

T.W.I.T.T. NEWSLETTER

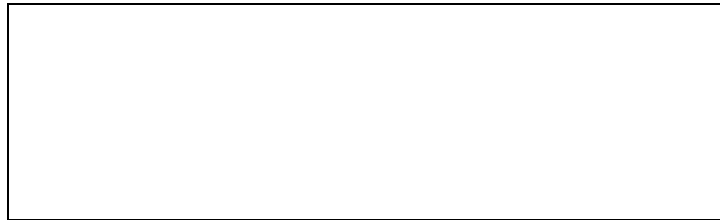


Is this a modified Mitchell U-2 or a design that pre-dated Don's work with Junkers type elevons?
See the e-mail on page 3 for more on this design.
Source: http://www2s.biglobe.ne.jp/~FlyWing/FlyingWing_Others.html

T.W.I.T.T.

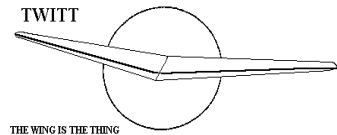
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021

HAPPY HOLIDAYS



The number after your name indicates the ending year and month of your current subscription, i.e., 0512 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 21, 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.

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

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PRESIDENT'S CORNER

Well we have made it through another year providing what I hope if a valuable service to the flying wing community. Next year is probably going to see some significant changes to the way we approach this whole process of providing information to our members.

As I noted last month, we may have to cancel trying to have formal programs unless we can line up a speaker that happens to come our way. This means our Southern California members will need to keep their eyes and ears open for possibilities and provide us with the necessary contact information.

I am also thinking it is time to start offering some options for receiving the newsletter with a varying pricing structure that goes with the delivery method. More and more publications are going to strictly electronic distribution, but I know we have members that don't have access to the Internet so can't really drop hard copy versions completely. I don't want to lose any more members than we have lately.

Speaking of membership, we are now down to 75 people on the mailing list. This is comprised of members and several complimentary issues to key people we feel can add value to TWITT. The number has been dwindling slowly from our high several years ago of about 130 full members. As I have lamented in the past, I am not sure why people drop out but can only surmise it is due to the lack of any real progress in the development and building of flying wings in the US. Nothing we can do about that end of it due to the cost and liability associated with such a project.

HAVE A JOYOUS HOLIDAY SEASON AND HAPPY NEW YEAR.

Andy



LETTERS TO THE EDITOR

November 14, 2005

U-2 Plans

Hi, Russ:

I am currently building a U-2 from the plans from U.S. Pacific. As you noted the plans are not real clear but are useable. It is my understanding that Richard Avalon underwent some major surgery early this year about the same time my plans were shipped and I have not heard from him since.

I sent him an e-mail shortly after I received my plans because I was concerned that some of the pages were missing. That said there is a Yahoo group devoted to the U-2 and has a lot of good information on it. Maybe we can help each other.

I have completed the inner and outer spars and am currently building the rear ribs. I also have a book written by Larry Collier "Building & Flying the Mitchell Wing" that helps fill in some of the holes in the instructions and plans.

I am located in middle Tennessee and would enjoy helping, if you like you can email me at jcranegt90@tds.net, with any questions and I will try to find some answers.

Jamie Crane
<jcranegt90@tds.net>

(ed. – The one thing Jamie forgot to include was the address for subscribing to the U-2 Yahoo group so here it is.

