member02**

Subscription Rates: \$20 per year (US)
 \$30 per year (Foreign)

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

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

Foreign mailings: **\$0.75 each plus postage**

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

PERMISSION IS GRANTED to reproduce this publication or any portion thereof, provided credit is given to the author, publisher & TWITT. If an author disapproves of reproduction, so state in your article.

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

TABLE OF CONTENTS

President's Corner 1
This Month's Program 2
Letters to the Editor 2
Nurflugel Threads 5
Available Plans/Reference Material 10



PRESIDENT'S CORNER

When I came across the shot of the Genesis prototype in the Experimental Soaring Association's (ESA) archives, I couldn't resist making up the cover composite photo. Since they are both from about the same angle, you can get a good idea of the differences in the size and sweep of the vertical tail, the lack of a horizontal trim tab, shorter nose section and, obviously the wing shape especially the inboard section. You can also compare the cover shots to this production version of the Genesis where you can see the aft part of the wing root has been flared and extended into the fuselage more than that shown on the prototype.



I am sorry we won't have a program for May, but I will try to find something meaningful for the July event since that is also our anniversary month. I am always open to suggestions, so please don't hesitate to call if you thing you have an idea that might turn into a program.

I hope everyone is enjoying the improvements in the weather throughout the country and are able to get back to flying on a regular basis, whether its models, ultralights or sailplanes. One of these days I have promised myself to get airborne again, so maybe this will be the year.

Hope you enjoy this issue.

Andy



**MAY 20, 2006
PROGRAM**

My attempts at finding a program for May have fallen through, so although the hanger will be open we will not have a speaker. If I can find an interesting subject, I will try to put together a slide and video show if those who show up want to see it, but there are no guarantees at this point.

I will make my usual plea for our members to make suggestions on future programs but either giving me a contact name or offering to do a program on a relevant subject.



**LETTERS TO THE
EDITOR**

April 20, 2006

I would like to join your group to share our common interest in flying wings, (in my case swept, tapered wing with fuselage). I'm a big fan Of Alexander Lippish. Probably like most TWITT members, I have my own flying wing design that I took and had a plan form study completed by an engineer who works at scale. Results are great and I am close to starting a prototype.

I am located in Smiths Falls, Ontario, Canada, in the 1000 islands region near the New York border. Is there a way to pay online or do I need to send money?

Looking forward to hearing from you,

Greg Brady
<greg.brady@crosstrainer.ca>

(ed. – I wrote back to Greg explaining why we don't except electronic payments – it's a cost issue – and that we would need a check or money order in US dollars. We may consider this when we have to raise subscription rates in the future after the next round of postage increases.)

April 12, 2006

Many thanks for your web page. I read the articles from Farnborough Hants about the Horten tailless aircraft.

To get a proper printout I reworked the layout a little for myself.

With this I found in chapter 4.3 two formulas for the wing twist that looked a little strange to me.

The second looks ok:

$$e = 2 \times ((Y/s) + (y^2)/s + (y^3/s))$$

but the denominator in the first formula looks a little strange. I read or understand :

$$e = e0 \times (a \times (y/s) + B \times (y/s^3)).$$

Is this right with ^3 in the denominator?

In the aircraft exhibition hall of the Deutsches Museum in Oberschleissheim (near Muenchen) I made some photographs of the cockpit of a redesigned Horten IV glider. Perhaps you find them interesting. I attached them as a zip file.

Greetings,

Christian Daniel
Bremen, Germany
<Christian.Daniel@space.eads.net>

(ed. – I pulled the article back out of the archives and double checked the formulas in question to make sure I didn't type them in incorrectly. I found he was correct and that the equation should read as below with the cube exponent on the y factor rather than the s factor:

$$e = e0 \times (a \times (y/s) + B \times (y^3/s))$$

I have also included a couple of the shots Christian sent along.)





April 8, 2006

Flat Airfoils

Hi Chuck: (Chuck Bixel)

Was just looking back at email you sent me back in 2000 about the flat airfoils work you put a lot of energy into. I see the picture of the TV-2B you sent. Did you get that to fly okay? Do you feel that the design and testing you have done is mature enough for commercialization or more at the stage of ready for more research and testing?

