No. 320 FEBRUARY 2013

T.W.I.T.T. NEWSLETTER

The X-48 is a Blended Wing Body aircraft, which is something of a halfway house between a flying wing and a conventional airplane. Note installation of larger engines than previous models.
Source: http://www.uasvision.com/2013/01/31/nasas-x48-c-blended-wing-body-prototype-new-photos/

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

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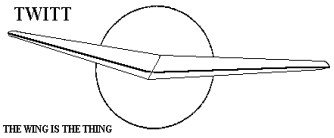

THE WING IS THE THING (T.W.I.T.T.)

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.

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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

I don't know where the time goes. It dawned on me on Saturday morning that I had not even started on putting the February issue together and it was due in the mail the next week. So I have thrown together as much as I could find from some e-mails and the various bulletin boards. I was in such a hurry I didn't necessarily do a lot of grammar and spelling checks except those done by the software so please forgive some of the errors you might find. So this goes to the printer tonight (Monday) so I can get it mailed out to everyone on Thursday, which will just about be on time.

There is a lot of different type of material this month so I hope it will spur some return comments by our members so we can get the flying wing blood flowing after an especially cold winter in some areas. Please send me your e-mails with your thoughts on these subjects or any others where you want some help.

I noticed we had a large group of renewals that came up in January and February, but I haven't seen many come in through the PayPal link. So I am assuming they will be in the mail, but timing is such I won't see them until after this issue goes out. So if your expiration date is still set at the hold value, please wait until the March issue before getting worried that I didn't get you check or money order. There is always a lag since the box only gets checked once a week, and this time around I didn't make it to the hangar to pick up what Gavin brought from the box. My apologies for the inconvenience.

LETTERS TO THE EDITOR

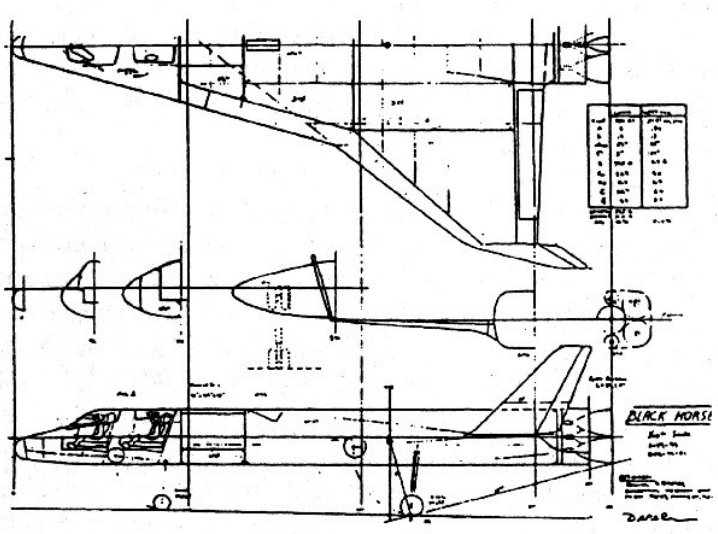
(ed. – Below are a series of e-mails from Jason that I have combined into one and added a couple of images from the various websites he included as links. I know he is very interested in space flight and the use of tailless vehicles as some of the suggested ways to reaching orbit or doing flight into the thinner atmospheres of other planets. If anyone else has links or images of such vehicles, we would very much like to see them.)

The British Skylon tailless SSTO (Single-Stage-To-Orbit) space plane (see: http://en.wikipedia.org/wiki/Skylon_(spacecraft) [you might need to enter "Skylon" on Wikipedia's opening page www.wikipedia.org to get to the article]) is closer to fruition, with the breakthrough--announced last month--of the successful testing of the pre-cooler for its SABRE air-breathing combined-cycle rocket engine (see: www.reactionengines.co.uk/). That revolutionary component permits the SABRE engine to operate as an air-breathing engine from zero airspeed at sea level to hypersonic speed (Mach 5.5) in the stratosphere, and as a pure rocket from there to orbit. It's interesting how the tailless configuration, so rare among aircraft, was/is so commonly used in winged spacecraft!

