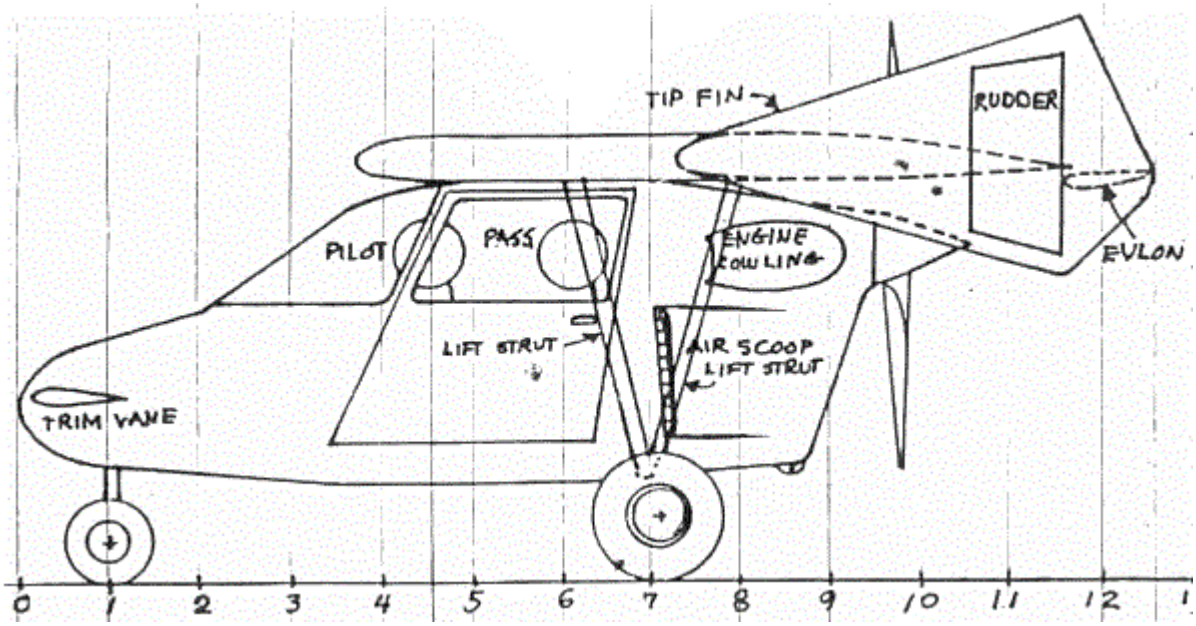
No. 189 MARCH 2002

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




This is the original prototype drawing by Jim Loyd of his "Boomerang". At one point he had a mockup fuselage section completed, but we are not certain if the project was ever finished and flown. Terry Baxter has suggested some changes into a sid-by-side arrangement with a different wing planform. See page 3 for more details.

**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., **0302** means this is your last issue unless renewed.

**Next TWITT meeting: Saturday, March 16, 2002, 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).**

TWITT
THE WING IS THE THING

**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).

**TABLE OF CONTENTS**



## PRESIDENT'S CORNER

First of all, I need to apologize to all our stateside members who received very mangled newsletters in February. We identified the problem as being a faulty stapling job by the printer that allowed the pages to separate as the newsletter went through the Post Office's machines. The lack of a stiffer edge provided by the previous printing technique also contributed to the problem.

I also have to take part of the blame. In my efforts to improve the quality of the pictures, I elected to change the type of printer they were using which meant doing six back-to-back single sheets instead of three 11 x 17 sheets with the center fold. For March we will go back to the original method so everyone will receive their newsletter in one piece.

Since the February issue contained so many neat color pictures of the Altostratus project, I elected to put it on the website under the Hodge Podge button. Take a look.

While on that subject, just a quick reminder for those of you with Internet connections. The website is now only available through the members.cox.net/twitt URL, so make sure your bookmarks or favorites links are set properly. E-mails sent to the @Home address have also stopped, so if you got a reject message re-send it to: twitt@pobox.com.

