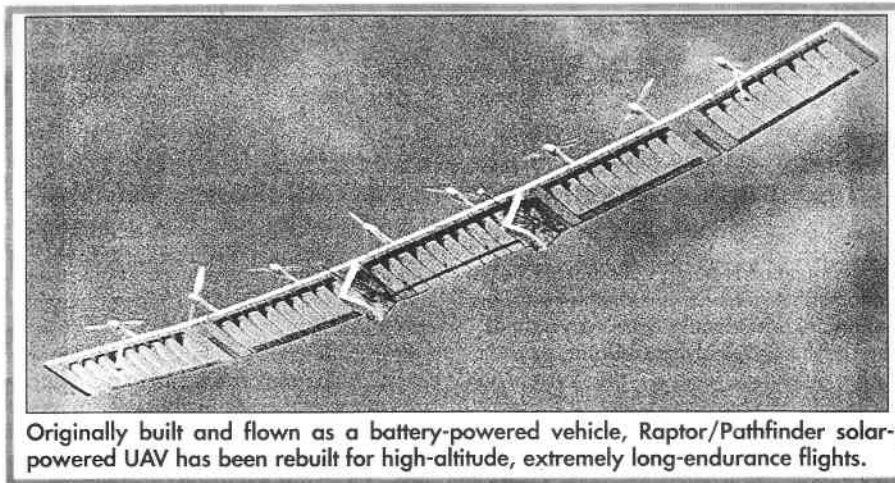


T.W.I.T.T. NEWSLETTER



Originally built and flown as a battery-powered vehicle, Raptor/Pathfinder solar-powered UAV has been rebuilt for high-altitude, extremely long-endurance flights.

A solar-powered, eight-motor, unmanned flying wing, designed to stay aloft for weeks or months watching for ballistic missile launches or sampling air pollution, was delivered to Edwards AFB in late Sept. to begin flight testing.

Dubbed Raptor/Pathfinder, the 100' span unmanned aerial vehicle (UAV) could be the first in a family of electric UAVs used to carry payloads akin to the satellite-mounted "Brilliant Eyes" sensors designed for the Strategic Defense Initiative. It will weight 540 lb and cruise at 31 kts. Its 640 sq-ft solar array is expected to generate a peak power of 11.4 kw.

The huge UAV originally was built as a

battery-powered electric aircraft in the early 1980s as part of a classified program. It was flown in 1983 on 9 flights of 30-60 min. each at altitudes of 8,000' and then put into storage. During the last two years, the UAV was refurbished as a solar-electric vehicle by its original builder, AeroVironment, Inc. of Monrovia, CA, in a research facility in Simi Valley. Initially the UAVs electric motors will be powered by batteries. Then researchers will switch gradually to partial solar power. Eventually, a follow-on vehicle will be powered by light-weight, regenerative fuel cells.

Contributed by several members. Source: Aviation Week & Space Technology, October 4 & November 1, 1993.

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

SEASONS GREETINGS

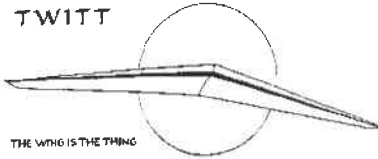


The number to the right of your name indicates the last issue of your current subscription, e.g., 9312 means this is your last issue unless renewed.

HAPPY NEW YEAR

Next TWITT meeting: Saturday, January 15, 1994, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, Calif. (First hanger row on Joe Crosson Drive - East side of Gillespie.)

TWITT



**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, east side of Gillespie).

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PRESIDENT'S CORNER



The turnout for the November meeting was somewhat disappointing considering the topic and speaker for the day. Thomas Bircher and his group are working on a very interesting project, and he had some questions to ask about what may be causing a performance

problem.

It was unfortunate that more of our engineering oriented members were not present to assist Bruce Carmichael in providing some insight as to why the larger version of the LEA series refused to bank and turn as had its predecessors.

I have been very pleased with the amount of information we are receiving in the mail over the past several months. This is coming from both the old and new members, and is providing some good material for the newsletter. We actually have some stockpiled for the next issue. Thanks everyone.

However, we have not received any items for the proposed auction, or heard any pros/cons on whether there is interest in such a thing. We at least have the sets of plans for the Mitchell B-10 and U-2, which will be sold to the highest bidder if there is no interest in donating or purchasing other types of material.

The past year has had both its ups and downs for the flying wing community. The ups have included the Stealth II nearing completion or actually flying, the SWIFT having success, the PUL-10 receiving some notariety in Europe, and the increasing numbers of model flying wings showing up at contests and recreational flying sights. The down to the international community was the passing of Dr. Reimar Horten, and a more personal level the passing of Jerry Blumenthal here in San Diego. Both of them will be missed in the year ahead as new developments continue to come forward that put flying wings into the forefront of aviation.