This article (see: www.risacher.org/bh/analog.html) on APT (Aerial Propellant Transfer) space planes is very interesting, and the figures indicate some amazing capabilities. If re-fueled again in orbit, such space planes could go anywhere in cislunar space, and even a pair of *suborbital* APT space planes could--if one transferred its residual propellants to the other in suborbital flight--enable the re-fueled one to reach orbit with a substantial payload (incidentally, this was essentially Tsiolkovsky's idea of staging rockets). Also, here are more links to information on APT space planes: http://www.google.com/#sclient=psy-ab&hl=en&tbo=d&site=&source=hp&q=Black+Horse+spaceplane&oq=Black+Horse+spaceplane&gs_l=hp.12...6019.15482.1.16283.22.3.0.0.0.0.0.0..0.0.les%3B..0.0...1c.1.x7ABbV6xYPo&bav=on.2,or.r_gc.r_pw.&bvm=bv.1355534169,d.cGE&fp=facdc1ee60048919&bpcl=40096503&biw=792&bih=377

Reaction Engines Limited, maker of the Skylon space plane's SABRE engine, has also developed a design for a Mach 5 airliner--which is also tailless--using a derivative of the SABRE engine (see: www.reactionengines.co.uk/mach5cruise.html).

Googling "Black Colt space plane" and "Black Foal space plane" will bring you web site links pertinent to them. They are smaller, sub-scale versions of Black Horse, and they are also tailless (although I haven't seen an image of Black Foal--I presume it's also tailless, as was Pioneer Rocket plane's various design iterations). XCOR Aerospace's under-construction vehicle (called Xerus, I believe) is tailless as well.



I even came across a blended wing/body one (Len Cormier's famous "Windjammer" SSTO design).

Indeed, other than Maxime Faget's low-cross range space shuttle orbiter designs, it's hard to find winged orbital spacecraft designs which are *not* tailless. I received the latest TWITT issue today, and I was happy to see the new sailplane designs--that field, along with spacecraft, seems to be one where the tailless concept really shines.

Jason Wentworth

(ed. – This was a letter that was probably more in line with ESA members, but it was addressed to TWITT. I wrote back that I didn't have the expertise to provide much help, but perhaps some of you might be able to provide him with some answers and inform us all of how to handle flutter problems.)

Good daY!

I am a LSA and PPL pilot, working on my CPL, and I have some questions about the aero elastic effects and flutter phenomenon. I would like to talk a little about aerodynamic flutter onset speed and flight control malfunction. It is known that free play, worn-out control rods or slop in flight control cables might induce flutter.

What I'm interested in is how critical flutter speed is affected by those problem. I'm wondering especially about a cable control failure where the surface would be disconnected and free floating. There are small light sport aircrafts and even some FAR 23 standard certified aircrafts which don't have mass-balanced surfaces, especially ailerons which I guess would be more prone to flutter. How critical flutter speed lowers in a situation like that (and how prone to violently flutter are these ailerons in an emergency disconnected situation)? Is there a linear drop in flutter speed? Can it reach even lower speeds in the normal operating envelope e.g. lower than Vno or Va? Normally, assuming no malfunction, flutter speed is at least 10% above Vne or Vdf, which is dive test speed used during flight-testing. How do you think things might change?

The same about the others control surfaces e.g. a broken trim tab linkage.

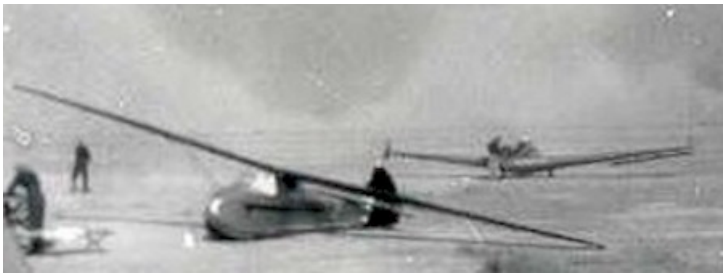
I really appreciate your help. Thank you very much!
I am sorry but I do not have the expertise to answer any of your questions regarding flutter or other aerodynamic principle. I am not sure who I could even forward this message too that could help you.
I hope you find someone to answer your questions.

