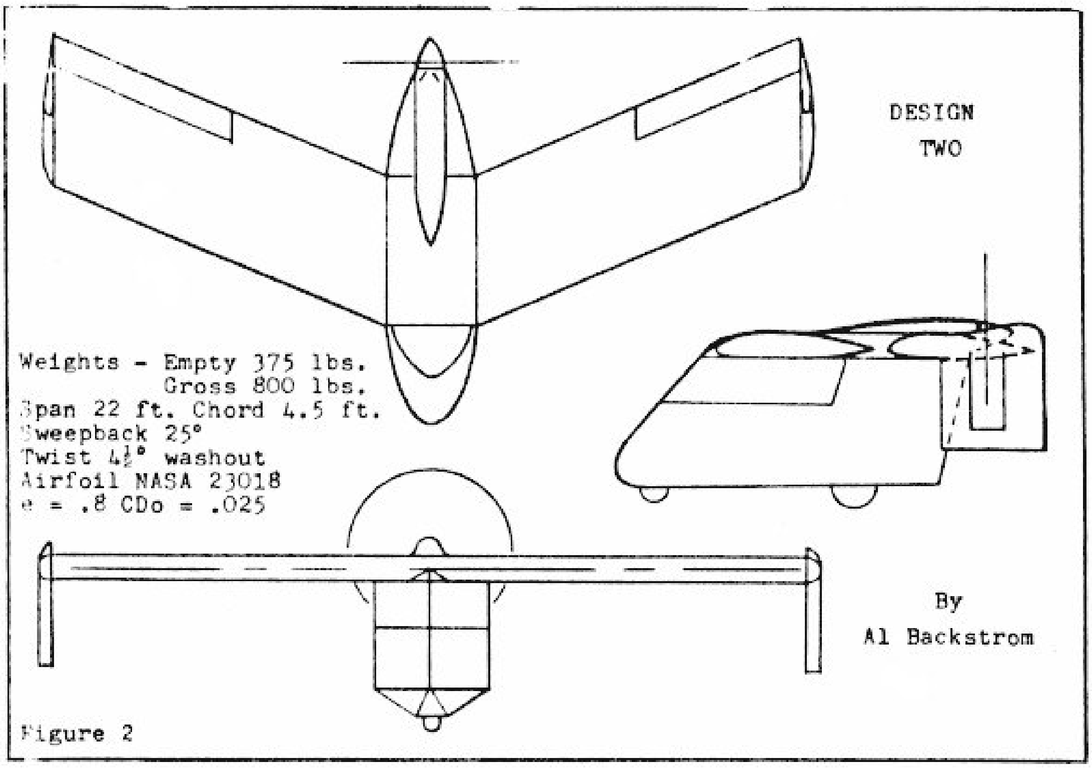
No. 281 NOVEMBER 2009

T.W.I.T.T. NEWSLETTER



From "Let's Take a Fresh Look At Ultra Light Airplanes" by Al Backstrom, Sport Aviation, April 1973.

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., **0911** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, November 21, 2009, 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).

TABLE OF CONTENTS

PRESIDENT'S CORNER

I think we have a really good issue for you this month. Lots of variety and some interesting information. My thanks to Fred Blanton for his contributions since they will allow me to publish some of Al Backstrom's work that we haven't had in our library in the past.

By the time you receive this issue you should be able to find the entire library of back TWITT issues on the web site. The access coding is in the masthead to the left so you always have it available. While we have some members that probably have every issue in paper copies, I know we have a lot of members who came on board and never ordered any back issues. So now is your chance to see what you have been missing all the years you have been a member. I hope everyone enjoys going back to 1986 and seeing how TWITT came about and the transition we have gone through over the years.

I have been a little disappointed that by providing some of our back issues free to the ESA gathering over the Labor Day weekend hasn't produced any new membership subscriptions. I have had an inquiry from Australia and I hope he finds a method for making the payment. We haven't had a member from down under for a long time so it would be nice to get some updates on the progress of flying wings. Perhaps we can get some more information on the Facet Opal.

Enjoy this issue and keep sending in your questions and comments so we can share them with the group.

Andy

THERE IS NO PROGRAM IN NOVEMBER

If you would like to stop by the hanger and just visit with us and/or look around if you haven't been there before, please take advantage of the day.

LETTERS TO THE EDITOR

October 16, 2009

This is the enclosure that should have been mailed to follow the May 2008 newsletter.

About a year and a half ago I had a major setback in that my wife of 40 years died of lung cancer, but it is now time to continue and I have my skis waxed and some of the dust collected so on with the LOPTER.

Now it looks streamlined, but I want to point out that it is not a speed machine, but rather it is so marginal that if it is to go at all it must be clean. Though it appears to have room for two it is a single place rig. It has no wheels or tire chains and only operates in the best weather. It primarily goes up and down. Only at altitude does it add any thrust through a variable pitch fan in the swiveled duct at the aft end.

Obviously better designers will, I hope, improve upon this first attempt. Only the most advanced airfoil can lift this bird and I plan to cover it with Mylar, waxed, in hopes if laminar blessings.

I would welcome criticism because it might intercept mistakes, so please have at it.

Syd Hall
Nevada City, CA

(ed. – Thanks for the additional information on your design. I hope some of our members will offer their input, both good and bad, in order to help you along with your project. I have included the last part of the May 2008 letter so people don't have to go back and look it up.)

Firstly, to be successful, such a bird must be efficient, aerodynamically, and that is the common denominator of all birds and sailplanes, so that is a must, here. Out goes the wasteful anti-torque tail rotor, to be replaced by counter-rotating rotors, and I'd prefer them to be coaxial, as the Russian designer, Camov, (who holds more world records than any other designer.) does in all his designs. It, further, must be well streamlined, not because it is expected to be fast, but rather, because to work at all, it must be efficient (as is the case in birds). There are many other variables that better designers may see fit to propose, but, herewith, I wish to submit my design of a LOPTER (or ultralight helicopter).