I was kind of stretching for material this month and then it dawned on me that I hadn't published the annual membership roster so everyone knows where the others are located. So make sure to check it out and if you have an e-mail address you haven't used with us before, send us one to the address above so we can add it for next year.

I have found it strange that no one has responded to Norm Masters letter on dynamic and super stalls. Does that mean he is on the mark or is everyone just busy?

Andy

## MARCH 16, 2002 PROGRAM

The March program will feature **Al Bowers** giving us an insight into origination of flight and where we are going in the future. His program is titled: "From Birds, Through da Vinci, the Wrights, Through Today: The Disassembly and Reintegration of Flight - Challenges for the Second Century of Flight."

How did aircraft evolve to their present configurations? Somehow, we moved from birds as a model for flight, to mechanical flight which doesn't use many of the same integrated features birds use to fly. By examining bird flight, can we learn anything new? This presentation supposes that birds still have a few tricks to show us, if we're astute enough to look back and carefully reexamine birds as a model for flight. A strong connection to aerodynamics, stability, control, structures, and propulsion are shown; how we solve those problems today, and how birds solve them. Finally the question is posed: can we do better in some areas by following the bird model?

This sounds like a very intriguing topic and will surely raise many questions from the audience about theory and practical applications. Mark your calendars for March 16th and tell your friends to come along for an interesting Saturday afternoon away from sports television.

If you can't make the afternoon meeting, then check out Al's presentation at EAA Chapter 14's hanger at Brown Field at 10 AM.

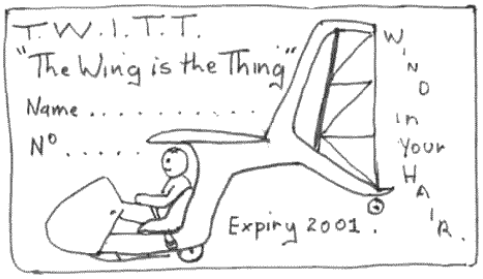
Both sights are easily accessible by aircraft. For Gillespie, ask ground control to direct you to Skid Row. At Brown Field ask for directions to the EAA compound.

## LETTERS TO THE EDITOR

February 4, 2002

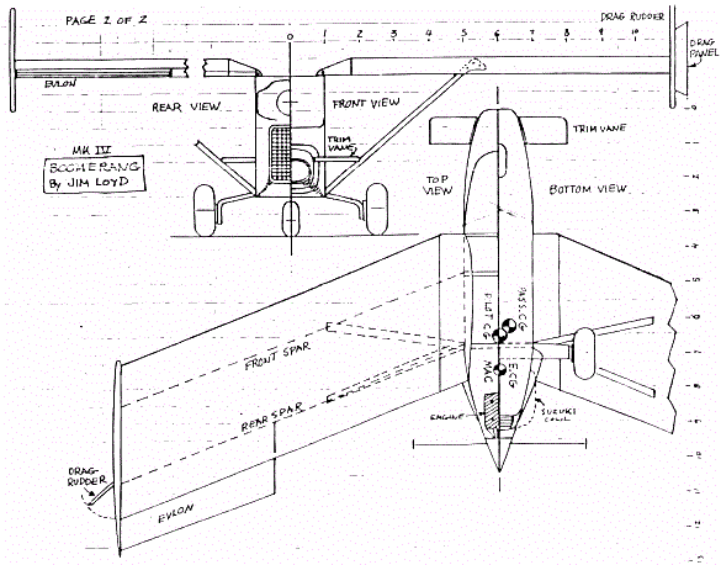
TWITT:

Having been on the downs, in and out of the hospital over the last six months, I was wondering where I stand with my membership in TWITT. Why isn't a membership card with the expiration date issued by the organization? I suggest personal cards could be sold to members with a badge of a flying wing similar to Scott Winton's Facet Opal or the Mitchell Wing or the Marske Monarch. Something like this illustration. It could be a standard size that fits a wallet and any member could have the back printed with any details he liked.