Popa Adrian
<popa_ioan_adrian@yahoo.com>

(TWITT Note: It is possible this is one of the gliders that Don Mitchell helped Bowlus design when working on a prototype troop carrier for the government. If anyone has more information about this glider, please let us know.) *(ed. – Below are comments from Rick Masters who provides some clarity to the subject. The Bowlus is in the rear of this reduced image from the TWITT website.)*

_____

http://twitt.org/bowluswing.htm#top



In my opinion, this is clearly the flying wing designed and built entirely by Don Mitchell during his stint as the General Airborne Transport XCG-16 Cargo Glider Project Director during WWII. Once the flight characteristics of the half-scale, 46-foot span MC-1 model proved satisfactory for the scaled-up versions in 1943, it was no longer needed for the project and Mitchell received permission from Hawley Bowlus to convert it into a flying wing. He modified it by himself, cutting off the twin booms and tail, sealing the ailerons, and installing the brackets and external flying surfaces similar to, but distinctly different than, Junkers flaps at the trailing edge. These are clearly seen in the photo. Note that, unlike Junkers flaps, they are situated well below the trailing edge. Neither Northrop nor Horton used anything like these external surfaces, which Don claimed were his own invention. The center section was a symmetrical airfoil, 30-percent thick with an eight-foot chord. Only the pilot's head stuck out.

The date given for the photo is incorrect. The flying wing was built during the later half of the XCG-16 project. The pickup truck in the photo appears to be an early 1940s Ford or Hudson. It was first flown at Baker Dry Lake.

My gut feeling is that the photo was taken on Rosamond Dry Lake in the late spring of 1944 and that the man beside the flying wing is Don Mitchell. Possibly Paul Tuntland, who flew the wing several times on air tow, is in the cockpit. Mitchell claimed the control surfaces performed flawlessly but he was disappointed with the performance of the wing itself, which, having been kludged together from a conventional wing, lacked the unique design characteristics (such as twist) necessary for an efficient flying wing, so he destroyed the wing before the project was cancelled near the end of 1944.

Rick Masters

Thank you for the e-mail, I look forward to receiving the newsletter, my main interests are R/C model electric flying wings, the flying wings of the Horten brothers and Northrop and unconventional models in general, I like the structural simplicity and aerodynamic complexity of tailless aircraft, it certainly gives the prospective designer plenty of challenges! I have a keen interest in the aerodynamic theory underpinning the stability and performance of flying wings and am building up a collection of useful formulas and reports relating to this. I will send you some details of my current and past projects (R/C electric swept and plank type flying wings of my own design) soon.

In the meantime you may wish to visit my website, www.myskies.co.uk

Best regards,

John Newton

(ed. – John is a new member from the UK and I always ask new members about their interests in flying wings and this is what he wrote back. I have also included a picture from the flying wing section of his website.)

Greetings Al (Bowers),

Stephen Sawyer, TWITT member in California here. I have been studying William Horton's Wingless prototype and saw pictures you posted in June 1999 newsletter. The " high lift " and roomy cabin is desirable.

Copying pictures from the newsletter isn't easy and I wonder if you have any photos or the 2 hr. presentation Russ Eckre produced about the Horton Wingless?

Please send me your phone number so we can talk more about the Prototype.

Thanks,

Stephen Sawyer
916 645 8494
s-sawyer@sbcglobal.net

(ed. – I don't recall whether or not Russ was able to produce the video on the Horton Wingless since we never saw a copy of it or heard that it was available. I know there are more pictures on the Internet than the copies we have on our website. I never did see any pictures of the Wingless flying with the extendable

wing tips fully retracted so am not convinced it was all he promoted.)

The Flying Plank Group Threads

Just joined the group and am working my way through the archives. Saw this reference to Pelican plans - was this by any chance a reference to the Debreyer Pelican flying wing/plank rather than the Canadian 3-axe ultralight? If so, could someone please point me in the direction of the plans download mentioned? (Had a look in files section and nothing there as far as I can see.) Interesting aircraft the Debreyer Pelican! Good info here if you haven't already seen it:
startair.chez.com/J_C_DEBREYER.pdf

Many thanks

Dan

Hello Dan,

The Pelican was designed to fly with minimum engine power. This is not a glider. Its low engine does not allow it to climb faster.

You can join the Yahoo group "ailevolante." dedicated to the Pelican. But it is in French.

http://fr.groups.yahoo.com/group/ailevolante/

Good research.

Eric Hanegreefs

Dan, They were on the site so I can't verify who uploaded them. I have the paper copies and will create a virtual disk to mail them. May take me a few days. How's your French and metric knowledge? They are a combination of English and French and metric measurements.