Regards

John Leslie
Ph +61 417 366 171
<john.leslie@flightship.net>

(ed. – If Chuck replied we weren't included so I am not sure if there is an answer to the question. If you don't recall his original WIG designs, you can revisit them at:

http://www.twitt.org/Bixel_WIG.html#top)

April 7, 2006

Hello- Received the TWITT newsletter today (Early this month!) and was amazed by the content. I will be sending along text and photos along with some flight photos.

Interesting to note Karl Nickel's input of why the aft end of the center section of most of the Horten's work was shaped the way it was. About the same reason why early US space suits were aluminized fabric.

Regards,

Henry E. Whittle
<Gulfrose@Juno.com>

(ed. – As of the time we went to press I hadn't received the new CD with text and photos, so will hope to have it for the June issue.

You may notice receiving issues slightly earlier than in the past, but this will be dependent on when it is completed and back from the printer. I have taken over the task of doing the mailing which will usually save a day or two in the turn around time between the printing and posting.)

April 23, 2006

No Dyke Delta?

I searched your website, but could find no information about the Dyke Delta JD-2. This is probably the most successful GA flying wing, if number of actually built and flown examples is used as a measure of success. Why no mention at all on your website?

Ernest Christley
<echristley@nc.rr.com>

(ed. – I offered the following back to Ernest: "I really don't know why there isn't anything on the Dyke Delta on the website. I did include one on the cover of the newsletter a couple of years ago, but never had much information to include a significant entry for the website. I will do some searching and see what I can find for links to add.

Thank you for visiting our website and bringing this oversight to me attention."

If anyone out there has some good websites on the Dyke Delta, please forward them to me since a search engine might not identify it.)

March 19, 2006

We have a long frozen winter, but LEA has reached a good progress in testing. The GPS receiver + transmitter works and all data can be shown on my PDA.

But then it was toooooo cold for flying...and then 30 inches of new powder snow on the lake, so no take offs possible. I now wait for spring!

Did you ever receive my CD? Can you open the material? What is missing that nothing was published?

Thanks for answering and please give my best greetings to June and Bob

(ed. – I wrote back that I hadn't received the CD, to which Thomas replied.)

Thanks for the Information. I will try to send you another CD by snail-mail. Quicker now are digital pictures, some included of the SKNAV System to measure performance.

Good to know that the transmission worked. If you like you can add the following text to the pictures:

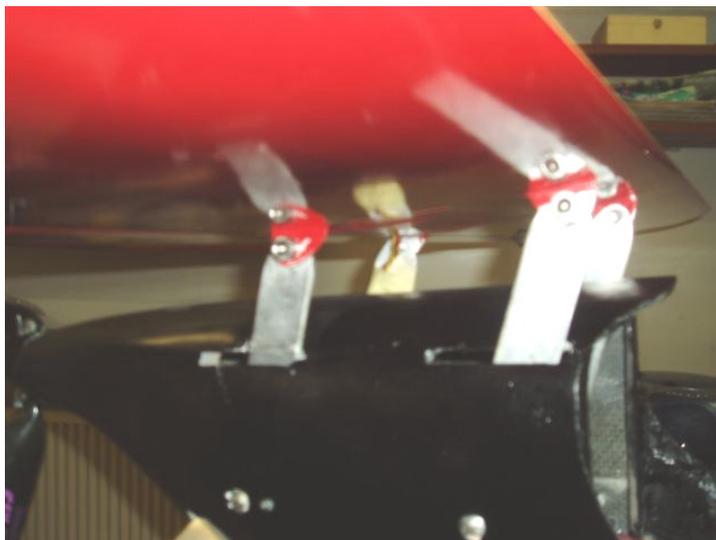
- ❑ LEA (Low Energy Aircraft) now equipped with GPS-System "Skynav".
- ❑ First flight January 2006 on lake of Davos, giving correct .igc file that can be analyzed by the Program "STREPLA".
- ❑ Lake of Davos in winter very favorable, as stable layered air mass with very little thermals so as to get a polar with little tolerances.

(Due to bad weather measurements can be made only next winter!)