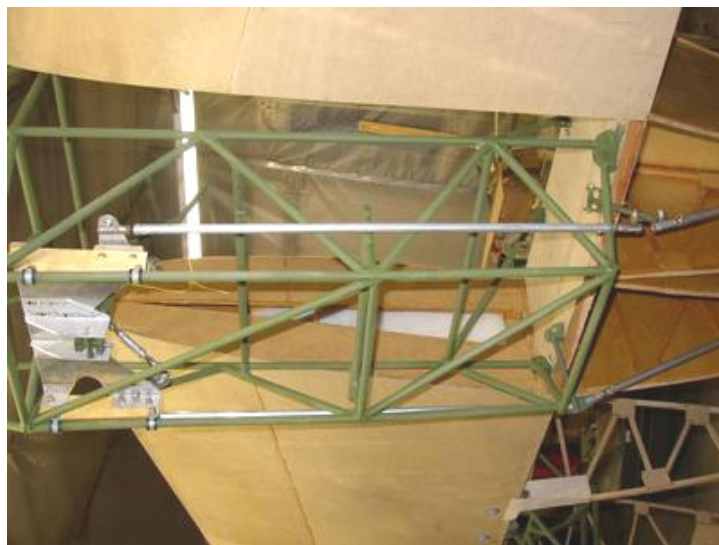
U-2Wing-subscribe@yahoogroups.com

If you haven't joined one of these in the past you will have several options on how you want to participate. Unless you like getting a lot of e-mails each day, the best option is to take the digest version so you get one daily e-mail when there is activity and it includes all the messages for the time period. I find this to be a more efficient use of time.

I have subscribed to the group so I can see what is going on and what type of information becomes available in the general sense of flying wings and pass it along. I have also included a couple of shots from the photo gallery showing some fuselage parts of Dave Gingerich's U-2.

Norm Masters e-mailed Russ with a general address for the Yahoo sign-up page and offered the following information.)

"There aren't very many U-2s under construction or flying but those who have them are very willing to talk about the plane and their experiences building and flying it. You can find answers to a lot of questions in the group archives and a lot of builders put construction photos in the group photos directory."



November 15, 2005

Blended Wing Body:

I am not sure where to begin and with whom. Your story I believe on the blended wing body aircraft that is now being test flown by NASA, how do I say is such an egregious rip-off of Vincent J . Burnelli's Lifting Body Aircraft, that if he were alive today or if his

surviving company had the funds they would be suing anyone and everyone associated.

The story by Joseph Mizrahi never mentions from whom all of this revelation in aeronautical design came from.

Give to Caesar what is Caesar's.

You can find more information on Vincent J. Burnelli by Googling him and going from there.

Also the commercial "blended wing body" aircraft they are wind tunnel testing at the Aims facility I believe is an intrusion into the patents authored by Ted Geffner when he was working for the Burnelli Lifting Body Aircraft Co.

Thank you,

Doug Geffner
Miami, FL
<DGeffner@gableseng.com>

(ed. – I replied with:

Thank you for your comments, however, I need a little more information about which aircraft you are referencing.

If you are commenting based on information from the TWITT website on BWBs, then it is quite outdated and there is probably no NASA testing of a specific design still going on.

If you are commenting about something that is currently being tested by NASA, I am not fully aware of it and need more information to make further comment.

I look forward to hearing back from you with which direction you wish to take the discussion.

(ed. – Doug responded with:

Thank you for your response. I will for sure do my research and get back with you.

My original intent was to have Vincent J. Burnelli THE inventor of the lifting body aircraft, get the accolades he should have received while he was still alive.

Perhaps that is why NOW all the interest by NASA and the commercial aviation community. He is no longer living and able to protect HIS incite and innovation in the annals of aviation history from being STOLEN.....

Doug Geffner

(ed. – I seem to recall a similar discussion on the patents of Burnelli in the past, but can't put my finger on precisely when and from who it originated. If

anyone recalls such a discussion, could you please point me in the right direction.)