Kevan Gates

Hi Kevan

Thanks - that would be great! French is OK and I use a handy conversion freeware, which I can highly recommend. Does weight, speed, area, volume, pressure, flow and several other useful things. Download it here:
http://joshmadison.com/convert-for-windows/

Thanks again

Dan

Dan, (et al.)
Try this link. Be prepared, 72 files and 52.4 mb.

https://skydrive.live.com/redir?resid=156EC76BB100D79F!599&authkey=!AJGVyMNVF6_4CXI

Kevan

Kevan

The plans I have saved earlier are missing pages 56 through 67.
Thanks for posting what you have.

Bill

Echo that - thanks Kevan!

Hi Bill - what does 56 through 67 cover? Any chance you could scan them in for us?

Still digesting the info but first reaction is that I'm amazed there aren't more of these about, considering the designer flew successfully for 10 years in one. If ever there was a design that deserves a renaissance this has to be it! Lends itself perfectly to an update in materials that could make for an even simpler construction plus we now have a much better choice of reliable, small and powerful engines available to us, particularly from the ppg world.

Fingers crossed someone can sort us out with the missing pages.

Thanks again

Dan

Hello,

I have built the pelican in 2010 ; I have check the plans Kevan Skydrive's link there is everything you need be careful with the weight ,mine is too heavy

Régis

The problem with most all ultralights or any light project is if you want to beef it up or make something safer, you add weight. To stay under the legal 254 pounds in the U.S., you can't have an enclosed cabin, brakes, large wheels or much horsepower. You can forget the 4 cycle engine choices too.

The second serious problem is the weight of the engine. If the pilot is heavy, the smaller 2 cycles can't do the job. Not everyone has a 3000 foot runway to fly out of. And when the temperature rises and the elevations are much above sea level, your distance to clear a 50 foot obstacle increases and your climb rate suffers.

I think the PLANK excels in this area because it does not have the extra weight of the rear fuselage and tail. Plus the tail drag is eliminated. It is proven that the flying wing is a very successful concept. Even the 40 years of development of the modern day hang glider proves this. But the L/D is at a stopping point because of the exposed pilot. Only gliders like the SWIFT that are enclosed have favorable performance.

Tommy

Dan,

The pages that Kavan has in his scans include fittings and landing gear details something the set I got from the group files was missing. One thing I'd love to see is the drawings for the BD-5 landing gear. I think it might be a nice option for this bird.

Bill

Guys, The files will be deleted in 7 days. Kevan

(ed. – This was dated 1/27/13 so they may not be available by the time you receive this newsletter.)

I have been working on an enlarged Ken Bates' Windlord (RC model with 100" span) for a couple of years now. Our original vision, because this version was to have ailerons (contrary to the original), included Frise-type ailerons to compensate for adverse yaw. Because the Windlord is a "plank," differential is not a good solution to this problem.

Luckily, the delayed building process has lately allowed us to begin thinking about other adverse yaw countermeasures. One of these solutions is the use of the Kasper trim device as outlined in Kasper's book and used on Mat Redsell's Monarch.

Our uncertainty comes when determining how large this tab needs to be on the Windlord, so we're looking for advice from the group.

The original Model Aviation construction article and sketches of the Kasper device can be downloaded from our Dropbox account https://dl.dropbox.com/u/613089/Windlord.zip>. This file is a little over 8MB for those concerned.

Our Windlord is a 132% enlargement of the original Standard Class (100" span) model. This size gives the maximum wing area allowed by the FAI for aero models. On our "cross country" version, the ailerons extend from the outer edge of the elevator to the last wing rib, 30", and have a chord of 5 1/4" at the root and 3 3/4" at the outer end where there is significant curved taper over the last 6".

Any Kasper tab sizing recommendations will be eagerly accepted with our sincere thanks.

Bill & Bunny Kuhlman

Mitchell U-2 Group Thread

I am new to the group. My membership finally came through, after the "spam-bot"; invasion.

I have been looking into building my own plane for more than a year now, and have some interest in the U2 and B-10. There are a few questions I would like answered before deciding.

After going through all the pictures in the Photo section, I see that some of them show a tube frame inside the U-2. Is this standard? The U.S. Pacific website is lacking in some details like this, IMHO. It gives the impression that the U-2 is all wood.

I also see that there may be a problem with the spar/gear combination on a hard landing. Some builders seem to have found solutions to the problem. Are these modifications documented somewhere?