Good to hear that Bob is better now. I might be back in early 2007

Thomas Bircher
<bitanx@bluewin.ch>

(ed. – I have included the pictures Thomas sent along. If you have any questions you can contact him directly at the e-mail address shown above.)



Labeled as a shot of the CG setter.



Skynav system.



Labeled as Machler, at a time when there wasn't any snow on the ground yet.



The project group getting things ready for a launch.



Labeled as the snow being okay for a takeoff.

NURFLUGEL BULLETIN BOARD THREADS

Subject: Sweep Angle vs Aerodynamic Center?

I am looking for some basic information on tailless design related to sweep angles.

For a plank, the aerodynamic center of the airfoil, and the neutral point of the wing are at the same location, and because the CG must be forward of the NP for stability, the lift produces a negative moment requiring an airfoil with a positive moment.

I'd like to understand if the aerodynamic center of the wing, the center of lift, is related to the sweep angle, and if a forward swept wing can result in the AC being sufficiently forward of the NP such that the CG can be located between them, resulting in the lift producing a positive moment and without any wing twist?

Are there any web pages that discuss this? what books?

If this is true, is it this principle that makes it easier to design flying wings with a small amount of forward sweep, such as the Alula, than swept back designs?

Gregory Ciurpita

<gregory.ciurpita.1983@njitalumni.org>~

These should help, but the person to ask is certainly Martin Hepperle:

<Martin.Hepperle9@MH-AeroTools.de>

http://www.mh-aerotoools.de/airfoils/nf_1.htm

<http://www.aerodyn.org/map.html>

<http://www.aeronautics.ws/index.html>

Cheers from Bruno

<msmprod@optushome.com.au>

The neutral point of a wing is more or less the aerodynamic center of the airfoil at the mean aerodynamic chord location. If you sweep the wing forward or backward, the neutral point will follow just geometrically.

I wrote "more or less": indeed there are some 2nd order effect that makes the neutral point to be not exactly at the aerodynamic center of the MAC. This depends of AR (finite wing = neutral point moves forward) but also sweep and taper. If you add Reynolds effect on top of this, you get lost... And for models Re effect plays!

The extent of this 2nd order term may be about 4-5% of MAC. For a flying wing it is quite huge, because the term for balancing the airplane are small. I mean, a small uncertainty in the neutral point location (= uncertainty about static margin) can lead to big difference in the airfoil Cm0 that balance the flying wing, hence the flap setting.

I have polynomial formula that evaluate this 2nd order effect as a function of AR, taper and sweep. This is polynomial fitting of a wide set of VLM computation, as proposed by a friend of mine, Nicolas Quendez.

You may find some answer concerning your questioning on wing conception in the paper I wrote will continuing Nicolas work. There are elements to compute the "trimming ability" of forward swept wing as well.

<http://perso.wanadoo.fr/scherrer/matthieu/aero/papers/fwicas2004.pdf>

You can also try to understand all this using AVL. It is very oriented to all those balancing & stability derivatives topics.

Matthieu Scherrer
<matthieu.scherrer@free.fr>

I have an Alula since 3-weeks, this is an amazing an funny model. I fancy slope soaring over my block.
http://pcii7.tibone.com/gallery/view_album.php?set_albumName=albuo51

Subject: Matthieu's Alula

Yes, the Alula is a fun model. The swept forward wing does not allow it to fly any slower than if the wings would be swept back slightly, but the stall characteristics are quite benign. Additionally, if you build it with separate ailerons and elevator, you can actually impart some aileron differential without affecting pitch too badly. We've recently programmed our transmitter so we can land with "crow" (aileron up, elevator down). This comes in handy when landing in tight spaces. We have had so many inquiries about our Alula models on the flying field that we designed and printed a special business card to hand out to those who express an interest in building one of their own.

We now have a two-meter version, constructed with ribs and conventional wood spar, completed and ready to fly, and have just started a larger version (2300 sq ins, FAI maximum area). The two-meter, named Redwing, has been covered in RC Soaring Digest <<http://www.rcsoaringdigest.com>>, and is only lacking test-flying data for the concluding installment to be published.