November 17, 2005

Flying wing designs of B.I. Cheranovskiy

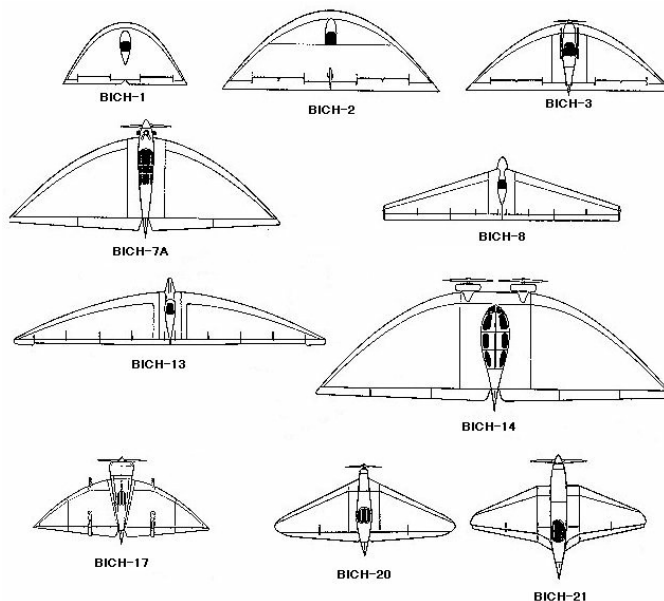
Can anyone at TWITT point me to any references for the flying wing designs of B.I. Cheranovskiy. They look extremely interesting and modern for their era. The only reference I have found is pasted below. Unfortunately I only speak/read English.

http://www2s.biglobe.ne.jp/~FlyWing/FlyingWing_Others.html

Thanks,

<paynebc@bellsouth.net>

(ed. – The referenced site appears to have some sort of scrambled up text, but there are lots of pictures of the various designs by Cheranovskiy. See the top views of his various designs below. It also contains links to other flying wings that you might find interesting.)



November 29, 2005

Inflatable flying wing

I was looking for information on inflatable aircraft hoping to find more info on D. Perkins inflatable man powered wing circa 1966 (said to have made 97

flights in ground effect -pg.19 of "Man Powered Flight" by Keith Sherwin) when I came across a more ambitious project described in German at:

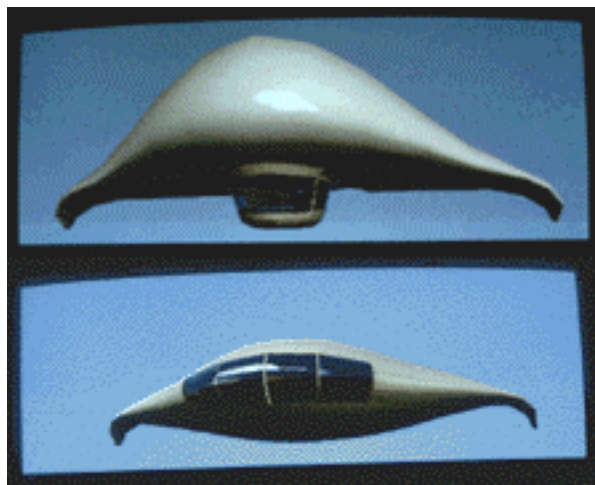
<http://heise.de/tp/r4/artikel/2/2531/1.html>

Maybe you have seen this already.

Have fun,

James Mclellan
<jwmcl@att.net>

(ed. – I have included a couple of pictures from the web site so you can get an idea of what James is talking about.)



November 16, 2005

TWITT:

I am on my visit to Florida and am sending you my renewal for the TWITT newsletter. Thank you very much for your work and the interesting news.

November 1 I reached the age of 83 and am in good health after so many birthdays.

All the best for you and TWITT.

With best regards,

Rudolf Storck
Deisenhofen, Germany

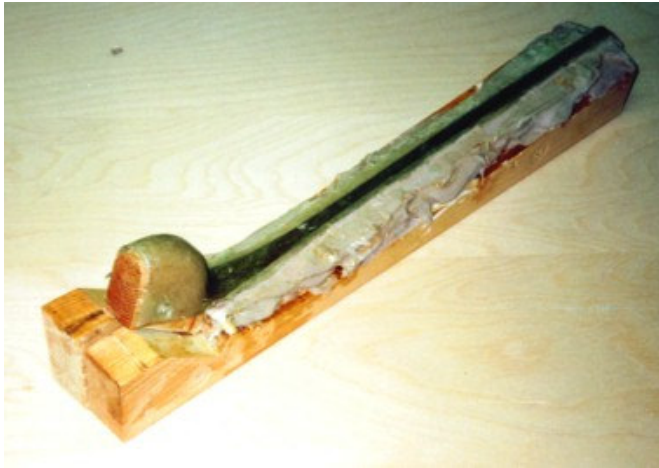
(ed. – I thought it would be beneficial to add some material besides letters to the newsletter that might be of value in doing actual building. These photos were provided to the Experimental Soaring Association (ESA) by James Terry and cover his construction of a tail wheel assembly. The techniques are applicable to other parts of an aircraft, so I hope you find it interesting and useful.)