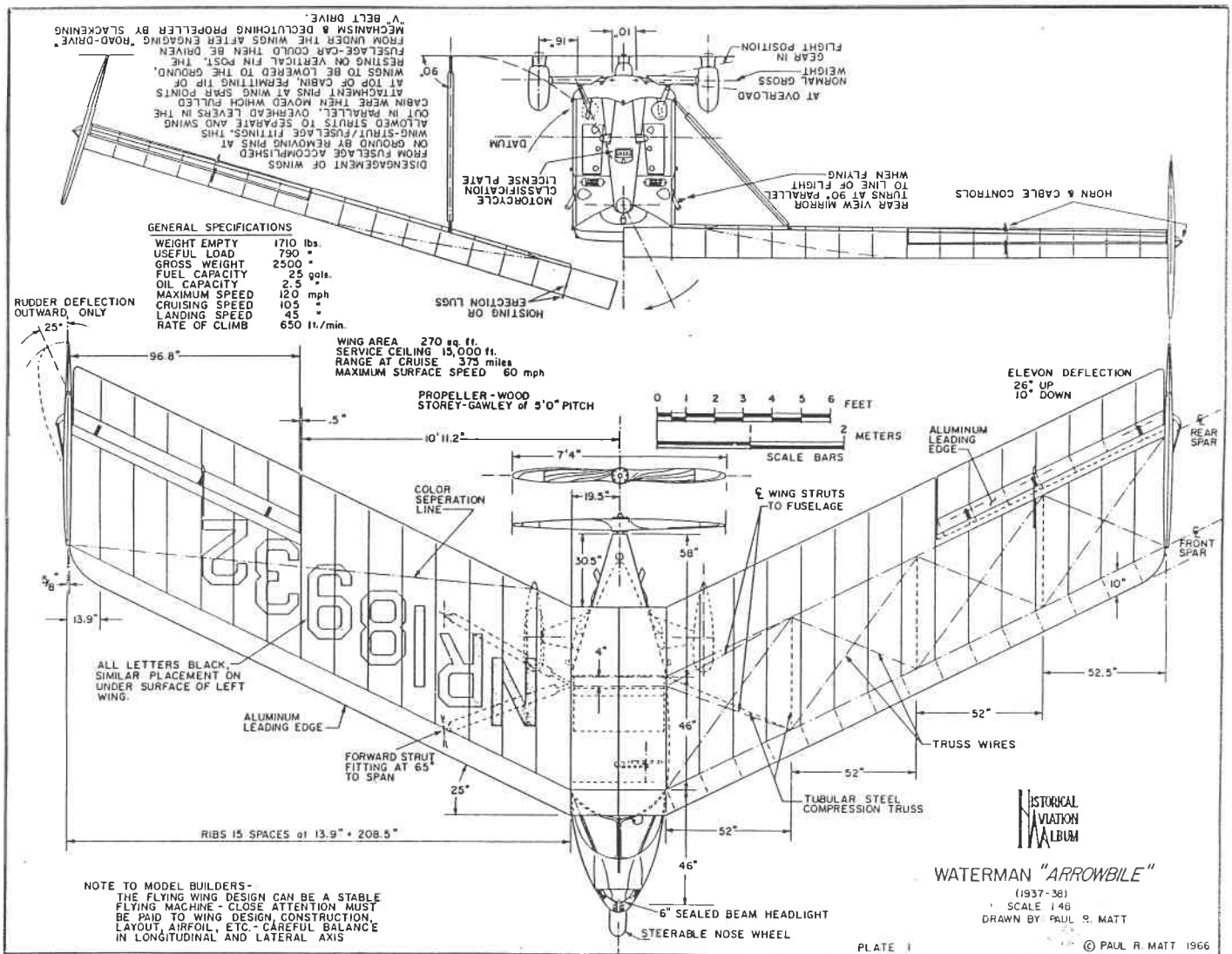
As we close out this year, I would like to wish all our members a happy and joyous holiday season, and a prosperous new year. I hope you all will be using the winter months to work hard on your pet projects, and that we might see some progress reports on your successes in 1994.

Andy

JANUARY 1994 PROGRAM

The program for our first meeting in 1994 is shaping up to be a really good one. Bob has contacted Chuck Sisto who has agreed to come talk to us about Waldo Waterman's ARROWBILE, which was a flying wing aircraft that could be converted into ground transportation. He was one of the two pilots that actually flew the aircraft for Waterman in the 1936 time frame. As you can see from the drawing below, this was a very interesting concept and did reach the flying stage.

Be sure to mark January 15 on your new 1994 calendar for this exciting meeting. We will remind you again in the January newsletter, but make your plans today so you won't miss this one.



MINUTES OF THE NOVEMBER 20, 1993 MEETING



Andy opened by welcoming everyone to the last meeting of the year. He commented on the low turnout after going to the every other month format, and indicated the program announcement in the newsletter would be spruced up to get everyone's attention.

Andy commented on the addition of some new metal folding chairs. Some were purchased at a going out of business sale with TWITT funds, and some were donated by Andy. Chris Tuffli also contributed two upholstered folding chairs. These will replace many of the older plastic and rickety wooden ones that were on their last "legs." It will also help to reduce the amount of storage space in the hanger.

Andy announced that Randy Bergum had sent us a full set of video tapes covering the 1993 SHA Western Workshop at Tehachapi. These will be gone through and organized into some logical pattern that would be appropriate for use by TWITT members. Once this is completed, an announcement will be put in the newsletter letting everyone know what is available and how much it will cost.

While going over the program for the day, Andy informed everyone that if they had some material they wanted to present that required the viewgraph overhead projector, they needed to let Bob know in advance. The machine is on loan to Peck Polymers, so it must be picked up during the week prior to the meeting.

Bruce Carmichael offered us a tale of ingenuity in determining the shape of a bird's vortices. Bruce had given a talk before a group of USC professors to return the favor of Dr. Lisserman speaking at the SHA banquet. One professor was trying to find a way of calculating the performance of a bird's wings. Since this is difficult, at best, he decided to approach it by studying the vortex and working backwards.

To view the shape of the vortex, he devised a mechanism of concentric hypodermic needles containing helium, soap water, and air to make BB size, neutrally buoyant bubbles. He then created a wall of these bubbles, set up several highspeed cameras and photographed his bird flying through the bubble wall.