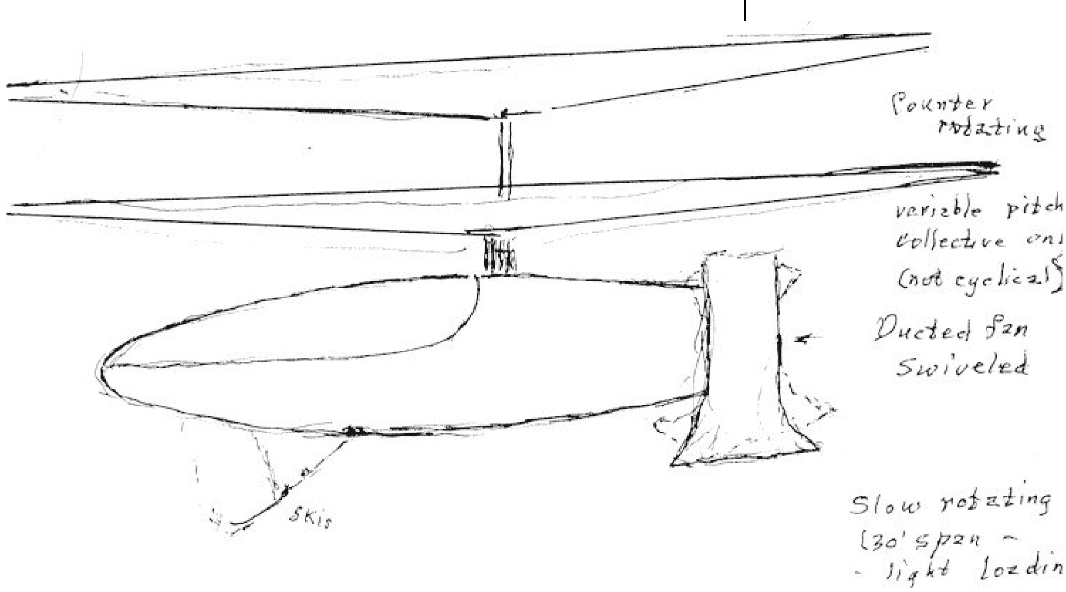
October 16, 2009

This is Doug Beasley from Houston, Texas. I've your e-mail about the hang glider. Thanks! I've seen some plans for a Horton 229. Their drawings are similar to the Ho X "Piernifero" Hang Glider. I might make similar to the Horton 229. They did make a glider to back then. I could make that one. There no big hills in Houston, Texas, but I've a solution to the problem. I could use the famous Pressure Jet Engines called the Gluhareff G8-2-130. They have used those to get hang gliders in the air. I could put 2 of those G8-2-130 engines in the back of that airship. 1940's Wood is to hard & a waist of my time. 2009 Foam & fiberglass is easier & saves time.

Sincerely yours,

Douglas Reed Beasley
energytool@sbcglobal.net

(ed. – Thanks for the added information. I hope he keeps us informed of his progress.)



(ed. – This is the message I got back from Steve Gray after he joined TWITT and I asked how he learned about us and what type of project he was working on. Welcome to TWITT Steve.)

Hi Andy, and thank you. I found your site while doing searches for flying wing and delta wing info. I also heard about it many times on the Homebuilt.com forum, and it was the people there that made me want to join in order to see your 'secret' information.

I am designing and hope to build an ogee delta wing tailless pusher two seat aircraft.

Steve Gray
starjumper7@comcast.net

October 26, 2009

I have a correspondent in Germany who is researching Robert Kronfeld for a biography. Kronfeld was killed test flying the GAL 56.

Anyway, my correspondent, Bernd Diekmann, is asking about the Baynes "Bat." The "Bat" was actually built by Slingsby around 1941. It is also known as the Carrier Wing." It too was test flown by Kronfeld.

I have found a couple websites (see below) and I have Norm Ellison's book on British gliders. Do you or your members know anything about it?

Also, do you know anything about the National Research Council (NRC) "Pterodactyl," which flew in Canada about 1946? It too was flown by Kronfeld. Seems he flew a lot of flying wings.

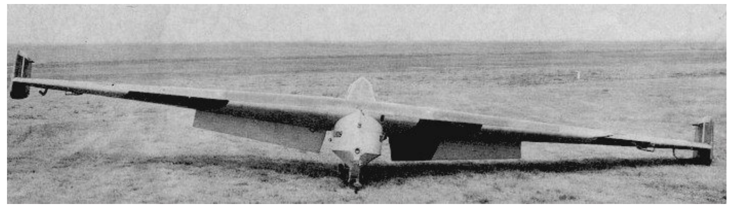
The "Bat":

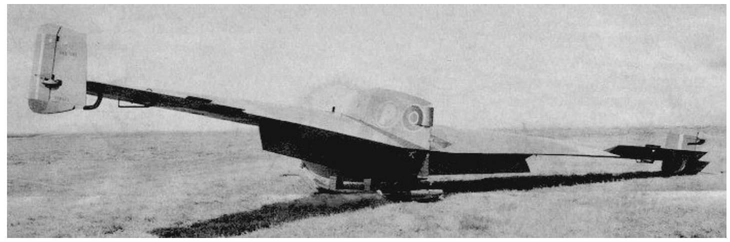
http://en.wikipedia.org/wiki/Baynes_Bat
http://en.wikipedia.org/wiki/L._E._Baynes
http://www.vintagegliderclub.org/vgc_news/bat.htm

Thank you for any assistance, which you can extend. I look forward to hearing from you.