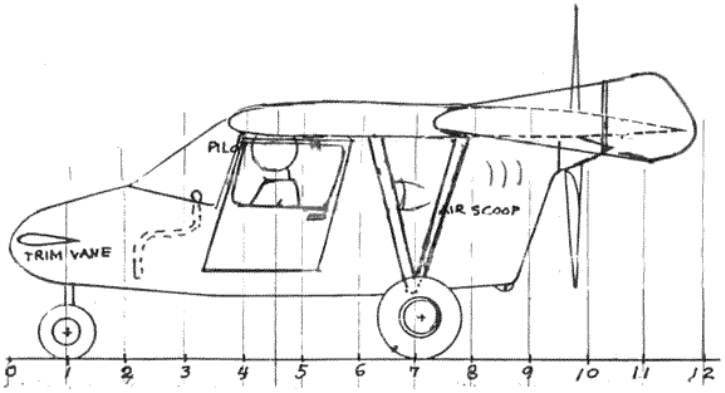



I enclose some old pages from some of the Australian magazines of Scott Winton's Facet Opal, but have no details of span, length, power, weight, etc. Do you have any details, plans, etc.? My repeated efforts to find more in Australia meets a brick wall. Please supply any relevant information. Your August 2001 newsletter with the Sgian Dubh (Black Knife) reminded me of the Opal. I received this when I was in the hospital and it was very good for the lonely hours in bed.

I would also like an update on the Marske Monarch sailplane, which I believe was to be made self-launching with a 20-hp engine. I believe this could be developed into a cheap standard ultralight with say a 30' wing span to suit hangers and with the wings folding forward it would fit on a normal trailer. Imagine how this would fly with the new light weight twin opposed air-cooled motors of about 70-lbs, tri-gear and the standard three-axis control. Did the Monarch ever have a larger motor fitted and, if so, do you have any performance details, please!!




**ABOVE: This is Jim Loyd's original design layout that goes with the cover drawing. You can see Terry Baxter's proposed changes in the side view below and the top view to the right. Not the smaller tip plate, longer span and tapered elevons.**

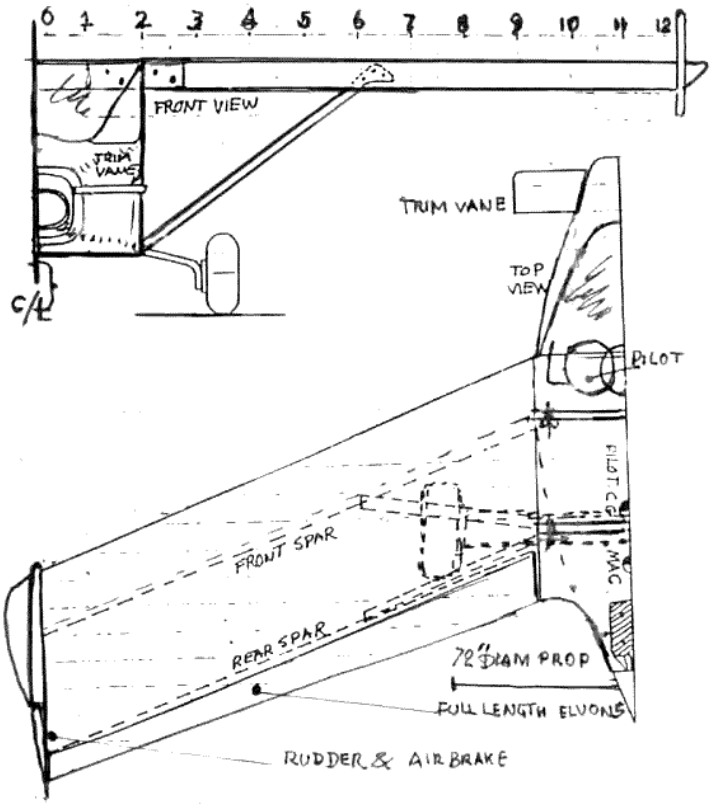



In Pacific Ultralights magazine, April 1996, I came across the Boomerang, a copy of which I enclose. Whatever happened? Did Jim Loyd, then a member of TWITT, ever build it. I have never come across any further articles of it. I would have preferred it was a side-by-side type, not a tandem.