A major concern: I have a 2.5 car garage to build in---plenty of room. But it has twin doors that are less than 8 feet wide. If I build a U-2, will I be able to get it out? I

assume that the wings on the B-10 can be removed, so it should not be a problem.

How is the safety record on the two? "Better-Half" thinks the B-10 does not look safe, even with an enclosed pod. Are ideas for the pod included on the plans? Personally, I like the B-10 because of the visibility, and it is really close to what I was thinking of for designing my own.

On a scale of 1 to 10, with 1 being the easiest, how hard is it for a first time builder to build these? Looks to me that the B-10 would be easier, even if I built an enclosed pod. On the same scale, how well do they handle in the air? Crosswinds?

Thanks!

Jim Bolinger

Hi, Jim.

Most "wooden" airplanes have steel tube framed fuselages because of the stress concentrations there, also a wooden frame is actually much more complex to design and build with little weight savings. Mitchell also designed with foam plastic ribs which are a big time saver compared to built-up wooden ribs. The wings fold just like the B-10. This PDF in the files directory shows some ways that other builders have addressed the landing gear problem: http://groups.yahoo.com/group/U-2Wing/files/spar-problems.pdf

Norm Masters

Nurflugel Bulletin Board Threads

Just see these links to get to the pictures.

http://www.delta-club-82.com/bible/photo.php?id_aile=841&langue=en

http://www.delta-club-82.com/bible/841-hang-glider-mark-10.htm

One of them will work. Enjoy.

I was happy to finally see some more of this Horten project (Rolf was guided at first by Reimar Horten). Keep that brain spawning wings,

Koen Van de Kerckhove

Hello Everyone;

I Popped in to the Pegasus Bridge Memorial Museum recently and was casually looking through the Log Book of Flt Lt Tommy Grant DSO, who trained and led the Halifax Glider Tug Pilots who towed the Horsa Gliders to Pegasus Bridge.

I was admiring the wide variety of types flown.

I was surprised to see this included several handling flights in a Horten IV at Farnborough in 1945.

Rather interestingly he flew a Granau Glider just before the Horten and was towed by a Storch both times!

He also flew a dual control (powered?) 'G A Tail-Less' aircraft several times. (Handley Page HP75 perhaps?)

He was then attached to the Experimental section of the Royal Aircraft Establishment (RAE) Farnborough.

Thought that might interest the group and may fill in a small piece of history.

Before the visit to the museum I had not heard of this Officer before, but clearly he carried out important Flying Wing evaluation work just after WW2. He was clearly a figure of note in both Gliding and Flying Wing testing.

Obituary link;
http://www.telegraph.co.uk/news/obituaries/1354357/His-Honour-D-A-Tommy-Grant.html#

Is this was the same Horten IV that was flown later in the United States by Falvy?

Log book shots attached. Sorry for the poor

quality, I just had a point & shoot.

Best wishes to all for the New Year;

Mike Gelpi (Portsmouth UK)

With those initials, the glider(s) were most likely from the General Aircraft, Ltd. series: the GAL 56 with "U" and "V" wings of varied sweep (1944) and the GAL 61 (appeared late 1948). Famed soaring pilot, test pilot, researcher, designer, and author, Robert Kronfeld, was killed 2/12/48 testing the GAL 56 glider. That glider had tandem seating. Each glider had room for pilot and observer, but except for Kronfeld, I haven't found names of other pilots or observers in my files. A powered version of the GAL 56 was designed, but not built.

Serge Krauss

There is a mention of those gliders and the Horten on p. 20 of this newsletter.

<http://www.lakesgc.co.uk/mainwebpages/VGC%20News%201973-2003/No_79_Summer_1993.pdf>

Rick Page

Thanks for that informative article Rick;
The Logbook entry of the 11th of October 1945 for the Horten IV flight confirms the timeline in the article of it arriving sometime in August 1945.
Was that the only Horten IV at Farnborough in 1945?