My first vacuum bagged part was this tail wheel fender shown with a skateboard wheel.



A tail wheel spring pattern was carved from wood and bent after soaking in boiling water. Note that the shaft is tapered toward the upper end and the reason for this will be shown in a later picture.



A mold for the tail wheel spring was made by packing Bondo around the spring pattern. A premixed plaster was tried for the mold first but it was a total failure. The mold is in 2 pieces split down the middle so the spring can be removed. Fiberglass roving was soaked in resin and laid into the mold until it was full. Additional roving had to be added twice to get the correct mold fill. The fender was held in place during this process and the fibers were wrapped around and up on the fender. Some of the roving was wrapped around a shaft where the axle will be.



The tail wheel spring as removed from the mold is shown here. There was a 1/32 inch plywood contour board on the centerline that held the pattern off the wood pieces so that the Bondo would completely surround the pattern.



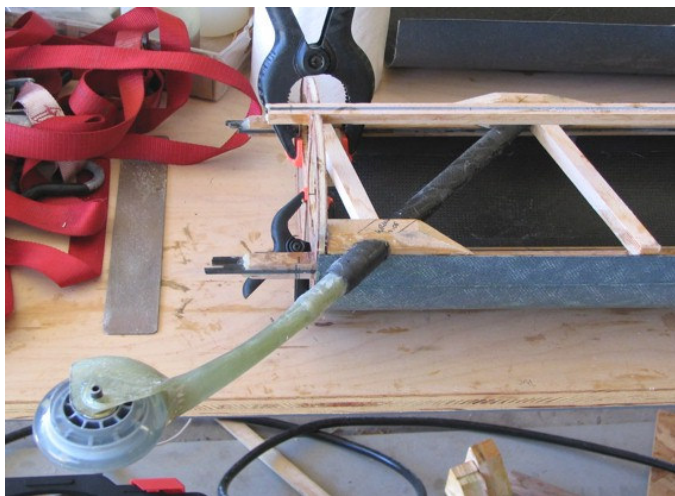
The cleaned up spring is shown here. Later, additional roving was wrapped around the spring at the lower and upper spring socket contact areas. This wrap was extended a short distance below the socket for additional resistance to splitting of the spring in the high stress area.



The reason for the tapered spring is shown here. Thin balsa was glued to the spring pattern and the pattern wrapped with polyethylene film. Carbon cloth was wrapped as tightly as possible around the pattern and then peel ply wrapped around that again as tightly as possible and duct tape used to secure the peel ply. After this assembly cured, the taper in the spring pattern allowed it to be pulled out of the socket. I don't remember if a hammer and punch had to be used to start the motion but the pattern came out cleanly. Roving was wrapped around the spring on the upper end first until it was a snug fit and then around the lower end to make it fit. Carbon roving was wrapped around the lower end of the socket to reinforce the high stress area.



The tail wheel spring socket was installed in the boom half in a manner very similar to the method given in the Builder's Manual. Details of the boom longerons can also be seen in this picture.



The tail wheel spring is shown in place in this picture.

Nurflugel threads:

November 8, 2005

Re: Nurflugel Book

Since you recommended it so highly, Serge, I've been looking for "Experiment in Flying Wing Sailplanes" but haven't found a source. Would you happen to know where I can order it?

