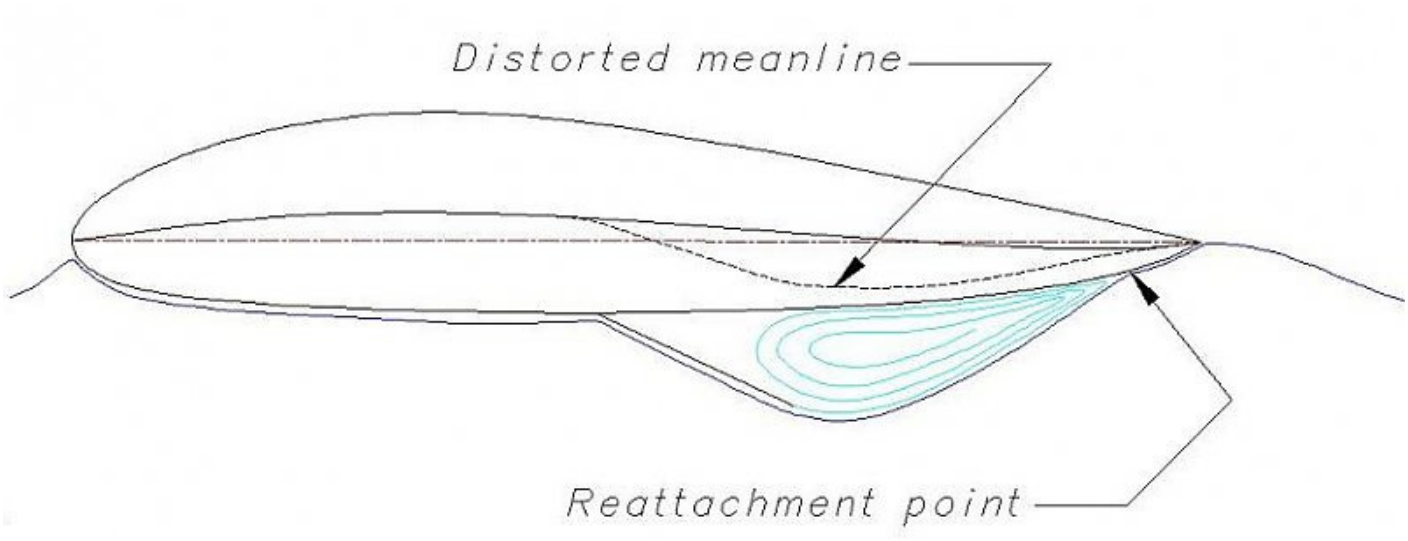
No. 343 JANUARY 2015

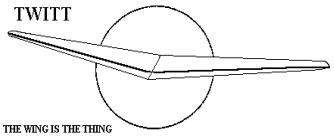
T.W.I.T.T. NEWSLETTER



http://www.homebuiltairplanes.com/forums/aircraft-design-aerodynamics-new-technology/14011-stability-control-tailless-airplanes.html

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., **1501** means this is your last issue unless renewed.



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. Officers:

President: Andy Kecskes (619) 980-9831
Treasurer:
Editor: Andy Kecskes
Archivist: Gavin Slater

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

(619) 589-1898 (Evenings – Pacific Time)
E-Mail: twitt@pobox.com
Internet: http://www.twitt.org
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Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.75	1.75	1.00
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60oz/60	50.00	53.00	37.00

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 another year is in the books. I hope everyone had a joyous holiday and a Happy New Year with family and friends. My family celebrates Christmas Eve with a dinner and gift exchange that brings everyone together at least once a year. For New Year's my wife hosted two tables of bridge after a potluck and Champaign at midnight. I don't play so worked on other things in my office until the magic time.