The first part of the program was a short piece of the SHA video showing Eric Raymond visiting Dr. Reimar Horten in Argentina. There were some nice shots of both the old and unflyable aircraft, along with the uncompleted structure for the Horten X. This project had not been finished due to running out of funds for covering material.

Andy then introduced our principle speaker, **Thomas Bircher**. Thomas explained that the Low Energy Aircraft (LEA) project has been a long-

term affair in part due to changes in the group member's lives, and in part due to problems with the third version of the aircraft.

The dream of LEA was to come up with an aircraft that could fly "forever." As a sidelight to the project was a look at making it into a flying car, with the wing as one component and a fuselage/car component that could be separated and driven away.

The group had also decided that if after getting into the flying wing project it was found not be practical then it would be abandoned. It was felt this would save time and money in the long-term, and other options could then be explored.

They decided to use the basic concepts on flying wings developed by Zoldenhof in Switzerland which only required small amounts of power. The LEA 1 was built taking his design at face value to see what would happen, the results being a good flying model glider.

The next step was to convert this into a powered version so more flight development time could be obtained. Unfortunately, powered aeromodeling was only allowed in Switzerland on Saturdays, which along with the weather restricted their flying time. This resulted in the testing program being drawn out over a longer period of time than desired.

There were two initial problems with the LEA 2 powered version. One was the size of the wheels, too small, which made ground handling somewhat difficult. The other was trying to land it under power. It was so efficient that even the lowest power setting (short of the engine quitting) would cause prolonged glides on final approach. Thomas later showed some video of the very long, low approach necessary to get it on the ground.

After this test program, the group moved on to LEA 3 which was a 6 meter version achieved by expanding the constant chord center section and using the outer panels of the LEA 2 design. There was one big problem with this aircraft in that the ailerons would not turn it. They couldn't even get it to bank no matter how much aileron or rudder was used. They think part of this was due to the laminar flow sections used on the outer panels. On the first flight the aircraft hit the top of some trees, flipped over and disappeared. It took a search by air to find it over 500 feet out past the trees, basically undamaged.

Thomas explained a little more about the configuration of the LEA aircraft. The center section is a high lift airfoil, with the outer wing like a Horten wing in aerodynamics and Zoldenhof in profile. The latter means that the profile is constantly changing over the epsilon axis. They had some trouble calculating these sections, but thought maybe some larger computer would be able to come up with a better set of figures.

The program continued by watching some video tape of these aircraft flying. The first flight of LEA 1 lasted nearly 11 minutes, and the pictures showed it to be very stable and perform well compared to the other gliders

flying the slope at the time. On one landing the aircraft performed a tumbling maneuver very close to the ground, but the pilot was able to almost recover before it touched down. Although it looked disastrous on the video, the aircraft came through without any damage and was flying again later that day.

The next part of the video showed the LEA 2 on its first test flight. After several minutes of ground handling trials, a successful takeoff was made, and the aircraft flew very well. The landing proved to be a little harder, and it ended up being deadsticked into the tall grass off the end of the runway. Successive flights showed the plane had good handling characteristics. They finally progressed to making takeoffs with zero flaps, versus the slightly negative settings of the initial tests. Other than adding some to the takeoff distance, the flaps had little effect on the flight quality.

The last part of the video showed the LEA 3 during its first ground handling tests. However, the new 4-cycle engine and propeller combination was not making sufficient power to get up to takeoff speed, so there were no pictures to show the problems with turning control Thomas had talked about earlier.

He did mention that LEA 3 had a new wing which was entirely laminar flow, implying that even the center section had been changed from the original high lift profile. The airfoil was changed from a NACA series to the Stemmie series. This worked well on the conventional sailplane, but apparently is not suitable for the flying wing.

During the subsequent question and answer session, Thomas indicated he is looking for a team who is young in mind, who can come up with some new ideas for correcting the problems currently plaguing LEA 3. He also commented that the span was large because it was to be a motorglider, therefore he wanted good soaring performance. The wing is carrying 8° of twist, which is similar to a Horten wing, part of it being aerodynamical and some being geometrical.

Thomas briefly discussed another aspect of this design, that being the ability to adapt the fuselage to allow handicap people to fly. The front could be moved aside so a wheel chair could be rolled into the pilot position. This would also allow the pilot mobility should an outlanding occur, since he would have his wheel chair.

Bob Chase asked how much dihedral they had in the models. Thomas said they had started with some dihedral, but it made the aircraft too stable, so they tried lesser degrees, including going negative (this made it hard to rotate). They finally ended up with almost zero degrees of dihedral in LEA 3.

Bruce and Thomas discussed the chord of the elevons as a percentage of the wing chord. The model had about a 20% chord elevon which should have been sufficient. He wasn't sure if the hinge line gap had been completely sealed, which Bruce felt might help improve control effectiveness.

If you are interested in learning more about the LEA project or would like to assist in helping solve some of the problems noted above, contact:

Thomas Bircher
8426 Augwiel/Kloten
Buckstrasse 23
Switzerland

Budd Love took the floor to tell us about his upcoming presentation to the International Powered Lift Conference in Santa Clara, CA, on December 2, sponsored by the AIAA. This will be attended by many prominent engineers from around the world and the US. It is an excellent opportunity for Budd to share his concept with an aviation community that can fully appreciate its importance, and perhaps see its potential for future development.

Budd had brought along some viewgraphs he prepared for the conference, but since we didn't have the overhead projector, we couldn't show them to the group. They show some details of the HIAM design we have not seen before, and Budd will bring them back in January, along with a report on how well the concept was received at the conference.