Raul Blacksten
raulb@earthlink.net
http://www.clio-whispers.com

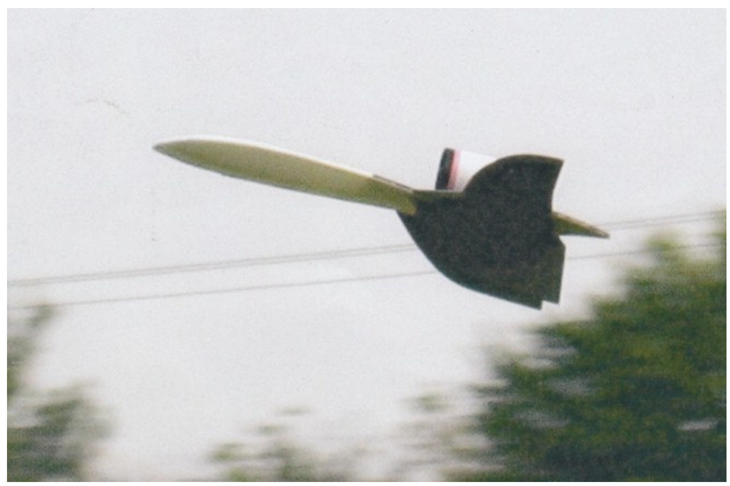
(ed. – The only thing we had in the archives was an article by Philip Jarrett in the May 1990 Aeroplane Monthly magazine. I don't know of any other articles or letters on this design in past issues, but some of you keep better track of those things than I do. So if you have something to offer, please send it directly to Raul and be sure to copy us so we can add it to the archives. In case you have forgotten what it looks like I have include a couple of photos from the 1990 piece.)





October 24, 2009

Thanks giving some time to renew my membership. Here is a photo of the Dark Schnozolla 1.5 to share with the group (below).



It has about 1 m span and a little over a pound gvw.

Very docile stall (maybe it don't really stall), and cool back flips.

The powered rudder is effective at zero airspeed as is the pitch and roll control, mostly.

Roll oscillation is not unusual and quite frustrating. (No different tips don't cure it)

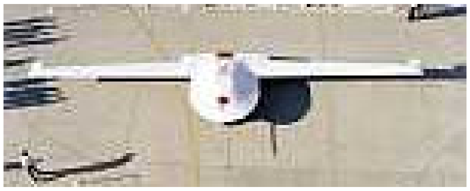
Helps to power up. The smaller one hovers nose high with a REALLY good pilot.

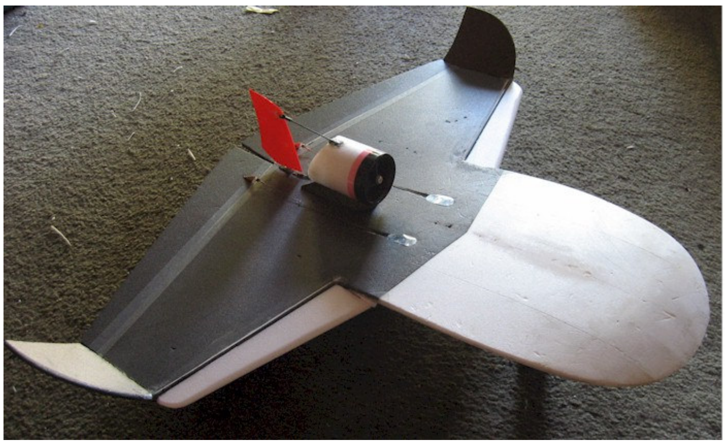
It was part of a try at VTOL without autopilot.

Probably not ready to publish until late next year when it is further along, but that photo is okay.

Here are more for you and/or the files. I like the concept if you don't need L/D. My German friends don't and give me a hard time saying the bulge should be in back like Horten might do..

Lockheed's Dark Star (below) (Dark Spot or Splat) was a great example of how it can go wrong!





(ed. – This is one of the Backstrom articles forwarded to us by Fred Blanton that was listed in last month's issue. He suggested using the first one in the list, so here it is. I was able to find some better copies of the images included in the article and I hope everyone finds it interesting and entertaining.)

Flying the Plank
by Ted Janczarek

Ted Janczarek describes his experiences flying one of the most unusual gliders ever built. Sport Flying, year unknown.

When you first laid your eyes on this craft you just couldn't believe what you saw. Can you imagine a tiny straight winged, tailless, rudderless and almost bodiless aircraft flying? As a matter of fact many aeronautical engineers and designers also harbored doubts. But not only did it fly – it soared too!

The skeptics said it was an accident waiting to happen. It was obviously most critical in the horizontal axis, and it looked like it would tumble if given half the chance. If the c.g. wasn't just perfect and only slightly altered, the next flight might be nothing less than disaster. And so went the murmurs and rumors among the engineers.

The gauntlet of challenge was thrown down by more than one aerodynamicist and I found myself eager to disapprove the many misconceptions entertained by this highly respected but skeptical group. It wasn't that my knowledge of aeronautical design was so great, but I developed a deep faith in Al Backstrom, the designer, who so thoroughly convinced me of the aircraft's capabilities.

The ingenuity and hare work of Al Backstrom combined with the efforts of Phil Easley and "Jock" Powell brought reality to the dream of a straight-shaped flying wing. The finished product was typed the EPB-1 "Plank". It enjoyed the attention of every inquisitive eye but with the passage of time it eventually faded into obscurity.

I had never flown an aircraft so light in weight (232 lbs). Attaching a backpack (necessary to keep the pilot's mass within the proper c.g. limits) my overall weight was more than the empty weight of the sailplane. It was really more like wearing the sailplane by strapping it on, then climbing in and getting seated.

The main spar along with a canopy stringer served as a chin rest. The effect was somewhat like a short person sitting in a Turkish bath with his chin raised.