After more than two decades of never having to build a tail, we remain enthralled by the potential of "the wing alone," and are continually delighted by others who fly our aircraft and express surprise at their good performance and ease of piloting.

Our sincere thanks to others on this list for their willingness to ask questions and to share information not readily available elsewhere.

B^2
Bill & Bunny Kuhlman
<bsquared@themacisp.net>

Subject: Klingberg Wing (large), again

Fellow Nurflugelers, (Is "Nurflugelers" a real word? Well it is now!)

Some years ago we acquired plans for the large Klingberg Wing - the one with winglets. Not noted on the plans is the amount of twist to be imparted into the wing.

If one of the list members has the kit and can find out the twist dimensions from the instruction manual (or where ever it's provided), we'd very much appreciate having the information.

Thanks in advance!

B^2
Bill & Bunny Kuhlman
<bsquared@themacisp.net>

The plans are pretty sparse, but the instruction booklet is a massive thing, maybe 60 pages. I have one at home. Lemme check.

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

Good news and bad news.

Okay, I found my instructions for the big Klingberg. Good news. I go through the whole assembly manual looking for how much twist to put in.

It turns out in the very front there is a very short one-liner about: the twist is built into the foam wing cores as cut. Bad news.

So unless you can get your hands on the wing cores, it's gonna be hard to figure out. Let me see if I have time this weekend, I may be able to measure the wing cores for you.

Sorry I couldn't be more help...

Al

Idug out my Klingberg 100 wing and found that the root is 0 degrees, at the break is 6 degrees and the tip is 13 degrees.

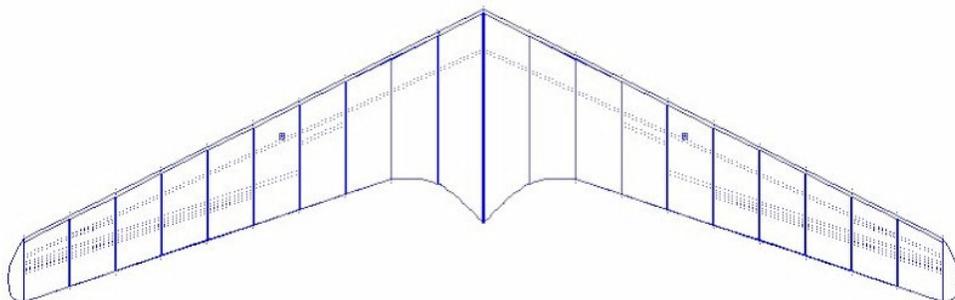
Mark Nankivil
<nankivil@covad.net>

As I recall, the Klingberg 100 had a CG shifting mechanism as part of the design. I think it was used to assist in trimming for different flight modes (launch, thermal, search, etc.) Does anyone know how effective this was?

Warren Bean
<warrenbean@cebridge.net>

Imel Im VII Flying Wing

I have got a new flying wing on the building board.
You can see a drawing of it here:



<http://tinyurl.com/9lmx3>

Specifications:

- Wingspan: 82"
- Airfoil: Eppler 334
- Twist: Imel twist distribution - produces upwash required at the wing tips to overcome adverse yaw.
- Spoilers
- Drag rudders
- Twin engine brushless power
- Fixed landing gear (removable for hand launch)
- Target Weight: Around 4 lbs with landing gear

Designed using CompuFoil 3D and Turbo CAD 9.0

I'd love to install retractable gear on this version, but the wing is too thin to enclose the 3" diameter tires required for grass fields. I'll need to enlarge this design to make room for the retracted gear.

Jeff
<northropn9m@yahoo.com>



I am moving right along with the new flying wing build.

<http://tinyurl.com/d2m2o>

I'll be joining the wing panels together this weekend and installing the carbon fiber joiners.

I think I am about three weeks away from flight-testing. The company recently purchased a professional grade video camera for recording flights so I may have some video to show-n-tell in the near future.

The wing panels have been attached. Working on the wing tips and motor mounts. I'll be installing the control rods for the spoilers and drag rudders this week. The wing is 78" sans wing tips. Wing tips add another 4 inches to the wingspan. Current weight of the wing structure is 10 oz. Goal weight with landing gear and twin motors is around 36 to 40 oz.