Andy adjourned the meeting wishing everyone a happy holiday season.

LETTERS TO THE EDITOR

10/7/93

TWITT:



Please enroll me in TWITT. As early as the age of 3 years I can remember dreaming at night that the airplanes flying overhead were wings and motors only.

I am interested in building a two-place kit. I have been looking at what the late Don Mitchell had been doing, the Aerodelta PUL-10, and I have been sometimes talking with Gilbert Davis about his Starship Gemini which he has finished designing, even though his back injury has inflicted terrible suffering on him. Also, Skip Carden, Box 15058, Durham, NC 27704, (919) 477-1832, who started the Ercoupe Owners Club told me that shortly before Fred Weick died at the age of 94 he was working on the design of a flying wing.

My library includes a pilot's handbook on the YB-49, Building and Flying the Mitchell Wing, Winged Wonders, and The Flying Wings of Northrop.

I have an ATP, CFII, ground instructor ratings, and 4000 hours of flight time mostly in small aircraft. I was a navigator on C-130's in the Air Force and earned a DFC and some Air Medals.

While I have some graduate schooling in

aeronautical engineering, my PhD. is in physics with a little post doctorate work in solid state physics (but my interest has been in electric dipoles I think are in quarks which result in a fine description of Van der Waals attraction).

I have also worked at least 10 years as an aircraft mechanic, including a little work on a homebuilt aircraft or two, but the only homebuilt I ever flew was a Breezy. (I flew it nude for some photographs that were published in a magazine.)

Upon seeing pictures and films of the YB-49, I knew it was to flying machines what the Mahler 8th symphony is to music. The Davis wing powered by a Mazda engine, I think, is the best design I know of; it is scaled from the N9M and the YB-49 as far as I can tell.

Please let me know of any other flying wing kits.

Respectfully yours,

Barney Vincelette
P.O. Box 141
Houston, DE 19954

P.S. - If you like I can try to get more people by starting a special interest group in Mensa for flying wings.

TWITT: 10/21/93

If you want to build a powered, high performance flying wing, you should consider what Gilbert Davis has designed. He "Starship Alpha", as he called it before Beechcraft took

that name for another aircraft (more similar to a flying wing than a "normal" airplane), had a 30' wing span and on only 30 hp achieved 120 mph. He has designed a larger wing that could carry 3 people - 5 if two could lie down inside the wing - and has a 40' span. It will probably use a Mazda 13B rotary engine.

Last winter he injured his back when the 2 stroke engine in the Starship Alpha broke a drive belt and he crash landed. He can walk with much pain according to what he told me when I last spoke with him. He seems to have modeled both aircraft designs after the N9M and YB-49, same aspect ratio, taper, and sweepback, and it appears very nearly the same airfoil. He has been helped by former Northrop engineers, including the late Rom Roselas and the son of one of the Northrop brothers.

He needs help to build this airplane and we need his help. I have enclosed a copy of an article "Davis Flying Wing", about him in Sport Pilot Special, Volume 3, 1992, pp. 92-95.

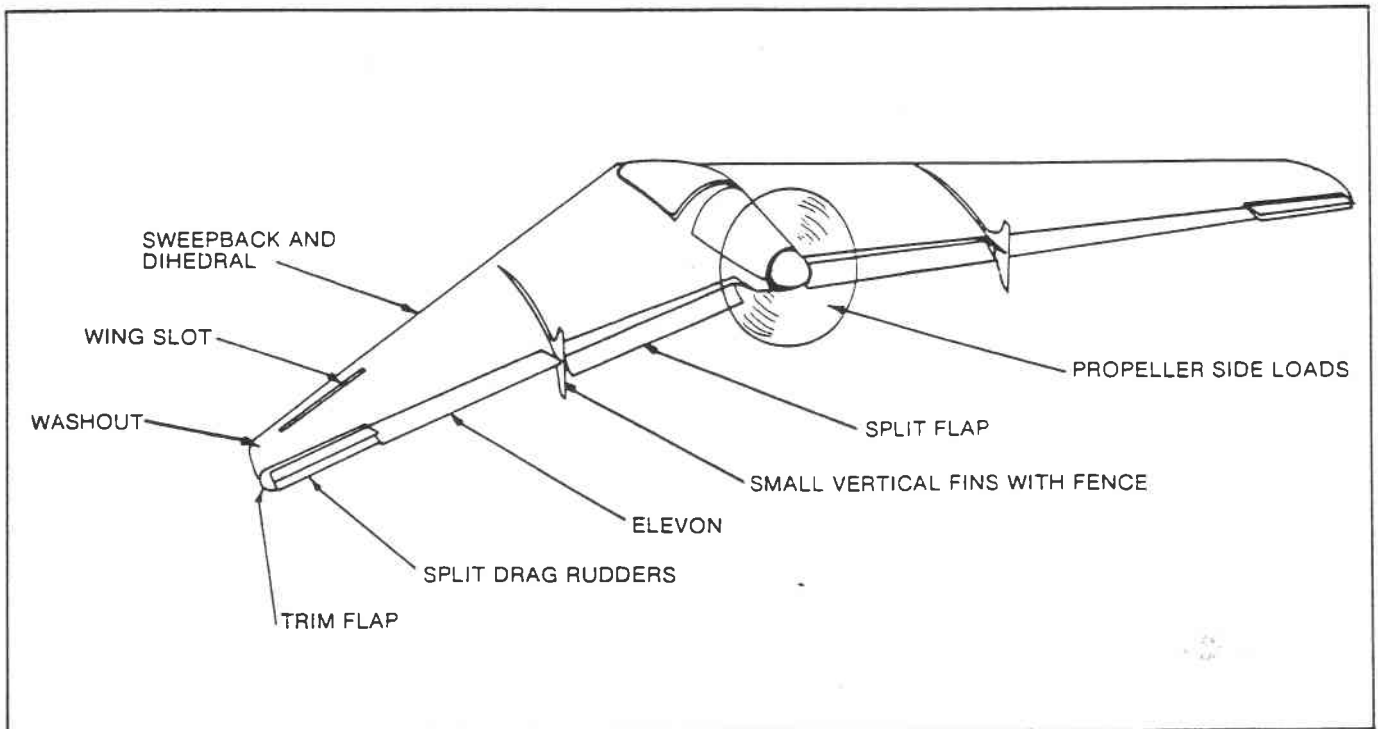
If you do not already know of him, you can write to him at:

Gilbert Davis
826 N. Maplegrove Road
Boise, ID 83704
(208) 375-2797

Sincerely yours,

Barney Vincelette

(Ed. Note: First of all, welcome to TWITT)



The aircraft featured in these photographs is the Davis Alpha test aircraft.

Barney, and thank you for the material on the Davis wing. We have printed the concept drawing of the Alpha, since it was the only reproducible picture in the enclosed article.

We have had some material in a past newsletter on the Davis wing, and it is encouraging to know that a more advanced project is still underway.

Hopefully, there will be some interest among our members for such a project and they will contact Gil Davis in the near future. Please keep us advised of whatever progress you become aware of, and perhaps encourage Davis to also join TWITT. One of our goals is to help in getting people together with similar interests and combine skills to achieve improvements in the design and construction of flying wings.)

11/16/93

TWITT:

The Horten X drawing on the cover of the November issue was from the June 1980 issue of Soaring magazine. The article was written by Al Backstrom (of Plank wing fame) and covered several midget sailplane designs (including the Horten X with it's 7.5 meter span). I have included a copy of the full article for the TWITT archives.

The same illustration of the Horten X is also found in the book Nurflügel by Dr. Reimar Horten and Jan Selinger. The text is in German, but there is an English translation of the summary paragraph. There is also a drawing of the 10 and 15 meter versions of this foot-launched design (the Horten Xb and Xc). I have included a copy of this section of the book including the table of data and dimensions for all three versions.

While looking for the Horten X drawing in my old issues of Soaring, I stumbled across another interesting article. This one concerns Don Mitchell's first flying wing. This is the wing assembly from the half scale prototype of the XCG-16 that Don helped Hawley Bowlus build. Don later removed the tail booms and added his now-famous external elevons to make a true flying wing. I created a two view drawing of the design based on the photos in the article. The drawing may not be 100% accurate since I was working from undimensioned photos, but it does show the general arrangement.

Enjoy,

Kevin Renshaw

(Ed. Note: We would like to thank Kevin for the additions to the library. His drawing is presented on the next page, and some of the other material will be used in future issues as various subjects arise where the information will be of value.)

10/25/93

TWITT:

I would like to join you bunch of twitts. As if being interested in airplanes doesn't make me TWITT enough.

As soon as I get my stuff together, my design researched and complete, I'm going to build a man carrying flying device. Most likely this will be a "flying wing" type. So please help me. I'm searching for technical information, books, papers, etc., which delineate the technology of how "flying wings" fly and don't flip over, etc., etc., etc.

I fly power and sailplanes, ultralight, hang and paragliders, and it gets real tricky trying to do all that simultaneously. My appetite is for a foot launchable, ultralight, self-launching, powered, hang-sailplane, tailless wing. Have you got all that?? There don't seem to be many of these around so it seem I'm going to have to invent one. I hope you guys can help me.

Your newsletter should be interesting. I will most likely maintain subscription to Sailplane Builder.

10/29/93

TWITT:

Hi again ya bunch of TWITTs.

I wrote to you two days ago requesting membership and information. At the time I was not aware that the article in Sailplane Builder magazine dealing with The Akaflieg Braunschweig SB-13 project was reprinted from the TWITT newsletter of May 1993. This is exactly the kind of airplane that I seek information about.

If you have any information about this sailplane especially co-ordinates of the airfoils and the coefficients (lift/drag/moment), etc., any data and dimensions, please send me copies. A copy of your May newsletter, or the article would be good. Any costs, please invoice me. The airfoil sections and their characteristics to me are most interesting. HQ34N/14.83 and HQ36K/15.12.

It's unfortunate that I have such a voracious appetite for information about ANYTHING involved with flying wing, tailless airplanes. I suppose you would get lots of pleas for help from people with similar addictive afflictions.

I look forward to receiving the TWITT newsletter and any further information and data.