During takeoff, compared with other sailplanes, the "Plank" ran along the ground slightly longer before becoming airborne. But not more than the sleek high performance beauties of today. Directional control on takeoff was less responsive than conventional sailplanes, but no sweet as proper rudder inputs, when needed, did the trick. Stick inputs activated the combination ailerons/elevators (elevons). Vertical opening drag plates located in the tip fins assisted turning effect by the individual application of the foot pedal. Depressing both foot pedals at the same time deployed both drag plates simultaneously increasing drag and acting in place of the conventional spoiler. Combined coordinated effort of control pressures produced a result remarkably like that of, or better than, conventional sailplanes of that era.

Flying on tow was a real joy. The sensitivity of control reaction was a delight to experience. You could make the "Plank" dance to any tune.

Today was the day I was to put the "Plank" through its paces and determine, once and for all, if the "Plank" could be tumbled it subjected to a few out of the ordinary situations.

Climbing up above the haze layer to 7,000 gave me a good cushion of smooth air and altitude for any maneuver and its consequence. The moment of truth was close at hand as I pulled the release handle and the "clank" of the parting tow line told me the "Plank" and I were on our own.

Clearing the area with a few introductory turns I started right in with a series of stalls – at least an attempt. Out of the corner of my eyes I noticed John Karlovich in the Waco tow plane circling with curiosity.

The first stall was begun with a conservative, small pitch angle. As soon as the stall was approached the nose of the “Plank” pitched down sharply. I couldn’t believe what was happening! With the next stall I pulled the nose up to a higher pitch angle. Again the nose pitched down even more briskly than before.

It was evident the ”Plank” was stall resistant. Regardless of how high the nose was brought up, the “Plank” always pitched forward just before the stall. Unlike most other sailplanes, when a steep pitch angle is held, as the sailplane slows there is a complete loss of control effectiveness because of the lack of airflow across the control surfaces until the nose pitches over and airspeed is regained. But the “Plank’s” controls were responsive at all times.

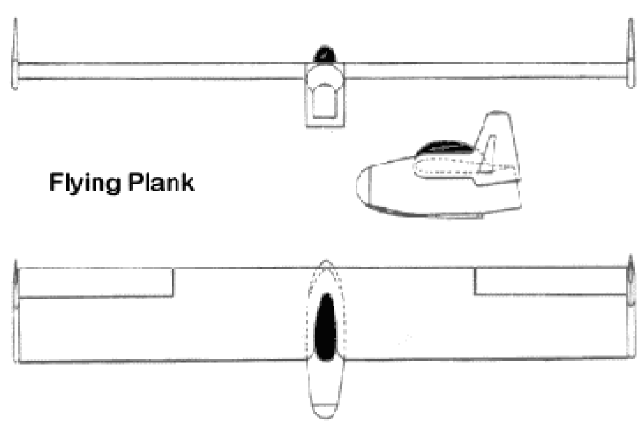
My next test was to determine the reaction of the “Plank” while it was subjected to 45 degrees, or over, of pitch, combined with an increasing bank until stall occurred. A conventional aircraft under the same setup will usually tend to break and drop off on a wing and actually begin to spin. But not the “Plank”! As soon as the stall was approached the nose pitched down, STRAIGHT AHEAD while the bank angle remained constantly fixed and UNCHANGED throughout the entire cycle as the nose pitched back up of its own accord as soon as flying speed was gained.

I proceeded further with steeper angles of combined pitch and bank keeping in mind the warning of expert aerodynamicists who said that this was the area where the tumble would most likely be expected. But try as I did, I COULD NOT GET THE “PLANK” TO TUMBLE – I couldn’t get it to tail-slide or even “whip” violently – even pulling it up vertically! At these angles, depending on exactly how close to vertical the angle came, was the direction in which the ”Plank” would pitch. Almost violently! If the angle was undetectably close past vertical, the craft would pitch over backwards. If it was almost, but not quite vertical, it would fall forward. I even tried shifting the c.g. by trying to move forward and then lean backwards on other attempts, but I was locked into a constant c.g. position by virtue of the parachute on my back and the spar under my chin.

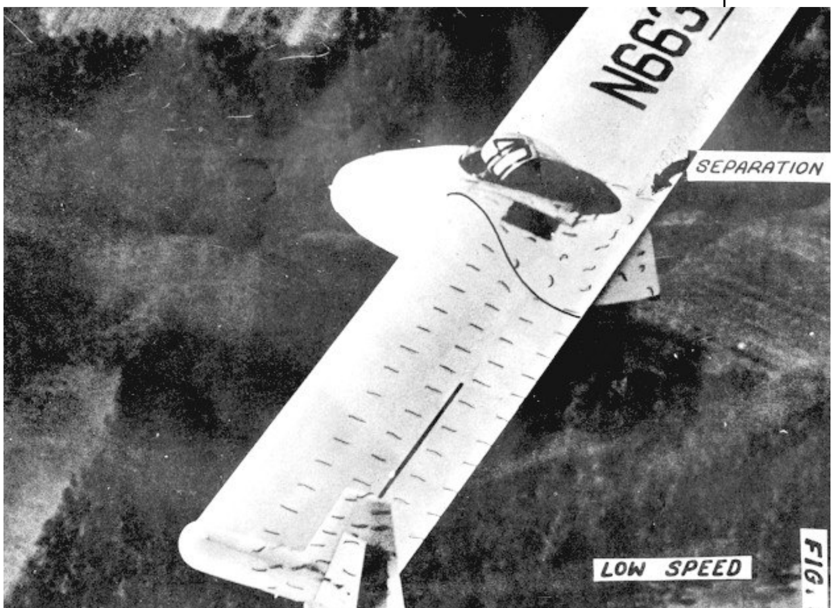
It was a remarkable experience to find this craft stall resistant and spin proof not to mention the unfounded fears of the perpetual tumble.