<http://tinyurl.com/d7r79>



The Imel Im VII was tossed into a 10 MPH headwind this morning and coasted approximately 50 yards. More tosses into the wind yielded flights as far as 90 yards.

The CG is set to 17% MAC and total weight is 28 oz. Wingspan with 2-inch tips is 82 inches.

I have found the drag rudders to be effective during the glide tests and appears to allow the wing to make nice flat turns when used in conjunction with the elevons.

The wing is covered with Ultracoat and have not taken the time to add stripes or any other markings, so she looks plain right now.

Pictures can be found here:

<http://tinyurl.com/oxaca>
<http://tinyurl.com/mapn8>



I am working on adding the motor next.

The Imel Im VII flew under its own power using an AXI brushless electric motor, 2500 mAH, 3 cell LiPo battery and 13x6 propeller. No canopy or payload nacelle were attached on these flights. Three complete flights were conducted. The aircraft flew brilliantly with no surprises. Winds were out of the north at 10 - 15 mph.

Pictures can be found here:



<http://tinyurl.com/hx9ge>
<http://tinyurl.com/hu4v6>
<http://tinyurl.com/e8q26>

Over the next week we will be installing the on board video camera.

Flight videos (From the ground of the test flights) will be posted later.

The Imel Im 7 now has four flights on it. The finished wing can be viewed here:

http://img.photobucket.com/albums/v338/k9ese/Im7_cowl.jpg



I've installed an on board video camera and I'll post videos from the wing and from the ground in a few days.

Is that a scale down of an actual Horten or was it designed from scratch based on their theories? Do you have the bell-curve washout to go with that beaver tail?

Doug Holverson
 <dholverson@cox.net>

The Im VII was designed from scratch based upon my research on Northrop and Horten flying wings over the last four years. I took a little bit of Northrop, a little bit of Horten and a little bit of Imel and built the Im VII.

I use a twist formula that I developed on my own. It seems to work pretty well as I am not seeing much adverse yaw or yaw oscillations in level flight. The drag rudders are not being used and I have locked them shut.

Jeff

We flew a sortie this afternoon with the Im VII UAV. The sun was just right to capture the

shadow of the wing as it was on final for landing. A picture can be viewed here:

http://img.photobucket.com/albums/v338/k9ese/Im_7_Shape.jpg



Place this picture in back and white and it would look like the shadow of a vintage Horten.

Drawings of the Ho4a and the Ho4b

I was wondering if some of you have actual technical drawings of the ho4a and the ho4b . I am a designer for work and I like to design in 3d. I am trying to make a very precise drawing in 3d of this plane. So if some of you have plans, designs , photo's ,... (everything that can help me) send it to me.

Thanks in advance,

Jan Van De Putte
Belgium
vandeputte.jan@gmail.com

The only somewhat exact drawings were done by the Deutsches Museum in Munich during the restoration of their IVa. As they only got the wings, they built the middle part from scratch, so that part of the drawings are really good. The wings were just added to give an impression, so I fear there are no good drawings of them anywhere, as the original ones seem to have been destroyed at the end of the war.

Christoph Nieß
<toffii@mixedstuff.de>

Is there a way to get the drawings of the Deutsches Museum so I can start at the center section? So as I understand... there is no way to get to the plans of the

wings? I thought the wings of the restored IVa were not build from scratch, but build from acquired wings.

Jan

The only way to get the plans is to contact the museum and ask. Their homepage is:

<http://www.deutsches-museum.de/zweig/werft/fws.htm>

(in German only, sorry, but there should be someone who can answer to English mails). They do not really like to give away those drawings.

The wings of the restored IV were only cleaned and repaired, so they were not disassembled to make any drawings. Measuring anything of them is no use, as they are seriously warped after 20 years of storage in a wet room. Also, the wingtips are not the original ones (aluminum with upper and lower drag rudder), but ones that were added after destroying the original ones in an accident (wood, only upper drag rudder, problems when flying them).

The man who led the restoration is Mr. Hanickel (I hope I didn't misspell). Maybe asking for him will help, I didn't have any contact to him for more than 5 years now...