Thanks,

Robert Marriott

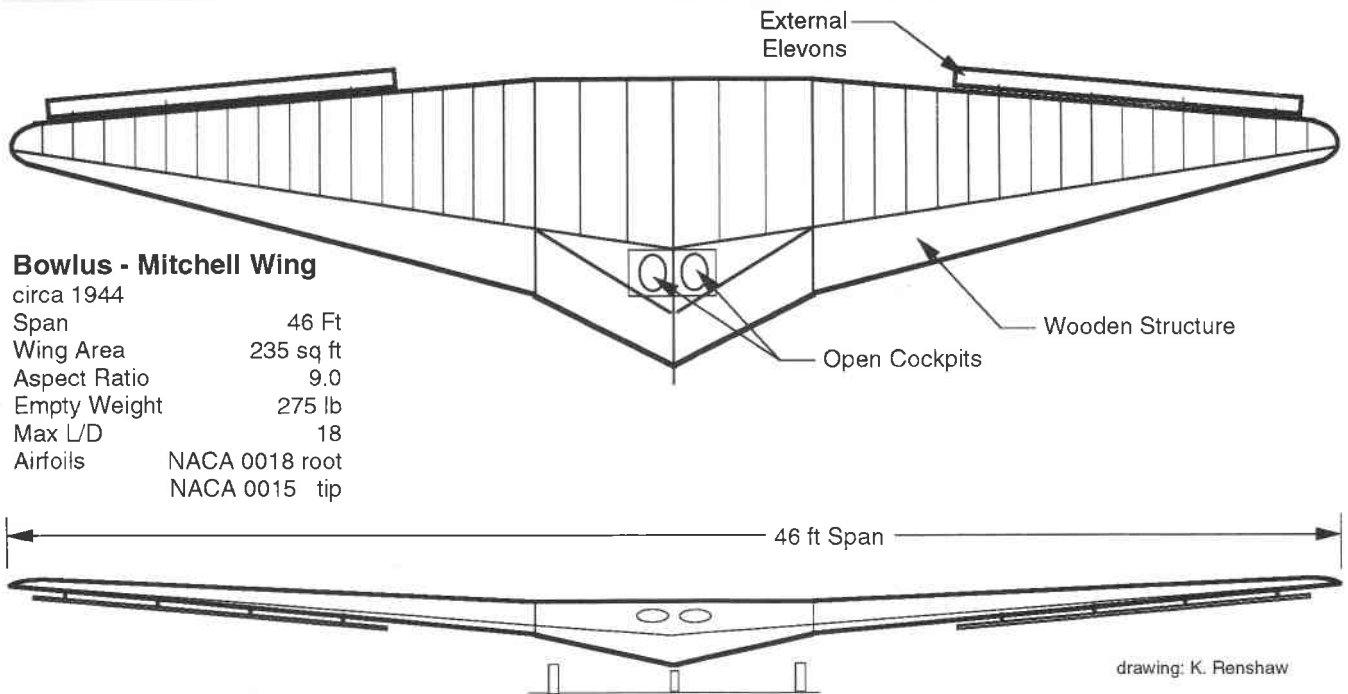
P.O. Box 194

North Strathfield

Sydney 2137 Australia

Mobile Phone - Australia .018 678 880

(Ed. Note: Welcome to TWITT and thank you for the two enthusiastic letters. There is a lot of information on the SB-13 in various issues of the TWITT newsletter and I will see what



Bowlus - Mitchell Wing

circa 1944
 Span 46 Ft
 Wing Area 235 sq ft
 Aspect Ratio 9.0
 Empty Weight 275 lb
 Max L/D 18
 Airfoils NACA 0018 root
 NACA 0015 tip

we can do to bring all this together in a package for you.

You might be interested in Serge Krauss' bibliography on tailless aircraft publications in order to find more books or articles on the subjects you noted above. See the advertisement in the back of the newsletter.

You are right about there being other members out there looking for some of the same type of information and help. We hope that you all can help each other by sharing information and experiences concerning your efforts in designing and constructing tailless aircraft.)

The picture below, taken by Russ Clemens, was received with the following caption: Previously classified photo of low aspect ratio flying wing with leading edge devices shown with Chief Test Pilot Ed Lockhart.



SPECIAL THANKS

We would like to give a special thanks to Randy Bergum for his contribution of a full set of VHS video tapes of the recent SHA Western Workshop.

There is some very interesting material buried in the tapes, and as time permits we will extract it into segments that have the most relevance to flying wing activity. There are also some general construction presentations that might be of value to anyone getting ready to build that favorite project.

We will let you know when the tape(s) are ready for distribution and provide a brief synopsis so you can decide on whether you would like a copy.

UNIQUE LIVES FOR FLYING WINGS

Dr. Reimar Horten 1915-1993
 Walter Horten, 80 years old

(Permission has been granted by Peter F. Selinger to reprint this copyrighted material. All rights, including any partial usage are reserved.)

This is a continuation of the article began in the November 1993 TWITT Newsletter.

Horten V, The First Full-Plastic Airplane

In this time they started a remarkable cooperation with Dynamit-Nobel in Troisdorf:

the twin-engined Horten H Va became the first airplane of the world built completely with plastic materials, but in a conventional method with ribs and bulkheads, stringers and spars, and planked with thin plastic sheets as it would be of wood and plywood, not as it's usual today in shell construction. This test these materials first, they successfully built a pair of wings for the primary "Hol's der Teufel." An engine fault during the start for the maiden flight in 1937 caused a total damage, not repairable because the material used at that time was too brittle. At this same time, Walter Horten, pilot in the famous Schlageter fighting squadron, arranged for them to start building three H IIs as H IILs in his squadron's hanger in Lippstadt. Completed later on in Cologne, the H IIL got a small tear drop canopy on top of the wing again for better viewing by the pilot. During the war, two of these had been test beds for things like the turbine air-inlet of the Horten IX.

During the end of the thirties, the Horten H III caused sensations. Their participation in the Rhön contest of 1938 with Heinz Scheidhauer and Werner Blech proved to be competitive with the other sailplanes of conventional configuration. In a hail storm flight, Blech lost his life and Scheidhauer froze his hands, which cause him problems even today. A small series of 10 H III later became platforms for a lot of tests, including the prone position for the pilot in the H IIIf (with very good references by all pilots who had flown it), a large number of wool-tuft flights for airstream research, the above mentioned H IIIe with the folding propeller and VW engine as a power plant, and the tandem two-seater sailplane H IIIg.