Mike

Here-after a short résumé of what I found so far on the Horten aircraft which survived WW2:

The H IX V1 was discovered by the U.S. Army, at Brandis, slightly damaged and removed. He was transported by order of General McDonald, in the village of Merseburg, 20km west of Leipzig, where were grouped the Luftwaffe aircraft deemed news-worthy by American specialists. There was a time projected to move to the United States but it was finally abandoned and burned in Kassel-Rothwesten. The remains of the H-IX V2 were discovered near Coburg. The aircraft was spotted by test pilot Eric Brown which obtained its transfer to the RAE Farnborough, on the part of General McDonald.
Transported to England in the hold of a captured Arado Ar-232, it arrived in July 1945 and was the subject of a project-study by the RAE to refurbish it to flight condition, equipped, at the express request of RAE test pilots, with English Rolls-Royce "Avon" jet engines in place of the original Jumo 004B. This adaptation is not carried out. The aircraft was exposed in October / November 1945 in Farnborough at an exhibition of captured aeronautical equipment (*). Its ultimate fate remains uncertain.
The Gotha 229 V3, unfinished, was captured in April 1945 in Fredrichsroda in one of the workshops of the Wagonfabrik Gotha. He was initially transported to the village of Wolfgang, near Frankfurt, where were also grouped the Luftwaffe aircraft deemed news-worthy by the U.S. Army. He was then transported by railway to Cherbourg and boarded the SS Richard Gatling destination in the United States July 12, 1945. Registered FE-490 and T2-490, he was, at first, stored on the Freeman Base, in Indiana, where 15,000 hours / men were deemed necessary to put in flying condition. In August 1946, he was transferred at Bridge Park, Illinois where it was stored, along with dozens of other captured aircraft in an old factory on the site of Douglas Orchard. In 1947 he was assigned to the National Air & Space Museum. It is currently undergoing restoration at NASM.
Elements of the V4 prototype were also transported at Wolfgang where they were finally scrapped. Other unfinished prototypes were , it seems, recovered by the Soviets. Their ultimate fate remains unknown.
The Horten IIL s/n 6, which served as a test bed for the two-seater Ho 229 aerodynamic program was captured at Kempten, 90km southwest of Munich, and sent to the United States. Initially stored at Freeman Field, this aircraft was later entrusted to NASM.
Two Horten H-III were captured at Rotttwell-am-Neckar and transported to the United States. The first H-IIIf s/n 32 with a prone pilot configuration, received registration FE-5039, the second H-IIIg s/n 31, registration Fe-5041. Both gliders arrived incomplete and poor condition in the United States. Also stored at Freeman Field, they were entrusted to Northrop Aeronautical Institute Inc., Hawthorne, October 22, 1947. There they were studied by Northrop engineers and transferred to NASM.
The first example of H-VI was discovered near Göttingen by the British and finally destroyed in August or September 1945. The second example was captured, unfinished, at Bad Hersfeld, and transported to the base of Freeman. On 22 October 1947, he was also entrusted to the Northrop Aeronautical Institute Inc.. Following an extensive study by engineers at Northrop, he was also entrusted the NASM.
In September 1994, the four gliders NASM Horten

were loaned to the Museum fur Verkehr und Technik Berlin for rehabilitation and static display. The first H-II s / n 6, was completely refurbished and presented to the press in January 1997.

The H-IV flown by Flt Lt Tommy Grant was the s/n 25 (registration D-10-1452 then LA-AC). At the end of the war, it was stored in its trailer at Gottingen. He was entrusted by the Horten brothers to the Austrian pilot Robert Kronfeld , provided that the glider is returned as soon as the gliding practice is again permitted in Germany. The glider was installed in an RAF aircraft and sent to Farnborough. It flew again on October 11, 1945 and then carried out an extensive test program until 1947, towed aloft by Tiger Moth or a Fieseler Fi-156 Storch also captured. On April 26, 1946, he was assigned the registration VP543. On 8 December 1947, the glider was purchased by Kronfeld and after his death, was entrusted to the Company Hawkridge Glider Denham for rehabilitation. In May 1950, he was tested by Robert Forbes, of the Cranfield College of Aeronautics. The same year he was bought by Sq Ldr. Crocombe which obtained its civil certificate of airworthiness (BGA 647). The aircraft was then sold to Hollis Button, an USAF officer, who brought it to the United States, after few tests by the test pilot Eric Brown.

