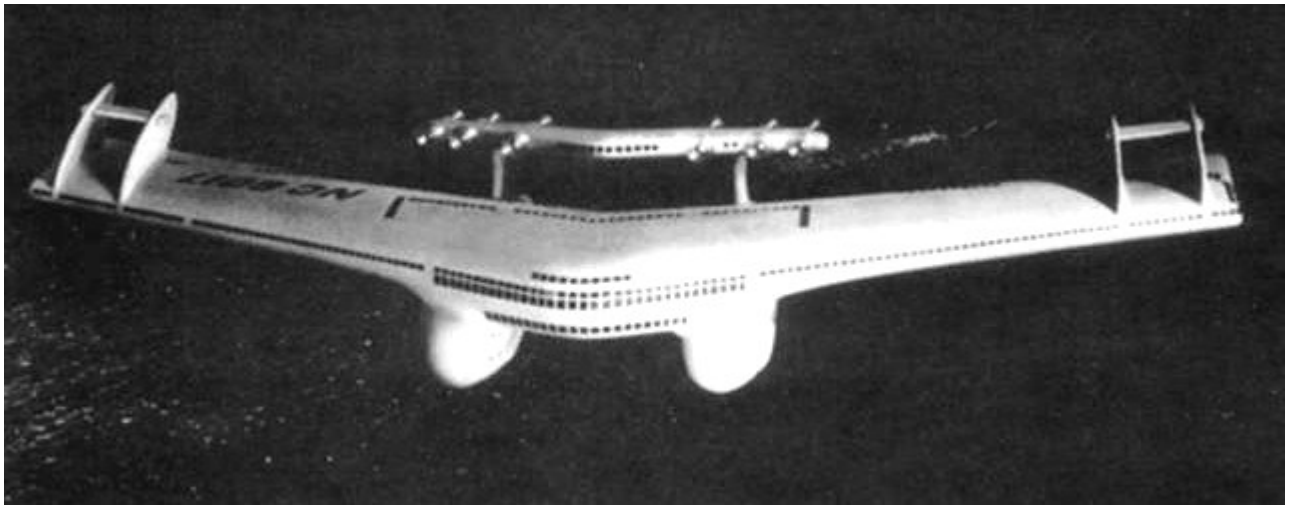
No. 236 FEBRUARY 2006

T.W.I.T.T. NEWSLETTER

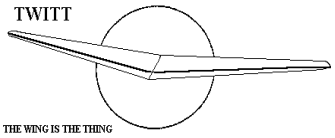


In 1929 Bel Geddes put forward a serious design for a seaplane capable of carrying 606 passengers. It would have nine decks, a crew of 155, three kitchens, two dining rooms, three private dining rooms, library, gymnasium, barber, hairdresser, and deck tennis. Not to mention suites, staterooms and promenades. Source: http://davidszondy.com/future/Flight/belgeddes.htm

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., **0602** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, March 18, 2006, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



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

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation, which is dedicated to furthering education and research in a variety of disciplines.

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

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PRESIDENT'S CORNER

I would like to thank all our members who came out for the January meeting. I think it was successful from the standpoint that it created a lot of comments and questions that were sort of answered on the spot. I would also like to thank Doug Fronius for stepping in at the end and answering what he could on the Northrop B-2. It made the program a little more personal than just looking and talking about slides.

What this program did show was we can provide a service to the members by exposing them to items they may not have access too in a more person way. This won't become the standard fair, but will serve as a stand-in when a program falls through or we just can't find something on topic to present.

It has been great getting new material from members like Henry Whittle and Serge Krauss. This month we have something new from Chuck Tucker who isn't even a member but came across us on the Internet. I was pleased this month to only have to put in a few pieces from the Nurflugel chat room, since that has been a lot of the newsletters of late.

One thing that I will be including more of in the future are some of the things from the Mitchell U-2 chat room. These are actual builders exchanging information about real world problems in constructing a flying wing. There are also a lot of pictures on the groups chat room site that might be of interest to our members, so I will be using some of them in the future.

I have been remiss in not getting to the TWITT web site updates as I have promised in the past. I don't know where the time goes each week and why I never seem to get to it. I am going to try harder to clean up some of the old stuff and get some new items posted. If anyone has some links they would like to see added to one of the various link pages, please send them along to me so we can share. I haven't had a counter on the site for a while, but I know it is getting hit quite a bit so the more we offer the more people will come back.

Andy

MARCH 18, 2006 PROGRAM

The March program will feature Martin Hollmann who will be talking about the design of wings and history of all flying wings. It will include the early history of the first all metal aircraft of Hugo Junkers, which include canard, flying wings and the first commercial airliners of the world. Then the design of the Lippisch and WWII flying wings (Me163) and the design of these wings and how they influenced the design of Northrop and, Convair's delta wing designs after WWII. Why such design features as sweep back and leading edge devices are needed. A comparison of aircraft configuration will be made for: flying wing; canard; conventional wing & tail and; three surface aircraft.

JANUARY 2006 MEETING RECAP

Andy got the meeting started by welcoming everyone to the first meeting of 2006. My how time flies (pun intended). Since everyone was a seasoned attendee he dispensed with the formalities and went right into the program.