In 1938 Reimar Horten tried to realize a parabolic shape as the ideal form of a flying wing design, also to avoid the middle effect completely, which almost should have been disappeared in the H V with its 4-times blended leading edge and t/4-line. This "Parabel" had been burned without ever having been flown.

High Performance Sailplanes Horten H IV and H VI

Still serving at the soaring school of the Luftwaffe in Brunswick, Reimar Horten started design of the high performance sailplane Horten H IV and began to build the hardware of the most elegant 20m span sailplane. In December 1940, he had to move to Königsberg-Neuhausen. There he could finish this first H IV and make the test flight. Numerous performance comparisons proved the superiority of the H IV to all other sailplanes of that time, like the Weihe and Reiher to name the most well-known ones, except for one. In 1943, fate brought them together in the often described duel. Heinz Scheidhauer flew the Horten H IV, and Han Zacher the D 30 "Cirrus" of the Akaflieg Darmstadt, also with 20m span and the same weight as the H IV. The higher aspect ratio of the D 30 won.

Therefore, Reimar Horten designed the H VI with 24m span and an aspect ratio of 32.4, comparable to today's super orchidees in plastics. But the Horten VI did not yet have a laminar airfoil.

In spite of all the war time troubles, the H VI flew for the first time in 1944. By the winter of 1944-45 the Horten team started the flight tests of a H IVb with a laminar airfoil at the famous Hornberg airfield. But this ended with a fatal accident caused by aileron flutter on January 18, 1945, and pilot Hermann Strebel lost his life.

Walter's talent in organizing and his influence in the military hierarchy gave them the chance to outsource the Horten's activities in aircraft construction to the so-called Luftwaffeninspektion 3 in Minden, finally leading to the Horten GmbH as the legal manufacturer for development and construction of the twin-jet propelled fighter-bomber H IX.

In Minden, also began the era of the twin-engined liaison aircraft H VII. Until the end of the war no complete aircraft could be delivered from the series production with Peschke, also located in Minden.

But especially remarkable is the 6-engined transport plane H VIII. Reimar planned to use it as a flying wind tunnel, because he couldn't get any such research time in one of the existing tunnels from the central coordination authority in Berlin. At the end of the war, this special H II was completed to 50%!

Stealth Aircraft - Horten H IX

After all the proceeding compromises, the Horten H IX twin-jet became an ideal of the Horten's flying wings. Only a small raising in the center for the pilot's head and for outlets of the two jet engines disturb the clean shape of the flying wing. The undercarriage was completely retractable, and the pay-load (bombs) also disappeared in the wing. The wooden wing, with its 17mm thick plywood nose and the lesser number of metal parts in the whole aircraft gave it good stealth characteristics, even by today's standards. The first machine had been tested as a put glider without engines to evaluate aerodynamics. Test pilot Erwin Ziller was killed in an accident February 18, 1945 as a consequence of engine troubles with the second prototype during a test flight. Ziller had "learned" twin-jet flying in the Me 262 during the last months of the war.

A supersonic, high-swept delta could be seen at the end of the war on the design desks of the Horten team. They also developed a two-seater sport plane for clubs in spite of the war time restraints. Also under development was an aerobatic sailplane in flying wing configuration, as well as the 6-engine jet propelled long distance bomber H XVIII as another extreme.

Argentina, Country of Adoption

After the war, Reimar Horten continued his studies, earning a PhD. in 1946. In 1948 he moved to Argentina, hoping to continue his research work in flying wings, since his expectations to work in either Great Britain or the United States did not work out.

In spite of the fact that he didn't succeed as he wanted in continuing with the results of his wartime efforts for civilian and military construction projects, he did have success in getting a chance to develop flying wing aircraft. The Argentines completed in the 1952 World Gliding Championships with two planes from his group, the I.Ae.34m single-seater. But a real breakthrough remained denied to him.

His 4-engined transportation aircraft I.Ae.38, a late realization of the H VIII from the war years, flew good, but due to a lack of engine power it was not good enough for the purpose planned. Nevertheless, he could count successes in South America.

Heinz Scheidhauer, at that time living in Argentina as a pilot, achieved a crossing of the Andes in a sailplane for the first time from Argentina to Chile. He flew with the flying wing two-seater I.Ae.41 "Urubu" together with an Argentinean pilot in an English "Sky" single-seater. The club glider H XVI and a rebuild of the H I and H Ib were all that remained in flyable condition.

The German derivations of the Urubu, H XVC, never came into regular club operation. The distance between Germany and Argentina was too great to develop such gliders in cooperation, as it would have been necessary to be successful. Also, the ground handling of the large flying wing sailplanes could not compete with the Bergfalke and Ka 2 of that time in Germany. Alfons Pützer in Bonn, Germany, had tried to develop a motorglider, based on the H III.

The I.Ae.37 should have become a twin jet Delta since the glider based prototype has successfully met expectations. But in 1959 all the developments of flying wings in Argentina were canceled due to the lack of money.

Reimar Horten - Father of Hang-Gliders

In 1960, Dr. Horten had to cease his design work and try to keep his experience as a professor at the university, and to evaluate his ideas in theory. One of these Horten ideas is still living, more and better, without us even recognizing it. The foot-launchable glider is his child, his idea and his invention. At the end of the fifties, a club in nearby Cordoba, Argentina, built the H X "I'alita" or "piernifero", that means "small wing" and "to be started by feet" with a span of 7.5m. The single-piece wing with a root depth of 2.5m could be transported with only with great difficulty, so they decided to begin a 10m version H Xb, and a 15m version grew on the drawing board.