Felling extremely comfortable in the “little jewel” I couldn’t wait to enter into a series of aerobatics. Starting with a loop, which was begun at 90 mph, I was joyously rewarded with an arc covering barely a few hundred feet. It came around faster than any other aircraft I had ever flown. With roll speed on the pullout, I immediately started a slow roll to the left.

From my experience of less than a half hour I found the “Plank’s” roll rate comparable to that of a jet. I just knew that I could go “cork-screwing” through the skies with an astonishingly rapid series of rolls. Although we had eaten up several thousand feet of altitude so far, I was still above 3,000. The slow roll was slow all right as I needed more aileron than I was getting – but there was no more to be had!!! The stick was all the to the left – but it was against my knee! The cockpit was so tight I just couldn’t spread my knees any farther than they already were. Since I didn’t require full aileron in the previous maneuvers I neglected to realize that I might during my slow rolls. I was glad that none of my aerobatic critics observed the resulting maneuver that was originally intended as a slow roll.



Descending below the haze level I found some thermal activity, which I began to work. After several minutes of experimentation I learned, with my weight and the resultant wing loading, the best thermalling speed was 55 mph. It didn’t take long to find a reasonable thermal and I soon climbing in new found lift.



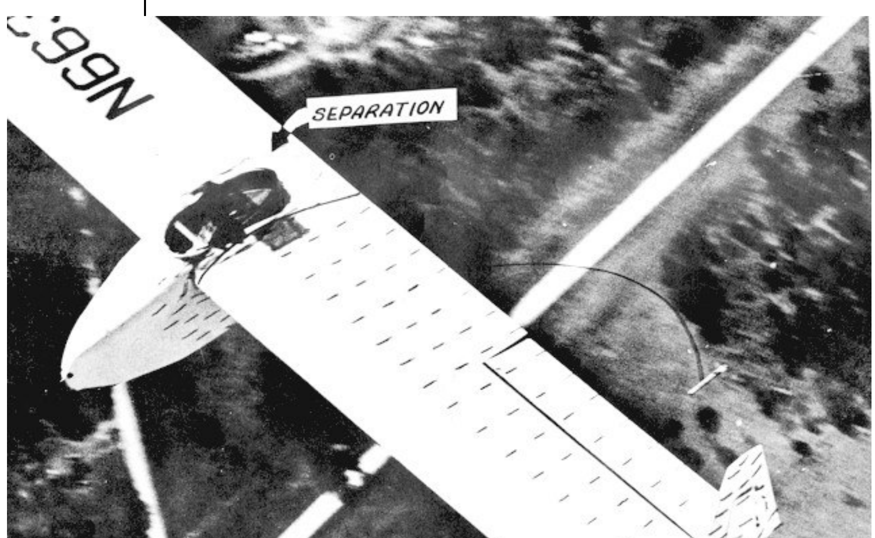
The pilots who regularly flew the "Plank" all weighed a good 50 lbs less than I. That 50 lbs meant ten mph less on their thermalling speed, an important factor during marginal or weak conditions.

While flying in turbulent thermals I began to notice a peculiar porpoising tendency of the "Plank". Every time we encountered the slightest bump, the "Plank" would tend to pitch upward and abruptly correct itself and pitch back downward to the original attitude. Therefore, going around in that type of thermal the pilot constantly bobbed up and down. It was a mild annoyance factor at first, but after a few turns it was a simple matter of adjustment to this unusual idiosyncrasy.

The roll problem was easily solved by shortening the stick. Almost half of it was sawed off leaving only a short stub. The "Plank" was then flown in a most unorthodox way by running the hand under the right leg and grasping the stick from beneath. Now I could hit the control stops without any more hang-ups and take full advantage of an unusually rapid roll rate. Aerobatic proficiency was achieved by flying this tiny sailplane only a few times.

I wondered how the "Plank" would handle INVERTED on tow. I soon found out! After reaching a safe altitude behind the Ryan PT-22 flown by Phil Easley, I rolled the "Plank" onto its back. Everything went fine until I needed to raise the nose. Then, by putting in forward stick about the same time the slack came out of the towline, the negative "g" force caused my seat belt to slip. My shoulders cracked open the rear hinged "bubble" canopy, forcing the air blast to completely rip off the hatch. Luckily the cross brace was a mere inch or so from my head and only smashed into my lower face as the Plexiglas tore away. Either the air blast or canopy wrenched off my sunglasses, momentarily blinding me. But my reflexes had be pull the tow release and roll the "Plank" right side up in the same motion. Not yet knowing exactly what damage had been inflicted, I cautiously flew in a straight line assessing my next decision.

The plane handled normally but I couldn't really judge airspeed with the blast of air flush on my face. Without the canopy, both the altimeter and the airspeed fluctuated badly and proved worthless. But I was pleasantly surprised and gratified how quickly I adapted to my predicament. Doing a few turns while working my way back to the airport, I gained complete confidence in my ability to satisfactorily control the "Plank" and landed without further incident. After coming to a halt I glanced down to undo my parachute buckles and say my bloody shirt. It was then that I first tasted the warm salty flow of blood oozing from the gash on m mouth. In trying to analyze why the seat belt should slip, we all came to the conclusion that it must have been a fluke as we could not duplicate the slippage on the ground.



The aircraft was then flown in successive air shows and flight demonstrations. But the greatest honor was to demonstrate the "Plank" to Dr. Alexander Lippisch. Dr. Lippisch's fame may best be associated with his flying wing design of the first rocket powered

Messerschmitt 163 which stunned the allied pilots on its first appearance during World War II.