I was also looking for "The Delta Wing", which seems to be out of print but I ran across some Wikipedia articles. There's a bio of Lippisch here:

http://en.wikipedia.org/wiki/Alexander_Lippisch

with so many links that it's getting hard to read. Oddly the delta wing entry only mentions Lippisch as a footnote, instead, giving credit for the invention of the concept to some 17th century Polish artillery expert because he put triangular fins on rockets (apparently before that they were stabilized by a long stick like a bottle rocket)

Norman Masters
<nmasters@acsol.net>

Norm-

It was self-published and printed up in modest numbers. Jim Marske wrote me recently that he has just ten remaining copies. He monitors this list, but you can probably reach him through his web site. Note though that there are two sites now - one his own and one by Mat Redsell, who is now working in Canada. If

you have any problem finding an e-mail address, contact me, and I'll send it to you. I still hope that he will bring it up to date and republish. There may be something relevant in the works from another quarter, but I'm not sure what form it will take and feel that I don't know enough to be comfortable in commenting.

Serge

(ed. – For any others that might be interested in one of the 21 remaining copies you can try Jim Marske at: marske@marion.net)

November 12, 2005

Subject: Trike Crash Video

My brother (conventional pilot) sent me video clip of a trike crash. It is about 500k in size.

WARNING. It is rather graphic. If you don't wish to view, don't open the file.

Comments as to cause may be fodder for dissection.

Morgan
Flying Turtle Farm
Tylertown, MS
<kilolani1@netscape.net>

(ed. – Morgan tried to attach the video to his message but the bulletin board doesn't permit attachments. Norm Masters noted there is no blood or gore and put it up on his site, providing the following link:

<http://users.acsol.net/~nmasters/temp/trike-crash.mpg>

He said it would be there for a week, but it was still active when I tried it before publishing this. The rest of this thread are the parts that I felt were informative about trike flying without all the other trivia that got posted.)

Subject: Why I Never Have Flown a Hang Glider *(from a comment by one contributor about not risking his neck in such machines - trikes)*

Every machine has limitations that must be respected: I have been flying trikes, mainly designed and built by me, for 27 years and hang gliders for 35. I have never had any problems because I have always flown in competent weather, FULLY inspected the aircraft BEFORE EVERY FLIGHT and avoided to try and perform aerobatic on a machine that

was not designed and built for it. Idiotic behavior leads to accidents and ruins the sport.

Bruno
<msmprod@optushome.com.au>

I am seduced by the lure of closeness with the elements, but the very lack of regulations seems to breed and attract those who eschew common sense in construction, maintenance, and operation. Even at the best, the lure is to fly in some of the spectacular areas, regions fraught with unstable air. A few of my wisest friends have succumbed to this trap, when unexpected currents upset the craft beyond their marginal control capabilities.

Good luck and happy landings,

Bob Storck
<bstorck@sprynet.com>

If you have to crash an aircraft, a hang glider is probably the best thing in which to make an attempt, except maybe for a blimp, and lighter than aircraft don't count for this discussion

The hang glider configuration has evolved from one intended to offer parachute-like re-entry capability for spacecraft

The wing loading is exceptionally low ergo so is terminal velocity, like a feather.

I don't have statistics but by far MOST hang glider crashes are survived without injury...students crash them every day, granted probably into soft sand, but it's kind of like most people learning to ride a bicycle or ski... they fall down

Also most hangglider pilots fly with a parachute that remains attached to the disabled craft and lowers the craft and pilot gently back to earth, again like that feather...well...almost

Add power, and now we've got some extra factors in the equation which I cannot defend quite so easily...or readily

Larry Witherspoon
<ssspoon@aol.com>

While I agree with you, Spoon, about hang gliders, I have to add that ballistic parachutes were invented for trikes. Trikes (properly designed and built) do not use hangglider wings: they use similar but MUCH stronger and resilient wings, purposely designed for them. About speed: a hang glider can easily be landed at 0 forward speed (e.g. pilot standing up) but for those that do not know how to do that, wheels, added to the side of the A frame, have been

developed and are used for take off (when towed) and landing. Some paraplegic people are flying hang gliders. Trikes can be landed at 25 km/h. If that is too fast.....

Bruno

Re: Trike Crash

What was he doing? It looks like he was making a steep turn and slowed to the point that he lost lift and stalled out? Or did he catch a wind gust or something?