In United States, the aircraft was damaged during its first flight in Valley City, North Dakota. On 15 May 1952, he received his certificate of airworthiness and received U.S. registration N79289. In July the same year, flown by Rudolf Opitz, he won the championship of the Midwest gliding in Toledo, Ohio. In August, he participated in the National Championship in Grand Prairie, Texas, where he came in seventh place. In September, he was sold to the Mississippi State University where he will be used for aerodynamic studies conducted by Dr. Raspet. In these studies, it was flown by Ray Parker, Dezco Gyrogyflavy and Opitz. Further tests were then funded by the U.S. Transportation Command and the U.S. Navy Office of Naval Research. On the death of Dr. Raspet in October 1964, the glider, now with 708 hours of flight time, was bought by John Shim and by Professor Johm Groom, and finally, in 1969, by Ed Maloney. This glider is now preserved in the Museum "Planes of Fame" Maloney at Chino.

A second Ho IV survived the war, but without leaving German territory. S/n26 (registration D-10-1451 then LA+AD) was found in good condition at Gut Tierstein by British occupation forces (BAFO). It was repaired and used by the BAFO Gliding Club of Scharfoldendorff before being seriously damaged during a landing in 1950. The wing of this plane was finally recovered by the Deutsches Museum, where they were mated to a new central section built by Peter Hanickel from photos and drawings. This glider is exposed since 1999 at the Deutsches Museum.

In April 1945, Reimar and Walter Horten were arrested and interrogated by U.S. and British military authorities.

In September 1945, the British military authorities, on the request of the Royal Aircraft Establishment, hired full-time the two brothers. Working on the premises of A. V.A. Gottingen, They were asked to complete the construction of the H-VIII and equipped it with British Rolls-Royce "Merlin". However, in December 1946, The R.A.E. abandoned all work on the H-VIII, for financial reasons. Walter then found a job in the mining industry. Reimar, waiting for better days, spent a PhD in mathematics and accepted a professorship at the University of Bonn.

Parts of a H-II (s/n ?) were also preserved in the late 70s by the Aerospace Museum (Muzeum Lotnictwa i Astronautyki) of Krakow in Poland. Actual fate unknown.

(*) To be confirmed!

Philippe Vigneron

There was supposedly a nice-looking Italian flying wing built in the late 1920s -- the "Cicogna". It had a suspended pod, slightly swept wings and slightly downturned tips. Go have a look at: http://scalesoaring.co.uk/yabb/yabb2/YaBB.pl?num=1288175810 I also have Andy's plans for his giant-sized 93" R/C pusher electric model. Lovely thing !! .Pdf article from original model mag is attached. Supposedly a couple of the originals were built -- one with a small pusher.

Geoff

That's an article that hadn't yet been listed in my bibliography, and when I looked in my file under Buxton, I found the bay empty. So that's my first article mentioning his tailless plane proposal, other than the A.R. Weyl series and perhaps something in one or two Italian magazines that might have reviewed his lecture.

On p.15 of that issue, you'll also find an interesting review of the reprint of Cecil Hugh Latimer-Needham's book on Gliders. It was interesting because of the then new developments in glider and general aerodynamic knowledge that the reviewer inserted in his lengthy criticism. Among concerns was

the then newly discovered fact that wind tunnel mounting interference had significantly compromised Reynolds Number data at NACA. I've read subsequent reports that set up "equivalent Reynolds Numbers" as parameters. Lattimer-Needham was responsible for two noted tailless efforts: the Halton Aero Club's "Meteor" and the Granger brothers' "Archaeopteryx" that flew successfully and was restored to flying condition in - I think! - the Shuttleworth collection. I believe it's out of commission now, but it was a noted design of it's time.

Serge Krauss

I would like to see a drag analysis of this configuration.

I imagine a pod hanging below a swept wing on a thin pylon which continues between the pilots legs to attach to the pod shell for structural efficiency. If the pilot is not to be contained within the wing, it can be very thin. Extensive use of carbon fiber could make it much easier to optimize this configuration than with older materials.

The pod could be an optimized "body of revolution" shape for minimum drag since it doesn't need to do anything except enclose the pilot and mount the landing gear.

There would be some intersection drag where the pylon meets the wing and pod. OTOH, the entire wing LE and upper surface would be 'clean' and free from root intersection drag.

I can imagine some nose-over problems when landing. The weight of the wing is high and forward in relation to the wheel contact point. This might be addressed with a retractable skid which extends well forward. Bildan

I think you're on track with your ideas, with one possible exception: instead of continuing the pylon down between the pilot's legs, where it would be a detriment in a crash (think guillotine and/or family jewels...), I'd use carbon fiber for the pylon, and have the laminate go around the cockpit, thus creating a safety barrier surrounding the pilot.