In the specifications it is quoted as 88 sq. ft. of wing area, which is not allowed in Australia, as the minimum allowed is 100 sq. ft. With a chord of 4' 6" and 12' wings, this would put it over the minimum allowed as an ultralight by the Australian Ultralight Federation.

I would prefer the Subaru auto engine coupled to the final drive of a VW Kombi which would put the prop high and the CG of the engine much lower. Increasing the body width to about 42" would allow the side-by-side seating making the wheels about 7' apart for stable ground handling. I take it the trim vane was lever operated by the pilot and I think full length elevons tapered to the tips would be more stable.

Individual rudders on the wing tips could also act as air brakes if operated together and it the cabin roof followed the same airfoil shape as the wing and open on the bottom, then the wings could easily be bolted on from inside the fuselage.




I have not been in the air for six months now, mainly being a bed pilot browsing through all the old magazines, etc., but the Boomerang was attractive to me as it looked to be a rugged bush plane suitable to the Aussie outback areas.

Please advise me on my membership status and I would appreciate any details that I have requested.

Yours sincerely,

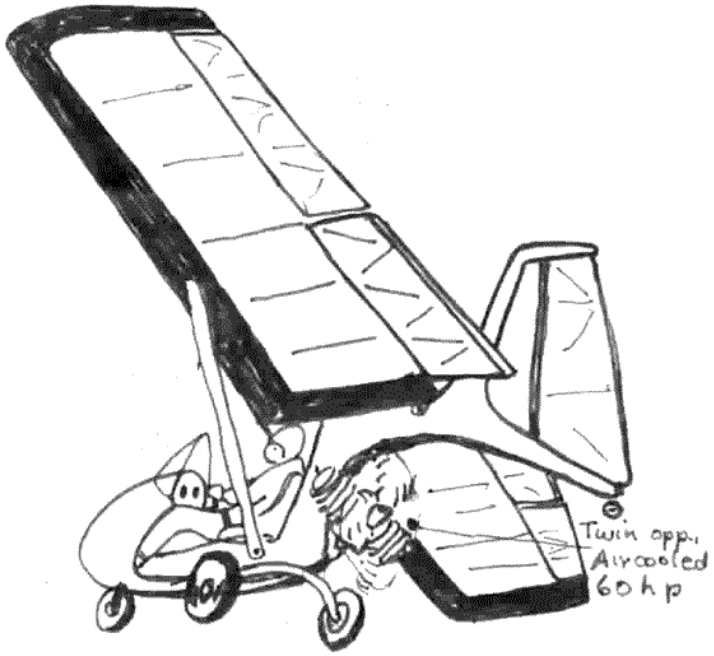
Terry Baxter
Darwin, Northern Territory Australia

P.S. Apparently the Mitchell Wing held the altitude record ten years ago, before Scott Winton eclipsed it with the Facet Opal. Can you give any technical details of the two seater that was developed for training? Thank you. These three ultralights, Mitchell, Facet Opal and Monarch, must be the best of flying wings that I have come across.

*(ed. – Sorry to hear that you have been ill. It sounds like you are finally out of the hospital and getting back into the swing of things. Obviously your brain has not stopped conceiving of new approaches to coming up with an inexpensive ultralight flying wing. So, let's see how much we can get into this newsletter to answer your questions.*

*First, on the membership renewal, your expiration date is always displayed on the mailing label. As you approach your due date we start circling it in red as an additional reminder. This method should always keep you abreast of the month and year of your renewal. We thought about membership cards but elected not to go that direction partly due to the additional cost of production and mailing. There has been no demand for one since we are a relatively small group and no one has needed one as proof of membership.*

*On the Facet Opal, we don't have a lot of information on it. We have a couple of articles similar to what you sent along, but not the detail you are asking for.*




*On the Monarch (see concept drawing above), I will have to do some research on Marske's website to see what I can find. I regret that I didn't get to reading your letter until just before publishing time and no one mentioned you were looking for specific information. I will do what I can to put together a package for you on this and the Opal.*

*Since Jim Loyd hasn't been a member for quite some time, I don't have any up-to-date information on the Boomerang. I would assume it was never completed because we didn't get a follow-on article from Jim telling us about his success. Perhaps someone out there knows what became of the project and will fill us in.*