This month we were treated to a slide show of the quarter scale Horten IX V2 project built and flown by a Dutch team during a period covering 2000 to 2002. The crowning point of the show was a 2-minute video of this JET model flying over the countryside.

The material below was taken from the following web sites:

http://home.wanadoo.nl/dutch-horten-team/
http://www.strictlyscale.com/projects.htm

The video can be seen by accessing the following site:

http://www.drfly.de/Horten9.wmv

So here are the comments included with some of the pictures and as a description of project straight from the people who designed and built it. It is a shame that they didn't do it with the idea of producing modeling plans that could be used by others to put their own versions in the sky.

Specifications Of The Model

The Horten Ho IX V 2 is built to ¼ scale. Here are some figures to give you an impression of the dimensions of the model. The wingspan is 4.2 m and the centre rib has a length of 1.86 m and is 29 cm thick! The nose wheel has a diameter of 200 mm, the main wheels have a diameter of 165 mm. The Horten is powered by two AMT turbines with a maximum thrust of 17 kilo's in total. The estimated speed exceeds 150 km/h. When fueled up the model has a total weight of 20 kg (18 kg empty).

Construction

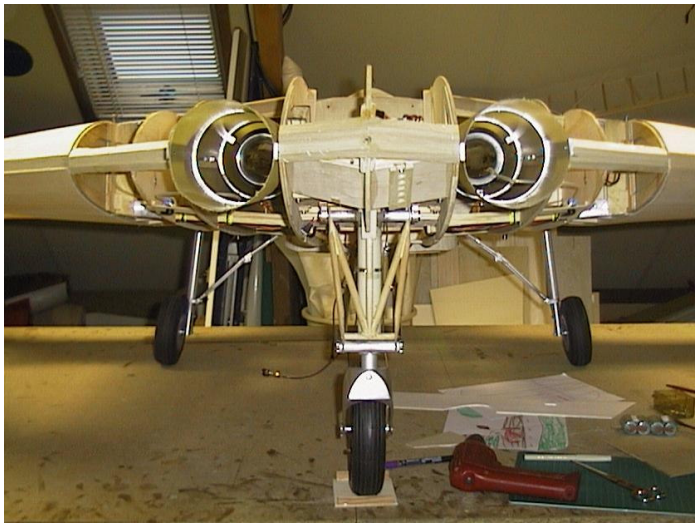
Wings and centre section. After completion of the ground plan, all the ribs were drawn and the wooden form with the right twist for the bell-shaped lift distribution was build. The wing was built on this form in one piece to be sure that the right half was exactly the same as the left half. After placing ribs and spars in the form, it was cut in three pieces, two outer wing panels and the centre part. Spars, wing attachment points, servo leads and finally the top sheeting were glued together. On this upper side, a counter form was build to make it possible to turn the whole model upside-down. After the completion of the counter form, the model was turned on its back and the bottom sheeting was realized. During the initial 'wood construction period', Aad van Sorgen, the 'senior-member' of our team, spent hours and hours on the construction of the undercarriage parts.

Propulsion System

Now the next important piece of work was starting: the integration in the model of the two turbines. They are mounted inside the wing, so a long exhaust pipe was needed to guide the hot gasses through the center

part. Two pipes were made out of thin stainless steel, 0.07mm thick, to form the inner pipes. Also two aluminum outer pipes from a 0.25mm sheet were made. Both pipes are spot-welded. On the inner pipe,

a venturi-shaped inlet was constructed. The whole inner pipe construction was then introduced into the outer pipe, ensuring it's position would remain adjustable. Each turbine is mounted inside an epoxy/Kevlar duct. The turbine, the duct and the two pipes are mounted on two aluminum rails. This method of construction resulted in two complete propulsion units, which can be mounted or unmounted very easily in or from the centre part of the model. This was done



to have easy access to the turbines for maintenance. Also in case of a crash, the turbines are protected. With the two turbines in place, the top sheeting of the center part was applied. Also the three legs of the landing gear were built in as complete units so that they can easy be removed. The air supply comes out of a soda-bottle of 1 litre and is controlled by a Robart-valve.

Camouflage And Markings

After sanding, filling etc, it was time to put the model in silk. The whole structure was doped once and then the large pieces of cloth could be applied with dope. The dope was first painted on and then rubbed-in to get a good contact between the wooden skin and the silk. After two extra layers of dope, the model was painted in the original colors, top "Violet-Grau" and bottom "Hell-Blau" The interior of the landing gear bays was painted "Hell-Grau". After applying the markings, text block, panel-lines etc, the whole model was sprayed over in a semi-gloss clear paint to make it fuel proof.

Further development and first test flight. Final preparations Now there was a model, empty weight 18kg, with a problem. The centre of gravity was very far forward, with the big nose gear in, it was very nose heavy. The C of G was almost on the neutral-point, normally very dangerous. Calculations showed that this was caused by the two big holes in the leading edge for the inlets of the turbines. Transferring the pump battery and both receiver battery's to the back, a still little nose heavy model was the result.

First Flight

On the 25th of May 2001, some 2 years after construction of the model was started, the Horten H IX V2 model took to the air for the first time.