Ed Regal
<eregal@skypoint.com>

Something between a stall turn and an ugly loop. Not enough speed on top. Went negative (a big no-no on pendulums), started tumbling, exceeded load factor for the frame, folded the wing, went splat. Depressing.

Gastone Rossato
<gastoneintexas@yahoo.com>

Trikes are everything BUT marginal: they are strong and very stable, WITHIN THEIR LIMITATIONS. If somebody decides to take off and fly with a 20 knots wind, the answer is evident. About the viability of these machines, it will suffice to mention journeys around the perimeter of Australia, Africa, liaisons between exploring parties at the North and South poles, etc. The whole lot documented. Jerry Breen, famous British Ace, has been teaching triking on the coast of Portugal for many years and he has established a few records. He taught me years ago and made me realize the capabilities and limitations of these excellent machines.

I do not think the wing's spar gave up, Gastone. I reckon he was attempting to loop (stupidly) the machine and ran out of speed.

Bruno

I have seen the clip many times before - it is used here in the UK in schools to show you want not to do.

On the structure neither spars fail in the accident - what fails is the cross beams and/or the retaining cable - you can see the spars intact fold back to the stored position and then re-open during the last tumble prior to impact when the wings hit in the extended position while moving reverse to flight ie trailing edge first.

What I have always seen in this clip was two fold failure in flight followed by single failure of structure.

The pull up and semi loop was crazy and was the first failure - it put the wing into negative G - as the outer washout in a trike wing is held with aero forces this then reversed and as the trike fell out of the loop this makes the reversed flow tumble the wing backwards (note this was a backwards roll not a tuck forward) and then the weight of the trike and engine/pilot pivot backward - one this back tumble starts you have no reasonable chance at recovery.

Basically you have to know your limits and those of the aircraft - Trikes must never go Neg G and must never back slide - or you die - period.

As for experience - I have hit a fence on flare in a hangglider (legs still attached - just), gone through the tops of trees in a balloon, had various engine outs and airframe issues with three axis and still fly trikes - each type has there limits and features - understand, accept and operate within.

... but you will NEVER get me up in heilicopter - those bastards are trying to shale themselves apart and kill you every second of flight.

Kirk Sutton
<sutton_ka@hotmail.com>

In about 1985 we had investigated "tumbling", what the accident shows. Sorry, that the reports are only in German available, but have a look at the drop-tests, photos and charts:

<http://www.fh-bingen.de/~schoenherr/Tuckweb/Tuck.htm>

Sincerely,

Michael Schönherr
<mech@net-art.de>

I have been holding this until a conversation got going. Two days before Morgan brought that video clip to our attention Stefanie Brochocki sent me a note telling me that there's a new Ph.D. named Guy Gratton. Dr Gratton's thesis is about airworthiness evaluation techniques for small aircraft. It's 255 pages and a big section of that is devoted to tumbling of swept wing tailless. Here's his web site:

<http://www.gratton.flyer.co.uk/>

He has it very conveniently available as several separate files or one big file. Section 4 is the one with tumbling info

Norm

FYI

Guy Gratton is the Technical manager for the British Microlight Aircraft Association (BMAA) and is THE only person who can approve a microlight homebuilt design... and he is TERRIBLY conservative and the regulations here require all microlights to be within full design acceptance - there is no freedom at all.

He completely refused to let me build a flying plank wing here in the UK because although I can (and did) provide full structural analysis and drawings for the design it would not have met the directional stability required to allow a novice pilot to fly it (something about tail volume being a bit low!!)

Over here ALL microlights have to be soooooooo tame as to be boring because they have to meet both the structural and handling requirements of either BCARS or JAR(VLA). NB - I have one of these planks already flying in Australia so I know its stability is adequate but this held no sway with Guy.

Also note that in the UK flex wing microlights (trikes) outnumber fixed wings well over 4:1 so its not unsurprising that his PHD was on the aerotumbles and stability.