*I have included both the original Boomerang drawings and your suggested modifications so everyone can see what you are talking about. I hope it generates a little bit of discussion both through the newsletter and from the website where I will add it in a couple of weeks.)*

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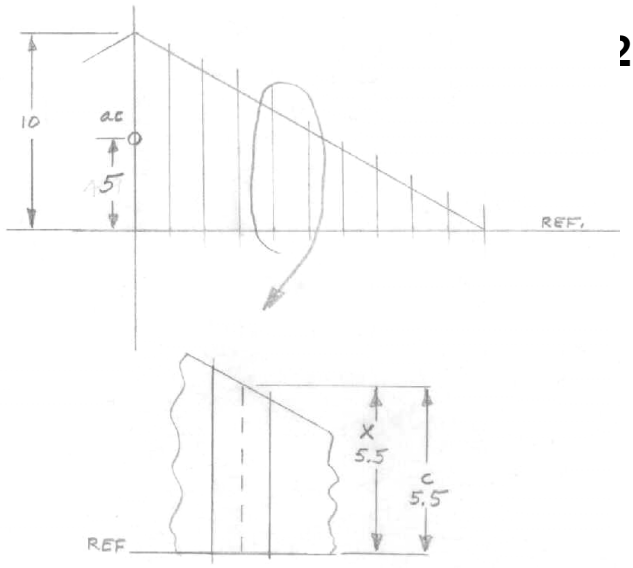
January 15, 2002

TWITT:

The letter from R. C Nutt in the last newsletter prompted me to send you this stuff. The subject of cg and ac keeps coming up and this may be helpful to TWITT members. In trying to duplicate strange bird planform shapes for my bird models I have had difficulty trying to locate the aerodynamic center and thus establish an appropriate cg location. Recently I decided to go back to the basic integral equation for determining the ac and came up with a simple table that should work for any wing shape (ed.




– the basis for this table will be published in a later issue after it has appeared in Model Airplane News). It's a little tedious, but seems to produce good results. I ran out a set of

Mean Aerodynamic Chord Calculations

Delta Wing Example

| Station % | Chord-c in. | LE from ref. x, in. | cx in^2 | c^2 in^2 |
|---|---|---|---|---|
| 0.025 | 9.5 | 9.5 | 90.25 | 90.25 |
| 0.075 | 8.5 | 8.5 | 72.25 | 72.25 |
| 0.125 | 7.5 | 7.5 | 56.25 | 56.25 |
| 0.175 | 6.5 | 6.5 | 42.25 | 42.25 |
| 0.225 | **5.5** | **5.5** | 30.25 | 30.25 |
| 0.275 | 4.5 | 4.5 | 20.25 | 20.25 |
| 0.325 | 3.5 | 3.5 | 12.25 | 12.25 |
| 0.375 | 2.5 | 2.5 | 6.25 | 6.25 |
| 0.425 | 1.5 | 1.5 | 2.25 | 2.25 |
| 0.475 | 0.5 | 0.5 | 0.25 | 0.25 |
| | 50.0 | | 332.5 | 332.5 |

| | | | |
|---|---|---|---|
| MAC = | 332.5/50 | = | 6.65 |
| MAC LE. (from ref.) = | 332.5/50 | = | 6.65 |
| ac (from ref..) = | 6.65-6.65/4 | = | 4.99 |

calculations for a delta wing. For a delta wing with a straight trailing edge and sharp tips, the ac turns out to be at the centroid of the wing area. It would be a good idea to have some of the other experienced aero guys in TWITT review this method to make sure I have done it right before you store it in your "archives".

For R. C. Nutt, the cg must be forward of the ac for positive pitch stability in the normal flight range of an airplane. Delta wings have a tendency to stall at the tips first which means that the pitch stability goes down as the angle of attack increases, (slow speed). For this reason the cg should be WELL forward of the ac for a delta planform. Good luck!