I imagine because of the holidays there hasn't been much going on in the realm of flying wings other than the U-2 group who have been talking about how to convert one into a two-place airplane. So there is a general discussion that doesn't really seem to lead to any definite conclusions on the viability of this conversion. One thing I found interesting was no talk of extending the wingspan to accommodate the added weight of a second person or an increase in horsepower. I will see if subsequent messages go into these areas and probably include some of them next month.

With the very cold weather flowing through a great deal of the country, I hope some of you are staying in your warm homes or workshops and building that dream flying wing, either full size or model. If so, please drop me a line with your story and especially some pictures to share with the group.

HAPPY NEW YEAR to one and all.

Andy

LETTERS TO THE EDITOR

(ed. – This came in after the December issue had already gone to the print shop. He always sends such interesting and colorful cards.)

We wish you a Merry Christmas and a Happy New Year!

This year now comes to an end and we are expecting a few relaxing days over Christmas. Here the nature gives a more spring-like impression and we fear that there will be no snow for the holidays.

We hope, this year brought mainly good things to you and the ones important to you. For the approaching 2015 we wish you the best, and that your hopes and expectations will become true.

Let the little bird carry us into a bright future!

With my best wishes,

Reinhold Stadler
Karlsfeld, Germany

(ed. – Bob Hoey was one of the presenters at the ESA Western Workshop last September. He brought us up to date with his group's latest experiments in bird shaped radio control models. This is an update on one of the areas he covered.)

Hi Andy,

You may remember last September at Tehachapi, I mentioned my attempt to test a variable geometry Raven model to identify the advantages of a "cruise" configuration compared to a "thermalling" configuration.(Straight wing morphed to an "M" shaped planform). It worked mechanically, but I was unable to observe any performance differences. I have decided to try a different approach.

With the recent availability of very small, lightweight autopilot modules for RC quad copters and drones, I thought it might be possible to build two models, one of each configuration, and fly them back-to-back on the same day. We can then download the data from the autopilot and try to determine the performance differences

Some very crude calculations show that a reduction of wing span of 20%, as well as a reduction of wing area of 20% (reduced skin friction drag and aspect ratio) would provide roughly the same performance advantage as a 50% increase in gross weight for a thermalling configuration. (Similar to the water-ballast advantages for competition sailplanes).

I have also had the experience of examining a Raven and a Dove within a few minutes of their demise and found an interesting characteristic. When pulling the wings outboard by the tips to a fully extended position, I found that the trailing edge of the wing naturally deflected downward, like a flap, near the very end of the span extension. This also forced an obvious increase in the camber of the wing airfoil. Based on this, I built the "cruise" configuration wing with a flat bottom airfoil rather than the highly cambered airfoil of the "thermalling" configuration. (both with the same thickness ratio).

The two configurations will be as follows;

Thermalling	Cruise
100% Span	80% Span
100% Wing area	80% Wing area
100% weight	100% weight
Cambered/reflexed (9% t)	Flat-bottom (9% t)

I have some concerns over the data resolution from the autopilot data measurements - (we'll see). Both models have been flown and the autopilot equipment is currently being installed. The models will be ballasted to the same weight, and the cg's adjusted to similar elevator trim deflections to minimize trim drag differences.

Bob Hoey
(bobh@antelecom.net)

Mitchell U-2 Threads

I have a Rotax 377 engine that has both a choke and a primer, I have been told that most small engines have either a choke or a primer but not both. My instructions say to start the engine, I put the choke on - then start with throttle at idle - when it starts I turn choke off. Now when do I use the primer? on really cold start ups? I don't? any advice would be much appreciated as I am a little confused and hope I don't have a funky engine :-)

Ryan Derot

I have a snow blower with same setup. Primer gets fuel flowing from tank to carb. Choke basically enriches air/fuel mixture with fuel (gets fuel to cylinder). So: 1. Turn on fuel, 2. Prime 3-5 times, 3. Set choke on, 4. Start engine. Do not over prime as this may flood engine. Priming is not needed when the engine is warm.