Kirk Sutton

I guess you and he both have to work within the bureaucracy you find yourselves in. Over here in the states we now have a new category called LSA which is supposed to provide a legal niche for airplanes between the current UL and GA, and sport pilots who want to carry a passenger or fly something a bit more "airplane like" than a trike. It too has minimum controllability requirements that will probably keep some flying wings from being licensed as LSA. Specifically the rapid entry into and exit from a slip without unusual control response. It's the "unusual control response" part that could be a problem.

Oh well... The motor glider license is far less restrictive anyway

Norm

November 16, 2005

Subject: High End High Flyin' Nurflugel Balloons.

Awesome read from space.com

http://www.space.com/business/technology/technology/black_triangle_020805.html

http://www.space.com/business/technology/flying_triangle_040902.html

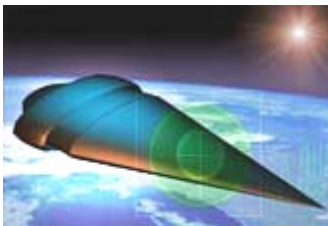
I remember reading articles on balloons like this too way back in the 70's. I was always a fan of dirigibles and balloons and their use goes back to who knows when.

My question is why the new craft have delta or triangle shape? I think I know why but would rather hear the expert info.

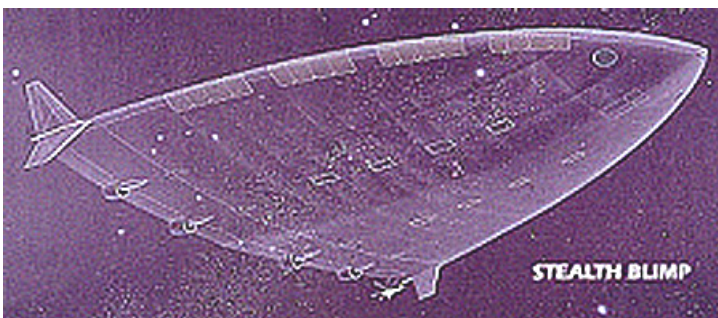
It's no big secret. I've seen these big black delta and triangle shaped aircraft very up close on several occasions. They would fly low over our houses and businesses back in upstate NY. They would scare the bejeezus out of the locals and really piss off the cops.

Best,

Greg
evolbaby@aol.com



(ed. – I have included a couple of the pictures from the two websites. The articles are written by Leonard David who is a senior space writer and were posted in 2002 and 2004.)



Lockheed Martin's Stealth Blimp from 1982

Delta shaped, helium enhanced, ion drive, lifting bodies have been flying since the late 60's to early 70's. So this shape isn't new, unless you consider the late 60's and early 70's "new" in the context of lighter than air craft development.

The shape generates lift and provides surface area for the ion drive system, that many think these aircraft use to get around.

The drive system is distributed across the surface area of the wing, aft of the airfoil shaped high point of the craft.

You need a lot of area to get any useful thrust out of a drive system like this and the delta shape not only provides lots of surface area for the drive system, it also provides lots of lift and interior space for the long flights and large payloads that the mission profile requires.

Dennis Mingear
<dennismingear@yahoo.com>

That sound's like DeSeversky's "Ionocraft". There was a PM article in the mid '60s on it. Not very efficient though. One wonders that you could generate enough thrust from an onboard battery to hold a big balloon in position above a surveillance target against any wind.

There's a long article about DeSeversky on the Rexresurch site:

<http://www.rexresearch.com/desev/desev.htm>

Norm

Thanks for the post, this machine is very similiar to the model I saw in PM at around the same time. As I recall, the efficiency wasn't all that bad, but look at the size of the "prototype", very small. Also remember that the vehicles we are talking about are relatively low drag bodies, supported with helium, and the power source doesn't have to hold them up, just provide the thrust required to get around and hold a position in space long enough to acquire the information they are looking for.

If the ion array were properly deployed on the wing, it would actually help maintain laminar flow over the lifting body, making the vehicle even more efficient.

This is one technology that really gets better with size. BIG, means that you can carry almost anything for a power supply. Think nuclear submarine in the sky.