The weather was very good, a soft breeze from the east and lots of sun. After the range check the tanks were filled again, the turbines lit and with shaking knees full power was applied. In 30 m it accelerated to the point of lift-off and with still full power it climbed at 30 degree into the blue. Throttling back was necessary because the model was still going faster. Testing

aileron and elevator response, the flaps were tried to see what moment it would bring: nose down, more than could be compensated so the flaps went up again. The nose gear produces a lot of drag that can nicely be compensated by a little up elevator. After a nice low-pass, the landing was on. Due to a incorrect C of G, the landing speed was very high. When the model touched down, the nose wheel broke of and the model came to a stop on its nose. What we learned was that on landing, the angle of the wing is less than the 7-degree during take off.

The Dutch Horten Team wishes to thank the following people. Without their support this project would have never been realized:

Paula van den Hoogen: mental support and assistance during construction
Bennie van de Goor (AMT-Netherlands): turbines
Reinhold Stadler and E. Uden: construction drawings and historical information
Alfons Gabsch and Raimund Sonst: calculations "Bell shaped" lift distribution
Heinz Scheidhauer (former Horten testpilot!): financial support and advice
JR-Propo and D. Davenport: RC-set and programming
Jupp Wimmer: vacuum-formed canopy

LETTERS TO THE EDITOR

January 5, 2006

TWITT:

Have been missing the monthly TWITT fix so have enclosed $40 for two more years at our new address.

An interesting web site:

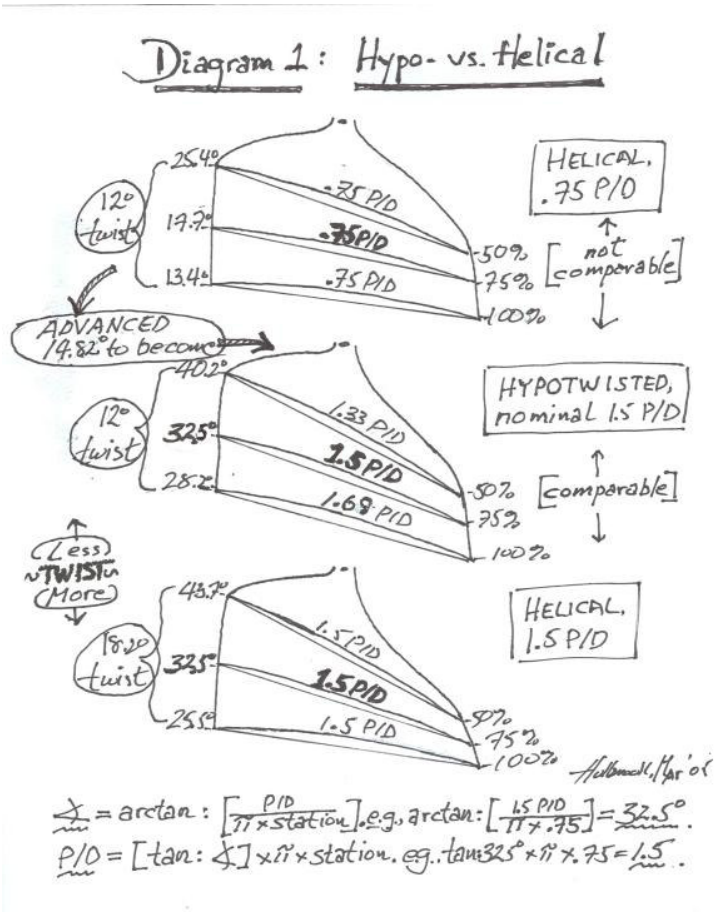
http://home.att.net/~mybeasts/hypo.htm

on hypotwisted props, at least for rubber powered models seems to provide more thrust.

Herman Gates
RR 3 Box 426C
Ava, MO 65608

(ed. – Thanks for the renewal for multiple years. It gives me hope that we will still have some members around in the years to come.

I have included one of the diagrams from the web site so you have an idea of what Herman is talking about. It is quite an extensive article, but appears to be very informative.)



January 18, 2006

B-2 Photos:

For anyone interested in the B2 - some good pictures

http://www.richard-seaman.com/Aircraft/AirShows/Edwards2005/B2/index.html

When I got the unique opportunity to visit one of the 'stealth' bases as part of the 'Logstar' program we got up close and personal with several stealth planes and were advised that you could not touch the 'skin' of the plane with your bare hand, because it left a residue that affected the 'stealthness' of the plane...

Truly amazing photos. Mentioned far into the photo shoot is the requirement for the two pilots to

remain in their seats for 40 to 50 hours. I recall missions that were only 16 hours long, in a KC 135 that allowed walk around, and had a toilet. The B-52 Chrome Domes were about 26 hours long. That plane provided a short walkway for one person to nap.

Those provided plush living compared to two days in the same seat. I admire these pilots, and their B-2....

Robert Eastgate
<Eastgate@charter.net>

(ed. – I had several people send us the link to this page so I used the pictures and text as part of the January program. However, since he is a professional photographer [he has other pages with excellent aviation shots] I don't want to breach his copyright and publish any in the newsletter.