Tom Manzer

From what experience I have with two cycle engines, the primer is for temps below about 55degF. The choke can be used by itself when temps are above that (Approx) If the temps are in the 65 to 80deg range it may be possible to not use any choke. especially if the engine is warm. I don't have any experience with the 377 however.

Nolan

(ed. – New topic. I combined several messages from Alex into one longer one with the answers to his questions coming in spurts with other letters.)

Yeahhh the flying bug is still with me,,,,

I'm looking at modifying my part finished U-2 ,,,,stripping back to the main spar and building it as a composite like the " KR2 Super S" then I noticed the B10 is a composite. Has anyone built the B10 composite or does anyone have any ideas which would be the better way to go KR2S or B-10? Does anyone know where I could get a set of composite B10 plans? I intend to get a set of U-2 plans from Carol Avalon to get the updated U-2 plans just to please the aviation regulators down here in the land of Ozz,,, (Australia)

Also as the composite will be stronger [without too much weight gain I hope],,, how do I go about recalculating my VeMAX ?

My thinking it to cut the main spar on the original scarf joint line and add a hoop pine laminate to fill the extra length needed between the original spar pieces to suit the two seat configuration,,,,, glass a layer of UNI glass top and bottom over the scarf joint of the two cap spars ,,,,,, then wrap a layer of UNI around each spar cap over the UNI layers,,,, add a spar web front and back in the join areas,,,,,, then G test it after a week of curing. Again any ideas or suggestions are welcome,

I am a bit confused as to the "G" rating of the U-2 ,,,,, I have read it's rating in the specs as "G +/- 4" the same as the B-10,,,, and elsewhere I have read the U-2 has a "G +/- 6" "G" rating ,,, does anyone know for sure what the "G" rating is of the U-2?

Can anyone tell me where the C of G should be on a U-2 ,,,,I have sheet # 3 and of course the area where it's written in has been water damaged. I'm not surprised though as the plans have been sitting for over 20 years.

I'm also looking for the composite B10 plans if anyone has a set to sell.

Between the B10 plans and the KR Super 2 website I should have enough knowledge to make a go of the project [fingers crossed ,,,,and everything else too].

Alex Patrick
Australia

Neither the B-10 or the U-2 are foam and glass. These are primarily wood airplanes with foam nose ribs. If you build them from foam and glass, it is a new design, a different and likely heavier airplane with bigger engine and much longer time to build therefore it does not make sense. The A-10 and T-10 were designed to be built from hot wired foam and aluminum (as close to the composite as you can get with a Mitchell Wing) and could be built much faster, but it was never released as a plan from home-builders.

James Cook

Hi James you have answered what I wanted to know,,,,,many thanks for that.

The reason I want to use fiber/glass is I want to make the U-2 a two seater so my wife can accompany me when I go for a spin in the kite.

As I have to extend the centre section to do this I thought the foam/glass system would be a better way to go. Spruce is too expensive here in Australia. The hoop pine from here is stronger than spruce but is heavier. By building a two seater I go into the ultralight class here in the land of Ozz,,,MTOW 600Kgs so I can afford a little bit of weight gain.

I intend to beef the main spar up with warren trusses + ply webs front and back and go for 6G's static in my garage,,,,,better to collapse in my shed than in the air.

I have a few more calcs to do yet and an expert fiber glass man to chat with and then I will look at the idea all over again.

Alex

I was also confused like you are on this info, I think it is best to go with the lower of the two for safety.

Not sure you would really want to pull 5 or 6 g's as I think that would hurt and plane is wood.

My plane is nearly ready to fly and I don't think I would feel comfortable pulling 6 gs.

What is your email address for me to email.

It looks like it is 1" behind the spar to 4" in front of the spar.

The U2 is a funny plane; specs are all over the place depending where you look.

My blueprints say gross max is 540 lbs, the official website says 670 lbs and other sites range from 750 lbs - 800 lbs.