Bob Hoey

bobh@patprojects.org

*(ed. – I need to apologize to both RC and Bob for not publishing this last month. Hopefully, the chart and table will help RC confirm what he may have already found out.*

*Bob, could you let me know when it would be okay to publish the rest of the material you passed along. I don't subscribe to MAN any more so am not sure when the Spring issue comes out.)*

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January 15, 2002

Dear Mr. Bixel:

I have been a member of TWITT for several years but moved away from Orange County in 1996, thus have not been attending meetings since then. After reading your very impressive letter in the January 2002 TWITT newsletter, I went to the TWITT web site to find your submission so that I could print it out for ease of discussion in our local RC flying club (El Dorado RC Flyers near Sacramento, Ca ).

I found your presentation very clear and complete and the illustrations of great interest. I have often wondered about the use of flat airfoils for our models but never attempted a thorough experimental program such as the one you accomplished. Your results sound so interesting that I will have to try some flat delta wing designs myself.

I am aware of the advantages of symmetrical airfoils regarding CP travel but the other advantages of thin, flat sections you found are very interesting. Have you left the leading and trailing edges square (blunt) or sharpened or streamlined them? Was the wing in ground effect boat shown on page 4 full-sized and manned like it appears or a model? When you refer to "double wings" do you define the inner body structure as one wing and the delta stub wings as a second wing? On the large cargo carrying WIG designs, is the trailing edge of the inner "wing" squared off as it appears? Does the hull of the machine on page 4 form a catamaran and allow acceleration to take off (WIG) speed? Do you know if these WIG vehicles would need ailerons for lateral control (or dihedral)?

I printed your article from the web site and noticed it did not include all the figures that Andy included in the TWITT newsletter. Andy, I am glad you included the figures showing CG locations from Mr. Bixel's patent. I have been considering designing an RC tail sitter similar to Convair's Pogo of many years ago and which was a delta wing. Now the more accomplished RC flyers are able to hover models without the torque free counter-rotating props the Pogo required, so a vertical take off and landing and translation to horizontal flight should be possible. It seems a flat delta wing should be ideal to make the transition to a nose high hover without a serious stall problem. Besides, a cheap flat foam wing wouldn't be such a traumatic loss during the learning process!

Thanks for the very interesting and thought-provoking input in the newsletter.

Paul Stahlhuth

3599 Stockwood Way
El Dorado Hills Ca 95762
phsjes@innercite.com

*(ed. – Thanks for writing to Chuck and us about your thoughts and plans. I haven't seen a comeback message from Chuck so I don't know if he has answered your questions.*

*I will have to go back and check the website since I thought I had transferred everything from the newsletter into the pages. Thanks for letting me know something was missing.)*

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February 20, 2002

Hello gentlemen,

I must say that your website is one of my most favorites. Initially thanks to data about BKB-1, but then I found many other very interesting aircraft. Tailless aircraft did not play a role in Polish aviation, however there were a few gliders, which performed better or worse. I could try to prepare some data, but since it is much work required I would like to check it first if anyone really wants it. So if you are interested in, please let me know and I will prepare some data and pictures. However please note that my English is as you see, so some of your effort will be required too.

Best regards
Robert Pietracha

*(ed. – I wrote back to Robert and told him we would be most interested in other Polish flying wings and more information on the ones we currently have on the website. As yet I have not heard back from him, but I assume from his message it will take a while to put the data together. I will let you all know through the newsletter and website when it has arrived.)*

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February 20, 2002

Hello,

Norman Masters sent me the following message re the SAAB Trapped Vortex Experiment:
"The paper was written by Ulf Clareus and Rolf Westesson in 1973. I gave the only copy I had to the TWITT library over a year ago. I didn't read it because it's in Swedish that's why the info on my web page is so sketchy. I ran across a reference to it in a paper by Edward Krupa about his tests of a wind tunnel model designed by Witold Kasper. It's actually completely unrelated to Kasper's unpowered vortex flaps but he used the data from the

Clareus and Westesson paper to show how effective a vortex could be as a lift producer."

He said you could send me a copy of it. I will translate from Swedish and reciprocate this to TWITT.