I had heard that the B-2 pilots had a garden lounge chair they could unfold and put in the small aisle way behind the seats so one of them could stretch out and get some rest in-between the aerial refueling connections. This seems much more plausible than remaining in the seat for the entire mission.)

January 18, 2006

My name is Chuck Taylor and what you are going to see is a video of my airplane the Tucker Vortex. The model has wingspan of 2 ft. and a chord of 2.5 ft. It weighs 8.5 lbs. and is powered with an OS 60 engine delivering 1.5 HP.

This configuration is scaled very close to a full sized airplane with a 10 ft. span and a 12.5 ft. chord and weigh about 900 lbs. The power loadings are also very close, the real airplane will have a 200 HP engine, which will provide takeoffs and landings at 40 MPH in less than 300 ft. and will cruise at 6,000 ft. Over 300 MPH! My pilot Mike Luvara instrumented the model and we recorded 10 G's on one flight and a landing speed of 15 MPH. The airplane will not stall or depart! We never got a wing drop on any of the high G turns.

Who am I? I learned to fly in the CPT program in 1940, enlisted in the Army Air Corps flying cadets, graduated from flying school in January 1942, flew combat in China, flew America's first jey the Bell P-39, XP-80, the Northop X-4, YB-49, XP-89, XF-104 and the Cosmic Wind midget racer and a Thorp T-18. My eyes aren't good enough to fly my model.

I think my Vortex could revolutionize general aviation with it high performance, no stall capabilities.

Chuck Tucker
229 Marks Drive
Hollister, CA 95023
831-637-4911
Xtucker@charter.net

(ed. – I talked with Chuck and he noted that this was the third in his series and that he is making modifications to have a video camera in the vertical, which should produce some interesting footage.

His first model was an 18 sq. in. foamie and has progressed to the current version. Since he had a lot of experience with metal he decided to cover this 2024 .025 aluminum, so that's not silver MonoKote that gives it the shiny look.

The video he mentions shows that it flies very well, takes off in a short distance and lands at a very high angle of attack and slowly. It has done aileron rolls, barrel rolls and loops so it fully aerobatic with the split elevons, but no movable rudder, which might be another change for the future.

I am sure if you would like to know more and talk with him about the design he would be very glad to hear from you on the phone or via e-mail.)

January 19, 2006

Mitchell B-10

I have decided to donate my B-10 to charity for the tax deduction. It would be more to my liking to pass it on to someone who I know would finish it and fly it. It has the Patmont cage and I have a Zenoah G25b or a Mac 101 engine for it. Both have re-drives and propellers.

Vic Gibson (Sacramento) 916, 722-9692
APilot@webtv.net

(ed. – If you live in his area or are willing to make the trip, it might be worth calling Vic to see if the B-10 is still in his possession and you can work out a deal.)

February 4, 2006

Query:

I am going to present a technical paper on a tailless aircraft. It has no tail and has no elevators. It has a delta wing configuration with split-ailerons. The ailerons tend to do all the controlling jobs of the aircraft. I didn't quite understand this....how is the directional stability and pitching (angle of attack) provided for such an aircraft?

Kindly mail me back clearing my above mentioned query as early as possible.

Myrtle Julia.
<myrtlejulia@yahoo.com>

(ed. – I wrote back with a brief description of an elevon system and pointed Myrtle to a web site that would give a lot more detailed information for help in putting the finishing touches on the presentation. It is good to see inquisitive minds looking at alternatives to the conventional airplane configuration.)

January 27, 2006

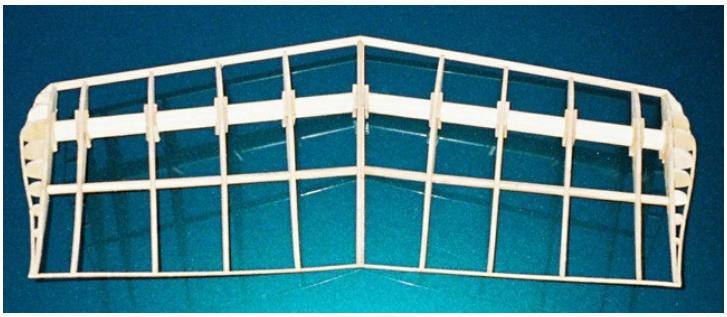
Polyvinyl Chloride Wing Spar

I have constructed a wing of constant chord that uses 5/8" PVC tube as the main support for the structure. The leading edge is 1/4" round dowel and the trailing edge is 1/16" Balsa square. There is an intermediate spar between the main and trailing spar that is 1/4" dowel. All holes for the structure were created on a radial table fitted to a vertical milling machine. The joining of the main spar through the foil section is reinforced by a cleat on both sides of the foil. Cyanoacrylate was used as the construction adhesive for both wood and plastic.

The geometry of the airframe is 10* sweep at the leading edge; 10* dihedral introduced at the main spar. Twist is 7* at the wingtip foil. Covering of the structure will be tissue paper and lacquer.