I set my gross up at around 700 lbs - 725 lbs

Hope this helps

Ryan

Please document what you come up with, I have thought about a similar project. I not only want to reinforce the wing but also increase wing area. I will start with a model scaled to reflect a complete scaling of weight and strength. I have another project in the shop but this will be the next one up.

P. Hardy

If you can obtain a copy of "Nurflügel" by Reimar Horten and Peter F. Selinger, there is wealth of Information about flying wing Designs.

Although only a couple of pages long, there are some nuggets in "Fundamentals of Sailplane Design" by Fred Thomas regarding Flying Wings. Mentioned are the control problems that the Akafliegers experienced during development of the SB-13. It is more demanding to fly than a conventional design sailplane, though between the best L/D Performance of Discus A and B Sailplanes of the same Wingspan (15M), at 42/1.

Flying wings CAN be a very efficient airplane layout, as evidenced by Jim Marske's Pioneer III, and in power applications with the Horten's Ho 229 Design during the latter period of WWII. The Pioneer III's ultimate wing spar strength is 24g, presumably desirable for stiffness in a flying wing design.

It is not necessary to use reflex airfoils for a swept-back flying wing design. Gaussian Lift Distribution required for decent handling would enable C of G ahead of the center of lift, overall. This would encourage use of a continuously varying airfoil section design, symmetrical at the tips.

For the two seat design you seek, the high Lift desired in the center section could use a canopy effectively in aside by side blended body design. No problems if the pilot and passenger were both placed at C of G or

the passenger could be placed at C of G in a tandem layout.

The Horten brothers used a prone position in their IV and VI sailplanes. A bulge below housed the pilot's legs, but much less practical for two people. For solo use, this would allow an engine to be placed in-line with the Wing, above the pilot's feet. The pusher propeller could clean up much of the drag from the "Keel".

Andrew Coles

I see in a couple of photos that there is a sort of trim tab on the t/edge f each elevon. Are they actually trim tabs or something else? Should the elevons be bigger maybe?

Is the B10 composite wing wood and foam/glass or just foam and glass? Would I be better off just building in foam/glass to the U-2 wooden plans? My leaning is to the latter unless the B10 is foam /glass. Again any ideas and thoughts are appreciated.

Alex

I think they just tabs that you bend for a permanent trim. I was told to fly my plane first and see how she handles before adding trim tabs.

Elevons are already big. They extend almost the entire length of the outboard wing. They only move 30 degrees so I am assuming it does not take much movement of the elevons to get the plane to respond.

I have no idea how sensitive the steering is, for example if the plane reacts quickly or is slow, sluggish and delayed.

Ryan

Thanks for your comments "Mr. Ryan Derot" and " Mr. P. Hardy".

I have to document; take pikkies and epoxy samples for all parts from start to finish to be able to license and register the plane,,,, they would all come into effect if I ever wanted to sell it,,,, mainly it is for their ultralight data base here in the "land of Ozz" ,,,

As for flying a U-2 no I have not ,,,,,I have flown planes before but do not have a pilots license. I intend getting one before I finish the plane.

GOD WILLING !!!!!

Cheers

Alex

Don't mean to get into your business, thought I would pass along a simple set of rules that I have learned to accept and appreciate.

I read a string of e-mails circa 2005 +-, stating "just beefing the spar is not adequate, that looking at the whole structure is necessary".

Reading your e-mail, seems your at least an engineer type. I am a designer working in the oil industry. All my work is checked by another designer, and I back check any items he changes. When designing high pressure and temperature systems, we always double-check our work. We also double check exotic materials, SS's, hastelloy, titanium, etc.

I am assuming your wife is an exotic material, hence your having an independent aeronautical engineer check your work with possibly another AE to recheck. Again, don't mean to get into your business.

Curt

Hi I am retired after 40 years of structural engineering. I built a U2 kit for a friend, which I sold after his untimely death. I also built and flew a wooden airplane for 25 years, during which time I designed, built, and load tested a new set of lighter wings.