Thank you.
Jim Bell

*(ed. – I have mailed a copy of the paper to Jim. It should be an interesting addition to the library in English. I will also make sure that Norm gets a copy if Jim doesn't take care of it first.)*

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## Flying Wing Fighter "Horten IX" by Doctor Reimar Horten

*(as translated by: Fernando Walter Siarez, Buenos Aires, Argentina. The original article was titled "Ala volante Caza 'Horten IX' ", by Dr. Reimar Horten, published by Revista Nacional de Aeronautica, (today: Aeroespacio, Revista Nacional Aeronautica y Espacial) " May 1950, number 5, pages 19-20; Buenos Aires, Argentina.)*

**T**he performances and qualities a modern fighter must have are very varied. In peacetime, the fighter development is always oriented towards its maximum speed, despite that there are many performances and qualities that determine its value during combat missions.

If the fighter is 100 Kilometers/hour [*about 60-mph -Trans*] faster than the bomber plane, it can overtake this latter and absolute speed is a secondary subject. During combat between fighters, higher speed is an advantage, as is higher climb rate and higher ceiling. Turning radius or time for a complete turn, are other performances that are not less important, to mention some of them.

To avoid combat, maximum speed is the only decisive one, but this is not the mission of a fighter. To intercept and achieve air supremacy, it is advantageous the higher starting position. If surprise factor fails, combat transforms into a "turning" combat. To be able to fly with small diameter turns, low wing loading is needed, from which a big wing results, what is advantageous for the practical ceiling. With this wing, take off and landing speeds, mainly the latter, are kept in an easy to dominate envelope and the amount of fuel carried aboard -that in jet aircraft can never be sufficiently large- allows satisfactory range values. The big wing does not decrease largely the maximum speed in jet fighters, because that is influenced only by aerodynamic design. This phenomenon comes from the fact that at such velocities, sonic speed is frequently achieved, so getting big additional drags. So, for example, the swept wing provides a mean to delay this drag increase, to much higher speeds.

Other factors of equal importance as speed, ceiling and turning radius also determine the combat value of a fighter. To describe them all will take us too far and is out of the scope of this article. I want only to remark the visibility of the aircraft. In the past, the detector was human eye, later it was the grounded radio that provided guidance until the airplane met the enemy. Today the pilot has the assurance of recognizing, even at night, an airplane flying many kilometers far, by means of the radar. In the past, planes were covered with camouflage paintings, and with the advent of radar, the already considered antique wood constructions, turned into something modern again. As reflection of electric waves on metallic surfaces is good, such is the image on the radar screen; on the contrary, on wood surfaces, that reflection is little, these resulting barely visible on the radar.

A fighter must use the surprise factor, especially at night; to do that, the plane must be built in wood, not only for the above mentioned circumstance, but also because the wood surface resistance to impacts is not necessary inferior to that of metallic surfaces, as was shown by tests. Also, those resistances are regarded of secondary importance, because with modern big gage guns, an impact means practically a total loss.

As far as landing speed is concerned, I want to say some words, because very often it is given a secondary importance: personally, I consider it very important because "cold losses" depend on it. Any loss is a victory for enemy. So, landing speed has great importance, besides the fact that it determines service possibilities in bad weather and at night. On the other hand, a pilot that has just ended a combat cannot be asked for high skill performances, needed with high landing speeds. Another point deserving mention, is that practice demonstrated that during a war, type specialization cannot be kept: the fighter drops bombs, takes part in ground combats, makes night interception and reconnaissance flights. Technology would like to solve a specific problem; anyway, it has to design the fighter as a multi-role aircraft and accept many compromises in such a way, that it must be able to carry bombs, or supplementary droppable tanks when it flies in a defensive mission; it must also be able to launch rockets, or be provided with an automatic movie camera, etc.

Guided by these thoughts, I built in 1943 the Horten IX model, from which two prototypes were built in the own firm, passing in 1944 to series construction under the license Gotha-Waggon Gotha. It is a flying wing of 16 meters span, equipped with two Junkers 004 turbine engines, built in three parts, the central wing section and two exterior parts. The central part that bears the load is 3.2 meters [*10.5 ft -Trans*] long and is built in steel tubing; in it the landing gear, turbines, weapons and pilot seat are fixed.