Some facts about PVC. **Polyvinyl chloride** Density 1380 kg/m^3 Young's modulus(E) 2900-3400 MPa Tensile strength(σ_t) 50-80 MPa Elongation @ break 20-40% notch test 2-5 kJ/m^2 Glass temperature 87°C melting point 212°C Vicat B^1 85°C heat transfer coefficient (λ) 0.16 W/m. Klinear expansion coefficient (α) 8 10^{-5} /K. Specific heat (c) 0.9 kJ/kg.K. Water absorption (ASTM) 0.04-0.4. Price 0.5-1.25 €/kg ^{1}. Deformation temperature at 10kN needle load source: A.K. vam der Vegt & L.E. Govaert, Polymeren, van keten tot kunstof, ISBN 90-407-2388-5

This material had been around for close to a century before Waldo Semon developed a plastizer process in 1926 while working for B.F. Goodrich, which increased the materials flex and eased production. This thermoplastic has half of its yearly production going to the construction industry. There are concerns about this materials carcinogenic properties.

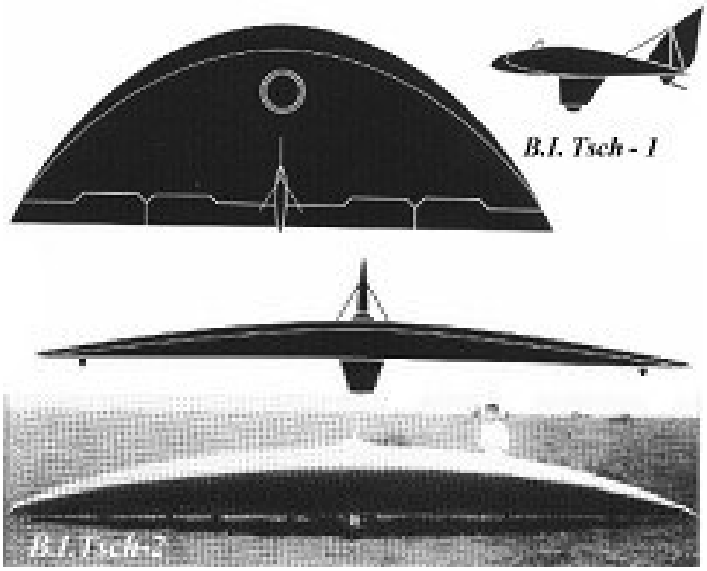


Lifting-Body, All-Wing, and BWB Origins - Concluded:

By: Serge Krauss

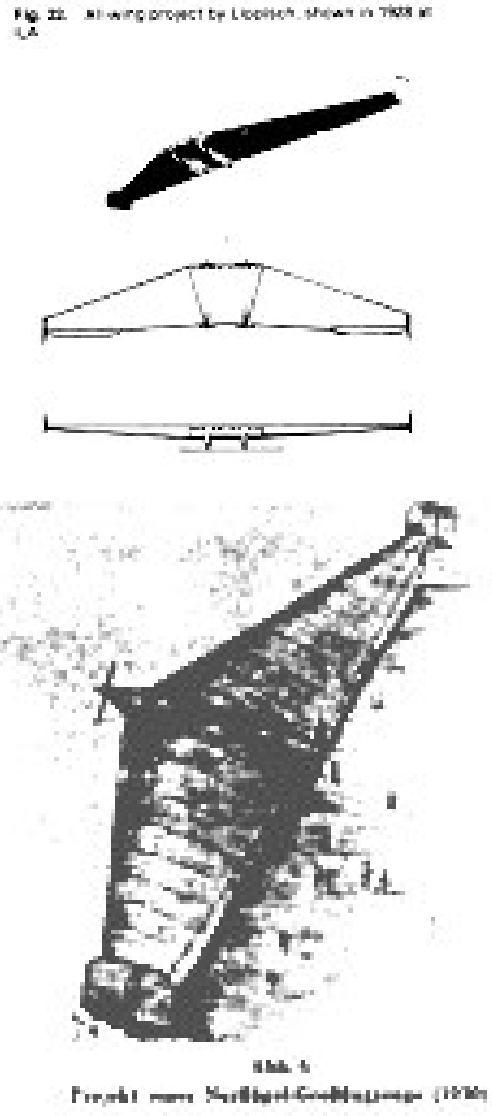
I am grateful for Andy's go-ahead to edit and expand the second part of this compendium, now that I'm back at my computer and files. I apologize for the typos and (minor?) logical errors remaining in the first installment, when I was called away again suddenly during a complete re-write and had to send my draft literally as I packed to leave. I am particularly embarrassed that after 30 years' familiarity with it, I misrepresented Junkers' patent claim, although I remain satisfied that his "1910 patent" did incorporate most – and perhaps all - of the BWB idea years before anyone else. I'm glad no one saw my *first* draft!

Anyway, while the aircraft and proposals appearing in last month's installment featured patented ideas that could serve as bases for all-wing or BWB aircraft, the following aircraft incorporate pertinent features which appear not to have received patent recognition. Related patents are mentioned. These all reflect a shared adventurous spirit among a variety of Burnelli's contemporaries working independently, but embody relevant ideas appearing before and up to the filing or publication dates of Burnelli's tailless aircraft patent.