I have the following comments: It would be extremely difficult to cut 5 lb. from the U2 as designed, but you could add 5 lb. in a heartbeat! Foam and fiberglass is a heavy construction method. Its weight has to be offset by its other advantages. You pay a weight penalty for fairings, wingtips, cowlings, etc. of fiberglass.

A composite member of wood and fiberglass or carbon fiber relieves the wood of stress and pretty much relegates it to dead weight. The best reference I know of for calculating and applying test loads for a wing is "Structural Testing of Homebuilts" Alex Strojnik, Sport Aviation magazine, March, 1992

Dave G.

Not imposing, your friends passing was not related to the U2 was it? So far in my research there has been very few deaths with the U2 except for a few people who flew it with no flying knowledge or training which is trouble on its own.

My U2 is nearly ready for taxi tests and is around the 400 lb mark empty with a Rotax 377 engine, powerfin carbon fiber blades, electric starter installed. Also have shock absorbers on the main gear to take some stress off the spar on landings.

Ryan

No, it was not U2 related, but it broke up the team. You seem to have the right approach and attitude, and I wish you success.!

Dave

(ed. – The following images were taken by Ron Ogden and Jeff Lippy during their tour of the Mary Baker Engen Restoration Facility in Virginia that used to be in the Paul Garver facility in Maryland. This new, spacious restoration facility is located immediately behind the main Udvar-Hazy Museum. The general public is not allowed to enter the restoration area; however, there is a glassed-in mezzanine walkway, accessible from the main museum, from which visitors can watch restoration activities in progress. This floor level access was arranged by Russ Lee for the ESA Eastern Workshop. Russ is a member of both ESA and TWITT.)

Horten H VI V2 FlyingWing

Mitchell U-2 at far right.

Wings of Horten Ho 229 Flying-Wing Twin-Jet Bomber

(ed. – This link also came in after the publishing date but it is worth watching even though the holidays are over.)

US Air Force Band Flash Mob at the Hazy! Courtesy Russ Lee…

https://www.youtube.com/watch?v=vniBBT7nRJg

Enjoy! And Merry Christmas!

Al Bowers

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

My book containing several thousand annotated entries and appendices listing well over three hundred tailless designers/creators and their aircraft is no longer in print. I expect *eventually* to make available on disc a fairly comprehensive annotated and perhaps illustrated listing of pre-21st century tailless and related-interest aircraft documents in PDF format. Meanwhile, I will continue to provide information from my files to serious researchers. I'm sorry for the continuing delay, but life happens.

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

Books by Bruce Carmichael:
Personal Aircraft Drag Reduction: $30 pp + $17 postage outside USA: Low drag R&D history, laminar aircraft design, 300 mph on 100 hp.
Ultralight & Light Self Launching Sailplanes: $20 pp: 23 ultralights, 16 lights, 18 sustainer engines, 56 self launch engines, history, safety, prop drag reduction, performance.
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Bruce Carmichael brucehcarmichael@aol.com
34795 Camino Capistrano
Capistrano Beach, CA 92624 (949) 496-5191

VIDEOS AND AUDIO TAPES

(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).
Cost: $8.00 postage paid
Add: $2.00 for foreign postage

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
Add: $ 2.00 for foreign postage

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.
Cost: $8.00 postage paid
Add: $2.00 for foreign postage

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.
Cost: $5.00 postage paid
Add: $1.50 for foreign postage

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
Add: $2.00 for foreign postage

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.
Cost : $10.00 postage paid in US
$15.00 foreign orders

FLYING WING SALES

BLUEPRINTS – Available for the Mitchell Wing Model U-2 Superwing Experimental motor glider and the B-10 Ultralight motor glider. These two aircraft were designed by Don Mitchell and are considered by many to be the finest flying wing airplanes available. The complete drawings, which include instructions, constructions photos and a flight manual cost $250 US delivery, $280 foreign delivery, postage paid.

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