Michael B.

I like this idea. It reminds me of Richard Miller's proposed "Thistledown" (Soaring, 5/72), which employed thin struts from the pod to the apex and both wings. This should save a lot of interference drag, and new materials and a single post might save more. I agree with the idea of separating the post to wrap around the pilot, if that can be done without excessive loss of vision, but certainly the suspended fuselage idea should otherwise increase pilot vision. Since the "fuselage" needs to be low enough to minimize aerodynamic interference with the wing, there well might be problems from the lowered drag center, which would tend to pitch the plane downward with increase in speed, and pendulum oscillation effects. On the other hand, with a swept-back wing the negative pitching tendency might be used to counter the increasing positive pitching moment from washout. I'd like to hear more discussion.

Serge

The biggest problem with a thin swept back flying wing is flutter as witnessed in the SB-13 project. I have heard this also occurred in the Horten IV and VI gliders. Flexing of the wing causes the wing to twist which sets up a pitching mode. The Germans called it 'pecking' in the SB-13. It's a rapid pitch oscillation that will not stop till the aircraft is slowed down. Flying through the tow planes wake was enough to set off this pecking, or even a bounce on a fast landing is enough to set it off.

Stiffening the SB-13 wing only increased the pecking frequency. This problem has not been solved. There have been several reports written concerning this. Some of you have Martin Simon's book "Sailplanes 1965 - 2000" which also describes this flutter phenomenon. Start thinking 'Plank' wings. I'm getting fantastic performance out of my Pioneer 3.

Jim Marske

Thank you for joining the conversation Jim. Now I wanted to ask about static margin. I am flying various plank geometries in x-plane (with its

incessantly mentioned limitations) and it seems a very large static margin is required, maybe 15 or even 20% of the MAC.

Please share what you have found with your Pioneer, Monarch and what you know of the Genesis....

This is the Cl max limiting factor. Do you have a figure for max Cl you have achieved?

Max Perrault

If the Plank has one limiting factor it's the allowable CG range. 15 to 20% is very generous - I'm thinking 10% at best. Normal operation CG, in my experience, has been 5%. Since this has worked against us in the past, I worked out a way for it to work for us. I installed a travelling lead weight that can be slid down the length of the fuselage within a fiberglass tube. Move it forward for high speed and aft in slow flight. It makes a wonderful speed trim device and at the same time keeps the elevators always in the neutral position providing the lowest possible drag not to mention retaining a high CL while in slow flight.

As wing chords get narrower, to achieve a high Aspect Ratio, the CG limit also gets narrower so care must be taken to have the aircraft balance be checked whenever a new pilot climbs on board. I solved this problem by situating the main wheel slightly aft the aircraft loaded CG. Procedure is to get the pilot on board, close the canopy, and teeter the glider on it's wheel. Now, measure the distance between the tail wheel and the ground to see if it is within limits. It doesn't hurt to be a bit nose heavy, but you don't want to be tail heavy as things will get squirrelly. To minimize the CG travel with different weight pilots the pilot's seat is positioned as close as possible to the aircraft CG. This has worked very well in the past requiring little nose or tail ballast change.

As for CL max, a common question, keep in mind that the reflex part of the wing is our stabilizer - and we don't have a separate flying surface back there to consider. When we designed the Pioneer 1, it was modeled after the popular Schweizer 1-26. Our wing area was the area of the 1-26 wing and stab combined. The 160 sq ft wing + the 20 sq ft stab = 180 sq ft. If you considered the entire Pioneer wing to compute the CL it will come out less than the expected 1.5 CL.. In fact, it is 1.33 using the same airfoil with a bit of reflex added. Since we did not have a sliding weight to reduce the elevator up travel the final CL max was slightly less than this. Bill Daniels did the test flying of the Pioneer 1 and measured a minimum flying speed of 28 kts (32 mph). The wing loading was 3.8 psf so the CL calculates out at 1.4. I suspect there may have been a slight error in the air speed indicator?

Jim M

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(ed. – These videos are also now available on DVD, at the buyer's choice.)

VHS tape containing First Flights "Flying Wings," Discovery Channel's The Wing Will Fly, and ME-163, SWIFT flight footage, Paragliding, and other miscellaneous items (approximately 3½+ hours of material).

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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.

Cost: $10.00 postage paid
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