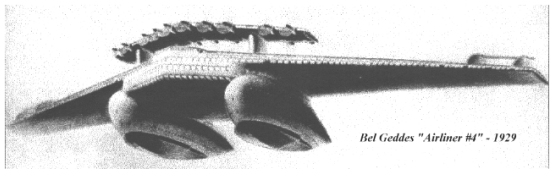


TSCHERANOWSKI, B.I.: This prolific creator of tailless types began with all-wing parabolic gliders in 1924. They may be the subjects of patents I have not found. (Bottom left illustration)

LIPPISCH, ALEXANDER: This pioneering genius of tailless aircraft also envisioned giant flying-wing transports with great carrying capacity within the wings. Proposals from 1928 and 1930 employ his successful "Storch" and "Delta" series configurations, respectively. His writings show that he was long interested in achieving an all-wing ideal.

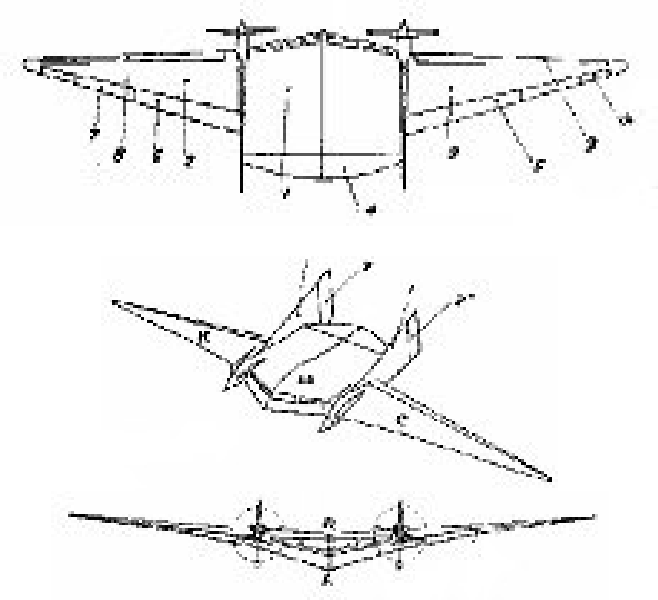


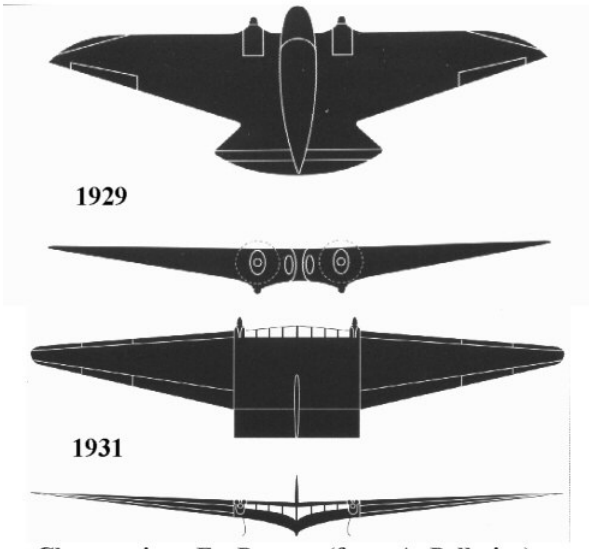
BEL GEDDES, N. (KOLLER, O.): 525'-span, 10-engined, swept, all-wing flying boat, w/2 upper surface vertical fins near each tip and engines mounted on auxiliary surface above l.e.: "Air Liner No. 4", designed/proposed (not constr.) 1929.



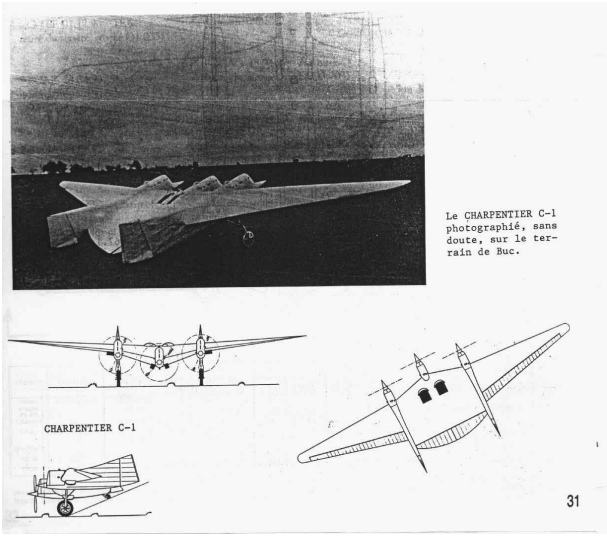
LESH, L.J.; **U.S. Patent No. 1,859,568**:"Airplane"; 5/24/32 (filed 2/28/29; `principle of similar proportional profiles and aerofoil continuity' suited to and perhaps ideally expressible in low-A/R tapered tailless; an example of blending 'wing' and 'body').