You could easily carry all of the shielding necessary to make something like this practical. Of course the size and payload capability would allow you to use diesels if you wanted to, weight of the power source would not be a problem for this class of vehicle.

Dennis Mingear

November 20, 2005

Subject: Air Force case studies on microfilm

The catalog at the link below is of Air Force case studies stored on 16mm microfilm. Reels can be ordered at (gulp!) \$30 each and several pertain to the various Northrop flying wings. I've never seen or heard of this report series before, so I don't know whether they're worth the money.

Incidentally, while 16mm microfilm is hard to find readers for, the film can be cut into strips, inserted in special jackets and treated as microfiche - same magnification required.

<http://www.enginehistory.org/References/AFHRA%20Case%20Hx%20Files.pdf>

All 4 volumes of the flying wing case study are on ONE reel (#3829), along with information on other aircraft.

Marc de Piolenc
<fmdepiolenc@yahoo.com>

That's a messy solution, fraught with the possibility of losing pieces. Most major libraries have reader/printers.

And I've bought simple readers, adaptable to read sheets of fiche or reels at modest prices, around \$100. Watch the surplus market, as they are often available.

Bob Storck

I have had little luck, even in the States, with 16mm, and where I live now there's no microfilm support at all - I have my own 'fiche reader and that's it. I never could find a surplus film reader, so when I need to read or print from my 35mm microfilm collection I have to use an enlarger! I probably have enough components in my gear to build a library-style carrel reader, but somehow I never get around to that.

In twenty-plus years I've never found a single film reader on the market - don't ask me why, because in that time I accumulated no less than two 'fiche readers and a reader-printer!

Mark, I've had much the same luck, even though the Portsmouth, NH public library had at least six very large microfilm readers in place the last time I visited. At least two were advertised as capable of making copies. Evidently, the back issues of local newspapers are available on microfilm. I was trying to copy some Nieuport 28 microfilm the Smithsonian supplied but had absolutely no luck. The lenses were so filthy internally and so unfocusable as to be

worthless for precision work. Fortunately, you can scan them into your computer with the right programs.

<Denofersh@aol.com>

November 23, 2005

December RC Soaring Digest available

We don't normally announce publication of an issue on this exchange, but the December issue contains a rather unique article of relevance to nurflugelers. Peter Wick has designed five airfoils for RC models with plank planforms. Peter's article includes usage information and coordinate tables for all five sections.

Peter has written several articles for Aufind, the well-known German model aviation magazine, and we will be publishing Peter's translations of those articles in future issues of RCSD.

The December issue PDF, 7.8 MB, can be downloaded from the RC Soaring Digest home page

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

Bill & Bunny Kuhlman
<bsquared@themacisp.net>

AVAILABLE PLANS & REFERENCE MATERIAL

Coming Soon: Tailless Aircraft Bibliography Edition 1-g

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

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

Prices: To Be Announced

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VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.

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VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (Brochocki, Kasper, Bodek) as related by her father Stefan. The second part of this program was conducted by Henry Jex on the design and flights of the radio controlled Quetzalcoatlus northropi (pterodactyl) used in the Smithsonian IMAX film. This was an Aerovironment project led by Dr. Paul MacCready.

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An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.

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VHS of Paul MacCready's presentation on March 21, 1998, covering his experiences with flying wings and how flying wings occur in nature. Tape includes Aerovironment's "Doing More With Much Less", and the presentations by Rudy Opitz, Dez George-Falvy and Jim Marske at the 1997 Flying Wing Symposiums at Harris Hill, plus some other miscellaneous "stuff".

Cost: \$8.00 postage paid in US
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VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.

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Tailless Aircraft in Theory and Practice

By Karl Nickel and Michael Wohlfahrt

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

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

Contents: Introduction; Aerodynamic Basic Principles; Stability; Control; Flight Characteristics; Design of Sweptback Flying Wings - Optimization, Fundamentals, and Special Problems; Hanggliders; Flying Models; Fables, Misjudgments and Prejudices, Fairy Tales and Myths, and; Discussion of Representative Tailless Aircraft.

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