The victory of the non-rigid hang-gliders

all over the world, led to the finish of Horten's further development, since they had the same aim of starting where and when they wanted and by foot launch. Heinz Scheidhauer had started building the 10m piernifero. The structure, half completed, can be admired even today in a friend's home near Cordoba - a masterpiece of the lightest design and most filigran building.

In 1983, the Weishaupt-Verlag in Graz, Austria, published a complete history of all the Horten designs from 1933 up to 1960. This created increasing interests all over the world in Horten flying wings. His bell-shaped lift distribution was a guarantee for gentle and smooth flight handling characteristics, and gave Dr. Horten later honors. A lot of the most modern flying wing projects, also in fiber-reinforced plastics, now bear his mark because he liked to help the young constructors to improve their designs or to recalculate them. Panek's PUL 9 and 10, Markmann, Böhm and especially many model builders owe great help to him. Now they can only miss Dr. Reimar Horten, but they will see all his aircraft, and all the designs he influenced as the future of flying wings progresses.

Walter Horten - 80 Years Old - Congratulations

In the same year (1993) that Dr. Reimar Horten died, his brother Walter Horten turned 80 years old on November 13. The above mentioned unique life for the flying wings of Reimar up to 1945 couldn't have been so prolific and productive without Walter. He was the first test pilot of the Horten flying wings, he organized the building of the aircraft, and had the connections within the military hierarchy to ensure survival of the flying wing program throughout the years.

Walter promoted the high performance sailplanes in the same way as the liaison twin, the transport airplane as a flying wind tunnel, the jet fighter-bomber, and the long range project with 6 jet engines. His experience as a fighter pilot gave inputs to design the flight handling characteristics, as the purpose required. As soon as possible after the war, he stated again in the German Bundeswehr, but he also sponsored and helped in the post-war flying wing activities of Alfons Pützer in Bonn, an old family from pre-war times. Now he lives in retirement in Baden-Baden.

In heart we have to congratulate him in memory of his part in the flying wing developments of the Horten brothers.

LIBRARY ADDITION

Karl Sanders has sent us another AIAA article for the library. It is: "Calculated Gust Loads For Tailless Airplanes," by Raymond F. Anderson (Aerodynamics Research Engineer), Lockheed Aircraft Corporation, published in the

Journal of the Aeronautical Sciences, January 1945, pp. 118-122.

This article contains many of the formulas and their explanations, along with numerous graphs of results, and a list of references. Part of the introduction states:

"The paper differs from most previous ones in that the pitching motion (as affected by center of gravity position and radius of gyration) is taken into account, and, in addition, instead of assuming that the maximum load factor increment occurs at maximum gust velocity, one may calculate the distance to the maximum gust velocity and the corresponding load factor increment."

Karl has also provided a source for more information on the Flying Pancake. This is a softbound book on the Chance Vought V-173 and XF5U-1 Flying Pancakes containing photographs, line drawings, flight operation instruction chart, model kit reviews, cutaways, cross sections, take-off and climb chart, specs, and a full history through all areas of development. The price was listed as \$7.95 (probably doesn't include some handling and shipping costs), and is available from:

Zenith Books
P.O. Box 1
Osceola, WI 54020

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Tailless Aircraft Bibliography

by Serge Krauss

3rd Edition: An extensive collection of books, articles and other items related to the develop-

ment of flying wing (tailless) aircraft design and construction.

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Order from: Serge Krauss
3114 Edgehill Road
Cleveland Hts., OH 44118

Tailless Tale, by Dr. Ing. Ferdinando Gale'

Consists of 268 pages filled with line drawings, tables and a corresponding English text. It is directed towards modelers, but contains information suitable for amateur full size builders. Price is \$38, postage and handling included (also applies to Canada and Mexico).

You might also want to purchase his new book **Structural Dimensioning of Radioguided**

Aeromodels, priced at \$18.00.

On The Wing...the book, by Bill and Bunny Kuhlman (B²) is a compilation of their monthly column that appears in RCSD. Many of the areas have been expanded and it includes coding for several computer programs to determine twist and stability. Priced at US\$28.00.

All these are available from B² Streamlines, P.O. Box 976, Olalla, WA 98359-0976, or (206) 857-7249 after 4pm Pacific Time. Orders shipped elsewhere will be sent surface mail unless an additional \$10 is included to cover air mail postage. Washington residents must add 7.5% sales tax.

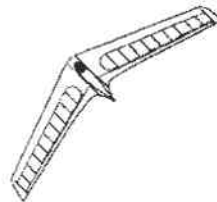
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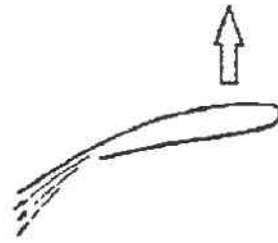
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BELOW: From "Wing Sense", Cartoon barbs help XB-35 facts to stick in a crewman's mind. Contributed by Eugene Turner. Caption reads:

AVOID PULL-OUTS AT HIGH SPEEDS. THE B-35 IS NOT STRESSED FOR ACROBATICS.



THE HIAM AIRPLANE NEEDS YOUR HELP

For those interested in assisting Budd Love with the future development of his High Internal Air Mass (HIAM) project, he would be glad to hear from you. This concept has some potential to include design of a Horten type flying wing utilizing HIAM technology. (See Dec '92 newsletter, page 4.)

Contact: AIRLOVE, LTD.
 6423 Campina Place
 La Jolla CA 92037
 (619) 459-1489

BELOW: The Horten designed P.U.L. 10, which flies beautifully. Contributed by Ferdinando Gale', from a European magazine.