CHARPENTIER, J.F.G.M.L.: multiple patents for tailless aircraft with load carried within wing. Claims though generally concern 3-element configuration (deep ctr., tapered outer panels, separated by twin fuselage elements w/vert. fins), control, and stability on planes that approach BWB shapes. Relevant aircraft: **"C-1"** Caudron tri-motor, constr. 2/33-10/12/33, taxied 10/15/33, taxi/takeoff crash 10/33, destroyed on take-off 1/35. **Fr. patents:** 674,280 of 10/21/29 (4/30/29, 1/27/30), 711,979 of 7/8/31 (6/4/30, 9/22/31), Addit. 40,110 to 711,979 on 1/19/32 (4/16/31, ?), 768,626 of 5/22/34 (5/2/33, ?), 770,705 date unkn. (6/16/33, ?), 799,706 of ? (5/22/35, ?), addit. 47,125 to 799,706 on ? (3/2/36, ?), 867,149 of 7/7/41 (6/1/40, ?); **Br. patent:** 375,515 of 6/30/32 (6/1/31); **U.S. patents:** 1,893,129 of 1/3/33 (5/26/31), 2,123,096 of 7/5/38 (3/23/36).

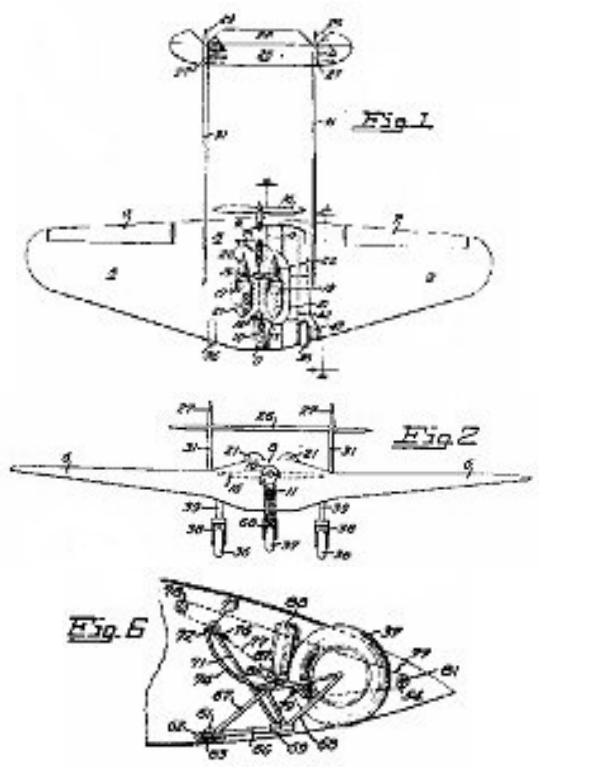




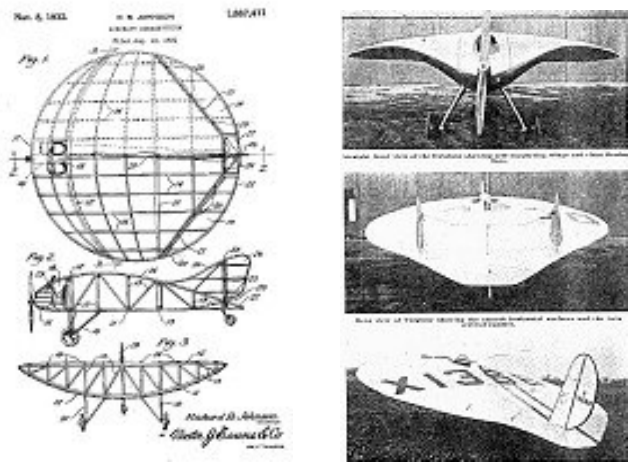
French patent drawings suggest more of a BWB. Charpentier's man carrying C-1 took on less of an all-wing appearance, due to scale limitations. (Below)



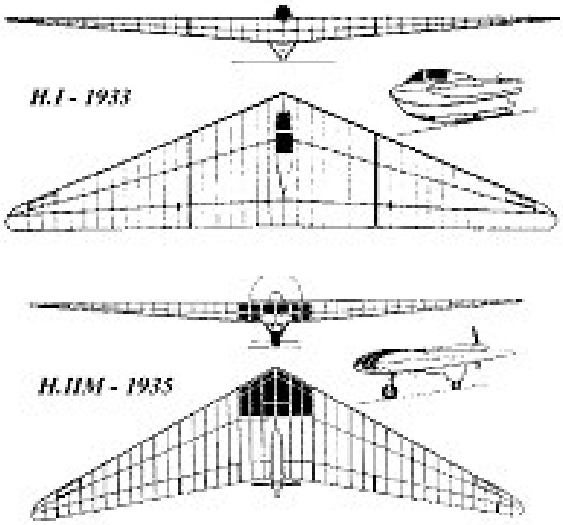
NORTHROP, J.K.: His much publicized **"All-Wing"** flew 9/26/29 and was meant to be the subject of his **U.S. patent No. 1,929,255 of 1/3/33** (5/10/29) below. This design was actually a twin-boomed, tailed aircraft to test the idea of carrying the propulsion and load in the wing, with the intention of then building true all-wing aircraft. Of course the great Northrop wings of the 1940's (and then the B-2) were its descendents. Despite the patent's full description of the all-wing concept, claims had been reduced to just landing gear mechanisms. (Next page)



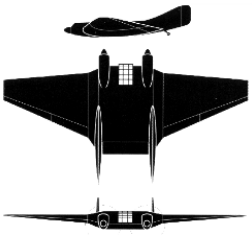
JOHNSON, R.B.: U.S. Pat. No. 1,887,411 of 11/8/32 (8/12/31, near right); Low-A/R "**Uniplane**" (A/R =1, far right) flew 8/34. Johnson's patent concerned only the wing's geometry, but the plane itself was actually a BWB by strict definition, employing the M-6 airfoil.