Further proving the ruggedness and ability to withstand severe and punishing “g” loads under most critical conditions was accidently demonstrated during an air show near Austin, TX.

I had just completed my aerobatic routine with an inverted pass at minimum altitude. The air was choppy with strong thermal activity and was jolting the plank with strong gust loads at higher speeds. Passing the end of the runway inverted I applied forward stick pressure climb out upside down, once more subjecting the “Plank” to a negative “g” load. Once again the seat belt began slipping. The only thing I could do now to prevent my weight from pushing out on the canopy was to wedge myself in the cockpit by spreading and pressing out with my elbows and knees pushing very hard on the floorboards (rudder pedals, because I couldn’t take my feet off just then). Also by easing off on the negative “g” in an attempt to create as close to a zero “g” condition as possible. It was like hanging over a cliff with a loose grip. You just couldn’t afford to loose your grip with one hand to seek a better hold. Out of the corner of my eye I took in the airspeed needle, which was past one hundred and increasing at an alarming rate. There wasn’t much choice to save the sailplane. The self-preservation instinct prevented me from just falling out, but already past the red line, I was equally concerned about any “g” loads imposed on the “Plank”. At that point I felt its destruction was certain.

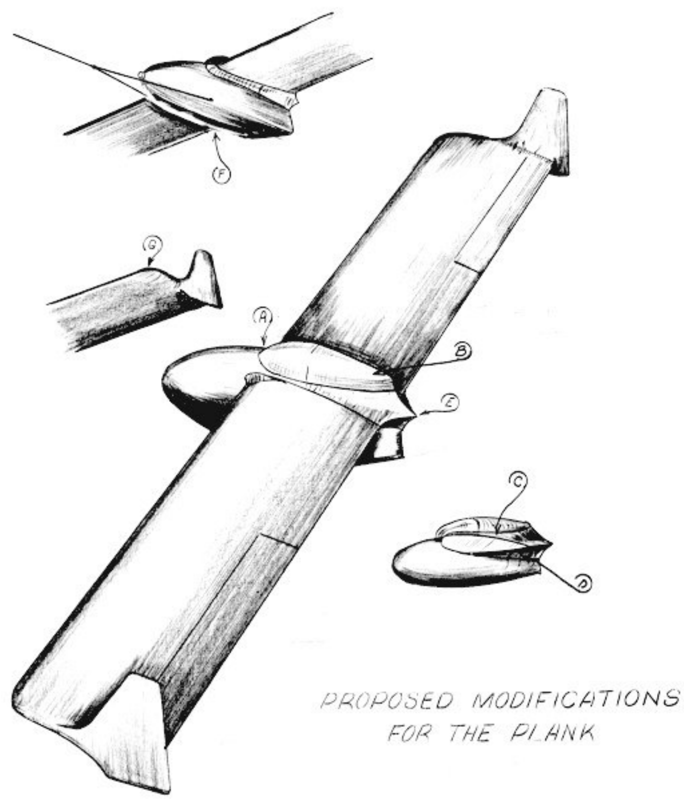
A popular question asked flashed into my mind, “How would you bail out of the “Plank” if the need arose?” The answer was easy. You don’t bail out of the “Plank” – you simply shrug it off!

Split seconds were fleeting with no time for procrastination and I gambled the whole thing with a very tight split “s” loading the “Plank” with an excruciating “g” load. As we screamed out of our tortuous dive I expected the wing to give away with the next jolt of turbulence and go fluttering to the ground. But our luck held and the “Plank” hung together proving again that this astonishing little sailplane was more than what met the doubting engineer’s eye.

The Office of Naval Research became interested and had extensive modification and drag tests schedule for reasons of research. Every area of parasitic drag was explored. The “Plank” was “cleaned up” to the Nth degree. Angles were rounded and fillets were added. Even the idea of adding a canard airfoil was toyed with to help boost up the ultimate glide ratio to 75 to 1.

With the test completed and the higher echelon satisfied, the future of the “Plank” became uncertain. Our close relationship dwindled into a lasting separation and finally faded into total obscurity at the China Lake Navel Test Center in California. But who knows, perhaps the “Plank” may once again emerge from out of the woodwork to become the center of attraction at any gathering. And maybe . . . just maybe, the murmur among the generation of spectators will ask once more, “What is it? It is a plane? Will it fly?”

(ed. – Here are a couple of figures from a report written by Al Backstrom in 1956 while at Mississippi State College. The tuff test photos above were also part of that paper but were included in Ted’s story.)



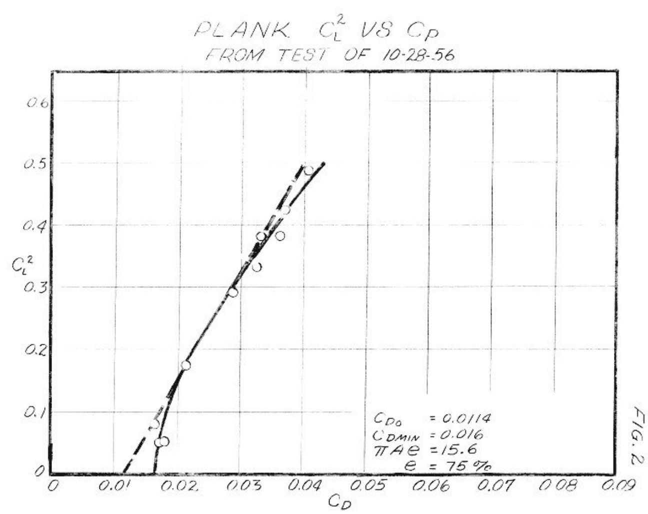
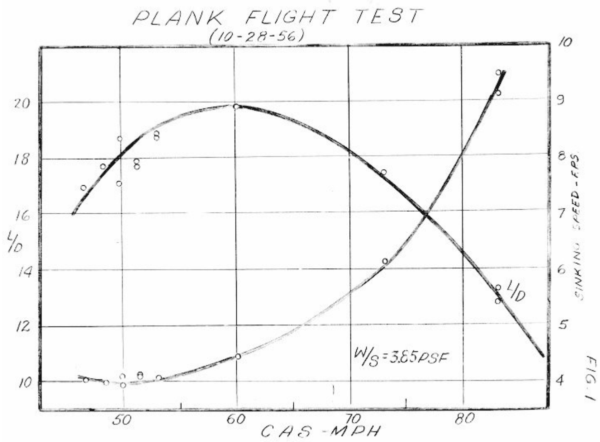