The turbines are inside the wing and receive air from the leading edge, without deflections. The cabin is put in the vertex of the sweep angle, between both motors, and is equipped with ejector seat, so as to allow the pilot to descend in parachute, without risk, at high flying speeds; besides the necessary armor, it has radio and identification instruments. Four MK 103 cannons, 30 mm gage, of 900 m/s of initial speed that produce a noticeable effect on the target and a ballistic corresponding to flight speeds. It has a hanging device for two bombs of 1000 Kilograms each, or for two droppable supplementary tanks, also of 1000 kilograms each. Its range is of 4000 Kilometers with 2400 kilograms of fuel in the wing, but it could be extended considering the very improved fuel consumption of today.

The landing gear, with nose wheel, had been designed for the aggravated conditions of night flying and was retractable to the wing center section. In spite of the low landing speed, of 140 kilometers per hour [87 mph -Trans], a detachable

drag parachute had been installed, which allowed very short landing runs. In the center section also is installed a aerodynamic brake that permits a rapid adjust of the own speed to the enemy's own one, and that can be also used for landing. The cover shells are wood "monocoque" parts, easy to dismount for maintenance of the engines [and of ] the weapons. The second model was a two place one for night flights and training. The outer wing parts, completely built in wood, are of single spar construction. The leading edge is built in shaped wood, this is, milled wood, mixed with adhesive and then pressed to the definitive shape. By means of this construction method, a high quality product of any shape and size, can be made. The spar that transmits the forces from the wing fitting to the "monocoque", houses in its interior the command push rods. All wing space must be filled with fuel, using very simple rubber bags, attached to the monocoque. The rudders, mounted as brakes at the wing tips, produce a safe effect at any speed, and -by means of some manipulations- can also serve as elevators, so as to assure, even in supersonic flight (it can happen in a down pitch) total dominion of the plane.

After five years have passed since the last construction in Germany, I can demonstrate that the Horten IX has not been surpassed by more recent constructions. Speed records are, today as yesterday, over 960 Kilometers an hour [*596 mph - Trans*], its maximum speed, but the general design combination has not been excelled. The fact is that the construction principles should have been guided only by the physical phenomena arising from experiments with other built airplanes, without copying them. The contrast to this is the conventionally built airplane, resulting from the average of several ones, to be built.

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**Tailless Tale**, by Dr. Ing. Ferdinando Gale'

A multi-faceted look at tailless aircraft. Aerodynamics, stability and control, many examples. Line drawings, charts and tables, and a corresponding English text. Directed towards modelers, but contains information suitable for amateur full size designers and builders. 268 pp. US$38.00.

**On The Wing...the book**, by Bill and Bunny Kuhlman ($B^2$) A compilation of their monthly column that appears in RC Soaring Digest magazine. More than 50 articles on a wide range of topics of interest to enthusiasts of tailless configurations. 234 pages of technical and non-technical articles, plus coding for computer programs to determine twist and other design parameters. 250 pp. US$28.00

**On the 'Wing...the book, Volume 2,** by Bill and Bunny Kuhlman ($B^2$) Continues where the initial volume left off. Contains more than 50 "On the 'Wing..." articles. Airfoils, designing for stability, control systems, descriptions of full size and model and aircraft. 234 pp. US$28.00

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Terry Baxter mentioned that Scott Winton's Facet Opal (left) reminded him of Hugh Lorimer's Sgian Dubh (Black Knife) (right). There are some similarities in the general layout, including dual vertical fins on either side of the propeller and the fuselage pod. However, the Opal's wing is basically a laminar flow rectangle, whereas, the Sgian Bubh does has some taper and the flared wing tips. The Facet Opal was powered by a 40 hp Rotax and set, what were then provisional (1989), records in the categories of: time to climb to 3,000 meters; time to climb to 6,000 meters; absolute altitude and; altitude for an aircraft under 660 lbs. Scott was tragically killed and the aircraft destroyed during a landing accident, so who knows what additional potential they had left to discover.