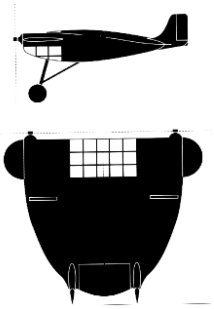
HORTEN, R. and W.: although the first Horten man-carrying glider was built in 1932, their model research began in 1928. Most of their early designs, powered or otherwise, were attempts at an all-wing ideal, with only very small protuberances for pilots. Their well-known efforts fill books. Two of their earliest:



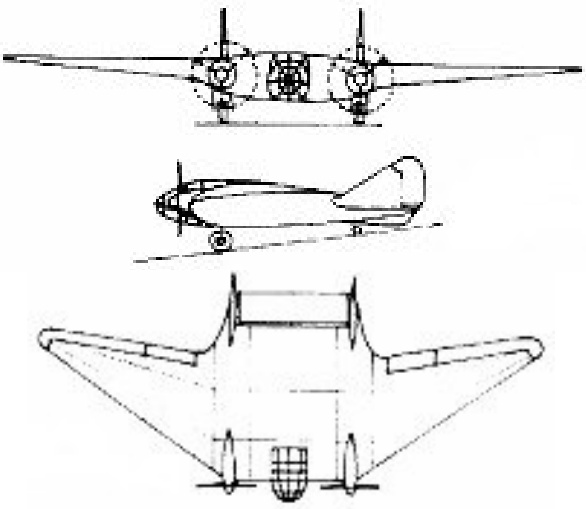
POUTILOV, A.I.: All-wing BWB "**STAL-5**", apparently constructed and tested in 1934, when it was found lacking in stability (near right, illus. by A. Pelletier).



ZIMMERMAN, C.: The creator of the V-173 first built this 7' man carrying all-wing or lifting body in 1935, but it never flew (far right, illus. by A. Pelletier).



LAMANNA, C.: BWB bomber model wind tunnel tested, 1935 (below).



I probably have other similar patents and published ideas hidden in my files, but I believe those I've cited show that ideas necessary for BWB's predated Vincent Burnelli's, and that there were other deserving, similarly engaged researchers and builders of his own time and earlier - an exciting period. This is NOT meant to denigrate Burnelli's work, since he created remarkable practical aircraft and surely did not deserve to be snubbed. He just did not originate the first *ideas* necessary for all-wing or BWB development. So I would not contest that Mr. Burnelli's accomplishments were impressive and deserved better acceptance, but I *would* question how original *any* inclination toward a BWB configuration actually was in 1933 or later.

If you would like to explore the cited patents, the USPTO has a great search engine on their internet site, http://www.uspto.gov/, where you can easily find any of these and judge for yourself.

Nurflugel Bulletin Board Tidbits:

Subject: Interesting NACA report

I just stumbled across a NACA report on spins and stability and tumbling of the Northrop XB-35. Naca-WR-L-739

The reports goes into changes of cg and its effects as well as control inputs. Interesting reading about how they couldn't get it to tumble but it would violently pitch up and down 90 degrees (180 total).

Dave
<Gnat@Shaw.Ca>

Subject: Lift distribution -> twist in wing construction

Just to remind there is also the AVL vortex lattice code by Mark Drela, recently made free software.

http://web.mit.edu/drela/Public/web/avl/

A great code with very general capabilities. Pretty much with everything a VL code can have, plus some basics in stability and other stuff.

Andre Martins
<kriptone@gmail.com>

Subject: Any Books On Early Glider/Barnstorming?

Any recommendations for books on the early 20th Century glider pilots and barnstorming?

Greg
evolbaby@aol.com

Subject: Re: Any Books On Early Glider?

Just from an enjoyment perspective, while the fine instructor, movie pilot, and lecturer, Derek Piggott reviewed Giorgio Zanrosso's anthology, his own series of books are great reads. Also, fellow Brit Phillip Wills was perhaps the best-known glider writer of the fifties, and was joined by Anne Welch with a few books of her own. You should read Hanna Reitch's bio and autobio for a sense of the times. Shame on me for not reading Dick Schreder's book, but if it is half as well done as his sailplanes, it would be a must.

Too bad that Richard duPont, Karl Striedeck, Paul MacCready, Dick Johnson, George Moffatt Heini Dittmar, and Rudi Opitz never have put their early flying histories to pen.

Bob Storck
<bstorck@sprynet.com>

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Coming Soon: <u>Tailless Aircraft Bibliography</u> Edition 1-g

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

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

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

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

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