FIG. 2



Nurflugel Bulletin Board Threads

I have been playing around with MAC's - really MGC's (mean Geometric chord) - deriving the MGC length and its span wise position for general elliptical wings from the integral definitions. Using Cr for root chord and b for the half-span, I found the MGC to be 8Cr/(3 pi) = about .85Cr, located at a distance d = 4b/(3 pi), or about 42.4% of the half-span, from the root. I soon discovered, assuming no mistakes, that the chord at this distance is greater than the MGC, and the chord equal in length to the MGC is located about 53% of the half-span out. I think that my MGC and d values are correct. Have I erred? If not, I need to ask...

How does one position the MGC chord wise, in order to locate the fore/aft position of the neutral point at the computed span wise location?

My values seem to agree with what I've found elsewhere, although the internet is cluttered with misinformation and hasty conclusions from just plugging the computed MGC's into the chord equations and thus locating them unreasonable far outboard. I appreciated Bill and Bunny Kuhlman's graphic method for compound wings, and it sets the NP position, but the integral definitions don't imply much here. My own texts hint that their authors didn't like to say much about MGC, and when they did, they explained very little. So are any of you up for this? All help's gratefully accepted!

Serge Krauss
skrauss@ameritech.net

It took me a long time to come to terms with the difference between MGC and MAC. MAC is really the "right" answer in my mind. Let me try to explain, and everyone can chime in correct me where I am wrong...

The MAC is that chord where half of the aerodynamic AREA is larger than this chord, and half the aerodynamic area is smaller than this chord. So it is very easy to have the MAC not correspond to a particular chord on the wing.

It make sense to me that half the area is larger and half the area is smaller, so it truly is a MEAN AERODYNAMIC chord in that case, as most of our effects are dictated by the surface areas that produce the moments and forces. Our moments and forces are resultants of the surface areas and length of lever arms. Or put another way, our forces and moments are products of (proportional to) the areas and the moment arms. MAC makes the most sense with respect to areas and to moment arms.

So if I were the research engineer in charge, I would much prefer the MAC over the MGC (though I am the first to admit the MGC is much easier to calculate!)...

Al Bowers ...stirring the pot a bit...
Albion.H.Bowers@nasa.gov

Thanks, Al-

My windows update, which is supposed to happen at 3:00 AM just happened at 9:30 AM and blew my partial post away. So I hope that one didn't go to Nurflugel. Assuming that it did not, I'll start again...

Did you mean that the chord that separates the half-span into equal areas is preferred to the integral definition, or were you feeling that they are pretty close and that I was using something simpler? I'm asking just because I find that the integral-derived chord doesn't quite divide the half-span into equal areas.

I've seen MGC used differently over the years and had come to see it not as the "average" chord, but as often presented as the "actual" MAC without allowances for twist, Reynolds Number, wing section, tip loss effects, etc. In other words, when I said MGC, what I meant was "1/A times the integral of C squared of y dy". Is this different from or the same as what you thought I meant by MGC? At this point, I'm not dealing with the "real-world" aerodynamic effects, but just trying to understand application of the basic definitions.

I have come to expect the MGC (in this guise) not quite to divide the half-wing into equal areas, unless the wing is rectangular. For instance, for the extreme straight-taper case of a pointed wing, this MGC is at

1/3 half-span, but still divides the inside and outside areas in the ratio 5/4. I did this with both HS geometry and the integration method. For an elliptical wing with an aspect ratio of about 5.1 (actually 16/pi; full span is 4 times the root chord), the ratio of areas was about 1.1/1, and that seems to be true for all ellipses, including the circular wing.

I have to admit that I have not always felt comfortable with the methods of weighting by areas or moments about the root; sometimes it makes "perfect" sense, and sometimes I'm having to re-convince myself.

Anyway, I guess my original question still stands. I still am not confident how the MAC is positioned chord wise at its computed span-wise position, when it is not the same size as the actual wing chord at that place. Does it conform to the beginning alignment? For instance, if all the quarter chords were aligned span wise, then the NP would fall on (near) that line. If the wing were truly an ellipse, then the mid chords would be aligned. Then would the NP fall at the quarter-chord point of the MAC centered like the other chords, but positioned at the computed distance from the root? What about other alignments like a linear sweep of some corresponding chord points, like l.e., t.e., .3c, etc.? Would I just place the MAC at the computed span wise position, placing the designated point along its length onto the sweep line and then use its quarter-chord point as the wing's neutral point?

'still mulling things over...

Serge

Dick Whitcomb passed away today... Godspeed Dr Whitcomb... *(see bio on next page)*

Each of Whitcomb's great innovations for aircraft reduced a different kind of drag.

Winglets - reduced induced drag.
Supercritical airfoils - reduced profile drag.
Area rule - reduced wave drag.

The only person who came close to touching him in the last half of the 20th Century was RT Jones. RT is generally credited with development of the swept wing (in parallel and independent of Busemann), optimizing span load for the bell shape (in parallel and independent of Prandtl and Horten), and the oblique wing.