Christoph

Mignet Formula Wings

I am Charlie , from Buenos Aires and have recently joined this group. I have purchased drawings for both Guy Francois' Butterfly and Daniel Dalby's Pouchel. These are now in Finland and will be brought to me in a week's time.

From them I intend constructing either one or the other or maybe use both techniques, which I gather are on similar lines. What I am aiming at is a completed, flying OpenPou (a la Koen V.) maybe powered by a 15 HP Aero Radne Raket (I can borrow it off my Mosquito. If underpowered just no loss, just go onto something bigger ...like a Visa 3CV maybe?) As the Mignet formula is aerodynamically considered close to a flying wing, I guess that would be the most logical follow-up that appeals to me.

My approach would be, starting from a proven prototype, a stepwise refinement, both on the drawing board and on the field. A practical approach I like, for field work, is mentioned in the now defunct "The Pou Review, Jan '96 #17, pages 8 and 10". An article written by Michel Descatha, "The Pou du Ciel Ladder". He uses an Alu ladder as the fuselage as a basis for his prototyping.

This article can be found at:

<http://www.flyingflea.org>

under Pou Review. Any comments will be most welcome.

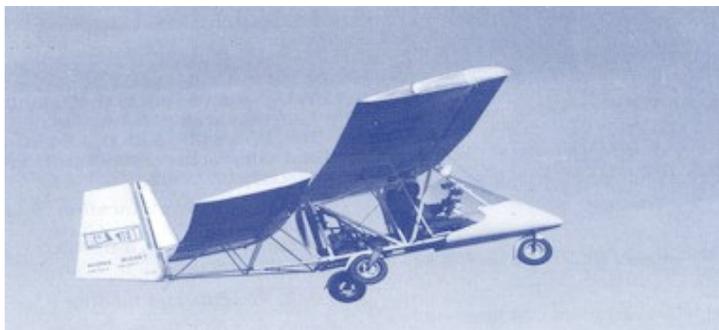
Regards,

Charlied Crawley
<charliedcrawley@yahoo.com>

If I may make a suggestion, Charlie (I am an experienced craft designer, constructor and - but NOT bold -pilot) I would like to WARMLY advise you TO BUILD FLYING RADIO-CONTROLLED MODELS, as BIG as financially possible (e.g. 1/4 or at least 1/6 linear scale), of ANY EXPERIMENTAL CRAFT you intend to build in full size. This will allow you to eliminate problems and deficiencies WITHOUT SUFFERING PERSONAL INJURIES OR WORSE.

Cheers from

Bruno
<msmprod@optushome.com.au>



Modern version of the Flying Flea

SPECIAL AWARD

I rarely blow my own horn. But I can't help myself. Not this time.
My Center Director, Kevin Petersen (an all around good guy), nominated me for an award. A very HIGH award. An award that can ONLY be granted after the NASA Administrator selects you. Apparently this happened a couple of months ago. The awards ceremony is to be 06 Jun 06.

I am to receive the NASA Exceptional Service Medal.

I cannot say that I won it. I happened to be the team leader that was selected to receive it. The folks

on my teams were the ones that really won it for me. This would be sort of like having a team win an Olympic sport, and only ONE medal is awarded to the coach. I am honored that the folks I work with do this for me. Not even all the astronauts that walked on the Moon have a NASA ESM...

Albion Bowers
<al.bowers@dfr.nasa.gov>

(ed. – I have included the award definition Al is referring too and a photo of the medal. We all congratulate Al and his NASA team for a job well done as reflected in this medal award.)



NASA Exceptional Service Medal
(Government employees only) An award granted for significant sustained performance characterized by unusual initiative or creative ability that clearly demonstrates substantial improvement in engineering, aeronautics, space flight, administration, support, or space-related endeavors which contribute to NASA programs.

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

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

Personal Aircraft Drag Reduction, by Bruce Carmichael.

Soft cover, 81/2 by 11, 220 page, 195 illustrations, 230 references. Laminar flow history, detailed data and, drag minimization methods. Unique data on laminar bodies, wings, tails. Practical problems and