Al Bowers

Has anyone ever heard of the name "Gülland" or "Guelland" in conjunction with the capture of the Ho 229 in Germany or the transport to the US ?

I was told that a Person named Gülland was under interrogation by east German "government body" (probably the "Stasi") in 1962.

He told them, that he was ordered to help preparing a tailless aircraft for shipment by the Americans in 1945. He recognized a set of boards with black coverings, which he was ordered to handle and pack very carefully. After this he wanted to take one bucket with a black "paint" out of a pile of cans, which was stored in a secondary room of the workshop. This alarmed the Americans and they ordered to pack and ship all those cans/buckets, too. The manufacturer of these cans reportedly was IG Farben. This interrogation was done in Arnstad, which is relatively close to Friedrichroda.

My first guess was that this might have been samples of the fuel resistant glue which was under development and used for the production of the so-called SPL-wings. These wings were already under production for the He 162, but not yet in operation. There is a US report that such wings have been found at Sonneberg where the Ho 229 wings were under production, too. This report also states that the US took those He 162 together with "samples of the glue used in their fabrication and the fluid used to treat the inner surface of the fuel tanks" have been removed and were forwarded to an US office.

On the other hand Reimar writes in the book "Nurflugel" that the fuel resistant glue was under development by the Dynamit AG, not IG Farben.

Maik Swoboda
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Maik, I checked my files and did not find mention of either name.

Russell Lee
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NASM

Bear in mind that IG Farben was not a company; it was a grouping (Interessengemeinschaft) of companies involved in the production of dyestuffs (Farben) - a government-sponsored cartel. I don't know whether Dynamit Nobel AG was a member, but it's not impossible. Anyway, IG Farben as such did not manufacture anything - it would have been a member firm that did it.

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RICHARD T. WHITCOMB

Engineer's designs advanced jet travel

By Stephen Miller
THE WALL STREET JOURNAL

Richard T. Whitcomb dreamed up techniques that made supersonic flight possible and innovations that endure on passenger jets today.

Mr. Whitcomb, who died Oct. 13 at age 88, solved a problem that had bedeviled aviation engineers, whose designs couldn't achieve supersonic flight even though they seemed to have enough power. Increased wind resistance at speeds approaching the speed of sound was the problem. Engineers took to calling it the "sound barrier."

Mr. Whitcomb's solution was to taper the airplane's fuselage in a manner he often likened to a Coke bottle, which dramatically reduced drag. Within three years of Mr. Whitcomb's discovery in 1951, Air Force interceptors were flying at supersonic speeds.

It was the first of three revolutionary advances Mr. Whitcomb designed. Another was a new and more efficient wing shape used today on nearly all passenger jets. And he designed "winglets" — small drag-reducing vertical panels found at the wing-tips of many commercial jets.

"I think he was the most significant aeronautical engineer operating in the second half of 20th century," said Tom Crouch, a curator at the Smithsonian National Air and Space Museum. "His fingerprints are on every jet plane flying today."

Mr. Whitcomb made his discoveries as a government engineer at the Langley Research Center in Hampton, Va., which had developed state-of-the-art wind tunnels where he could test his ideas in supersonic winds. He would spend hours at his desk chain-smoking.

In the 1960s, Mr. Whitcomb developed the specially shaped wing known as the supercritical wing, an improved design that increases fuel efficiency at near-supersonic speeds. He filed down the model edges, flattening the top of the wing and rounding the bottom to find the optimal shape. He had a reputation for being able to visualize airflow.

Richard T. Whitcomb examined a model that incorporated his supercritical-wing concept at the NASA Langley facility in Hampton, Va., in 1970. The aviation pioneer's innovations led to supersonic flight. *NASA Langley*

During round-the-clock wind-tunnel testing, he lived in the laboratory and slept on a cot. Although he never married, he would sometimes emerge from marathon sessions for Sunday dinner with family who lived nearby. "Uncle Dick rarely showered," recalled a nephew, David Whitcomb.

Mr. Whitcomb inaugurated himself as an aeronautical engineer at age 12, commandeering the basement of his parents' home in Worcester, Mass., as a workshop where he sought to improve common model planes.

"There's been a continual drive in me ever since I was a teenager to find a better way to do everything," Mr. Whitcomb told *The Washington Post* in 1969. But it was the technical problems involved and not flying himself that interested him.

"It had nothing to do with Lindbergh or anything like that," he said. "It was just the fascination of making a model that would fly."

Mr. Whitcomb said his first innovation was a method of doubling the power available from the rubber bands that powered his early models. After studying at the Worcester Polytechnic Institute, he went to work at Langley, in 1943, where he quickly acquired a reputation as a wunderkind, according to a National Aeronautics and Space Administration history of the lab.

When he had the idea for the Coke bottle-style fuselage, "It was like a bulb lighting up, but it wasn't out of the blue," Mr. Whitcomb said in the *Washington Post* interview. Others at Langley had been working on the same problem.

His method for sculpting a plan to reduce drag became known as "Whitcomb area rule" and was kept secret at first. After it was made public, he won the 1954 Collier Trophy, awarded by the National Aeronautics Association for "basic knowledge yielding significantly higher airplane spee and greater range."

In 1973, President Richard Nixon conferred the National Medal of Science on Mr. Whitcomb. His secretary had to remind him to buy black shoes to wear with his tuxedo, and he forgot his suspenders, so he met the president with his shirt pinned to his pants.

Although he did much to defin modern flight, Mr. Whitcomb never learned to fly.

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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.

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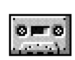

(ed. – These videos are also now available on DVD, at the buyer's choice.)

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.
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VHS tape of July 15, 2000 presentation by Stefanie Brochocki on the design history of the BKB-1 (<u>B</u>rochocki,<u>K</u>asper,<u>B</u>odek) 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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