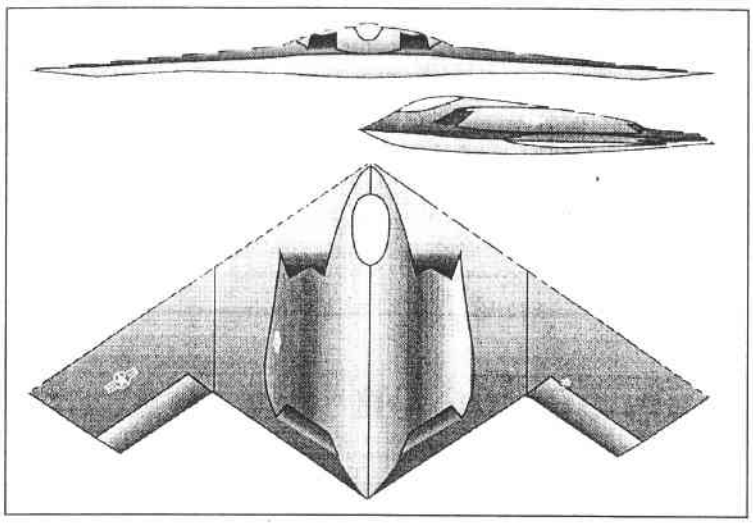
No. 95 MAY 1994

T.W.I.T.T. NEWSLETTER



Associated Press

This drawing from Jane's defense journal, allegedly shows a new U.S. stealth aircraft.

U.S. BUILDING STEALTH HEIR? THE AIR FORCE WON'T CONFIRM IT, BUT THE PLANE HAS BEEN CAPTURED ON VIDEO TAPE.

RIGHT: (Contributed by Fred Blanton; found in the local (Vacaville, CA) newspaper) "LONDON (AP) The U.S. Air Force apparently had developed a new stealth aircraft capable of spying or bombing, an authoritative British defense journal report Wednesday.

"Jane's International Defense Review published a drawing of the diamond-shaped plane, which strongly resembles a smaller version of the B-2 stealth bomber.

"The unidentified aircraft has been seen in flight in several places across the southwestern United States and was captured on two videotapes, one made near Groom Lake Air Force Base in Nevada, the magazine said in its March issue.

"The Air Force 'is not in a position to comment on the story, one way or another,' according to spokesman, Col. Doug Kennet, in Washington.

"American aviation writer Bill Sweetman, who wrote the report, said he believes the plane is a superior, all-weather successor to the F-117 stealth fighter, the world's first radar-evading warplane.

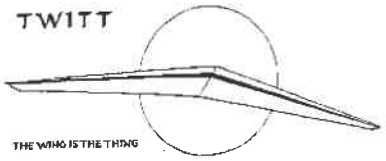
"The new aircraft flies at medium or low altitude at over 500 mph, said Clifford Beal, the magazine's features editor who viewed the videotapes.

"'Compared with the F-117, the new aircraft would have greater range, all-weather sensors, greater weapons capacity' and perhaps new measures to frustrate advanced radars, Sweetman said."

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

The number to the right of your name indicates the last issue of your current subscription, e.g., **9405** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, May 21, 1994, beginning PROMPTLY at 1:00 PM at Battery Ashburn on Cabrillo Drive near the Cabrillo Lighthouse on Point Loma in San Diego.



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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Multiple Back Issues: $0.75 ea + bulk postage

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Wt/#Issues	FRG	AUSTRALIA	AFRICA
1oz/1	1.00	1.00	1.00
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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

WOW, ZOWIE, SHAZAM!! This is really great. You guys are overwhelming me with material for the newsletter, and it's fantastic. There is so much it will take time to get in all squeezed in, but don't let that stop you from sending it. If it is time sensitive, I will put it in earlier than something that is maybe an expansion of previous material, etc.

You those of you with computers, I use MS-DOS WordPerfect, with a 3½" high-density drive and 5¼" low-density drive capability. If you run a MAC, save the file out as an ASCII TXT file and I can import it into the newsletter for reconfiguration. If you do an ASCII file, please leave out all unnecessary embellishments, e.g., underlines, bold, italics, etc., but include them in a printed version so I can insert them after conversion.

I would like to thank Eugene Turner for all the material he has sent to the library over the past few months. His latest contribution includes some Northrop newsletter articles and other Northrop factory things we have not seen in the past. The photocopies of the pictures are not good enough for our newsletter, but some of the drawings will find their way in from time to time.

From his correspondence, I appears he has a great deal of material on Northrop, Horten, Lippish, birds, planks, tailless, saucers, etc. (are you listening Serge??). We are looking forward to seeing more of these things in the months to come, and will keep you informed of what is being added to the library.

Several of you have been asking for an index of what is in the past issues of the newsletter. Bob Chase has agreed to take this on as a project, and will get it done as soon as his other commitments will allow. We will announce its availability.

As you will see from the program announcement we are doing something different this month. We felt there would be a problem with having to choose between the two events on the 21st. So, since TWITT members were involved in the dedication, and Hawley Bowlus' prototype glider was turned into a flying wing, we felt it appropriate to join in with the dedication.

Please come and help honor these pioneers.

Andy

MAY 21, 1994 PROGRAM

This will be a special meeting held in conjunction with the dedication of a historical marker at a site on Point Loma (San Diego, CA). This has been achieved through the hard work of TWITT members Bob Fronius and Don Hunsaker along with many other local aviation enthusiasts. This marker is in recognition of the sailplane builders and pilots from the 1929 to 1931 era of flight in the San Diego area.

As of our publication date, the following agenda was being planned:

KEYNOTE SPEAKER: Bill Chana, local aviation historian, member of the Bowlus family, and continuing supporter of TWITT.

Appearances by many local civilian and military dignataries.

Also expected to attend are some of the early aviation pioneers being honored on the plague, including:

Forrest Hiatt, "Bud" Perl, and possibly some members of the Hawley Bowlus family.

Possibly the display of an original oil painting of a #18 Bowlus done by John Ludowitz (a TWITT member).

LOCATION: BATTERY ASHBURN SOUTH
CABRILLO MEMORIAL DRIVE
SAN DIEGO, CALIFORNIA
TIME: 1:00 pm (will begin promptly)

DIRECTIONS: From Interstate Highway 5 southbound or 8 westbound take the Rosecrans Street exit. Proceed down Rosecrans about 3 miles to Cannon Street (State Road 209) and turn right.

At the top of the hill, turn left onto Catalina Blvd. and proceed southbound following the signs towards the Cabrillo Monument.

Shortly after passing Fort Rosecrans Memorial Cemetary, Battery Ashburn will be on your right. At the south end of the battery (a large mound of dirt with concrete channel entrance ways) take a hard right turn and go to the top where there will be parking. Parking is somewhat limited, so it would be helpful if people car pooled as much as possible. (Be careful not to take the second right turn which will take you to the bottom of the hill.)

LETTERS TO THE EDITOR

4/8/94

TWITT:

I am happy to FINALLY have the fourth edition of my Tailless Aircraft Bibliography ready. As you will see, it has grown to about 2600 tailless and over 750 related-interest listings. There are over 15 pages of tailless design dates, listing works of over 250 creators of tailless aircraft. Finally, the list of information sources has doubled. How about thousands of works and technical drawings for the Horten 229 (IX), Me 163, and Me 262?! Their location is now "in the book". Anyway, while still not a "coffee table" book, it is an even larger source of valuable, hard-core information.

Price is now $23 domestic, $32 to Europe, and $35 to Asia or Australia, reflecting increased production and shipping costs. I can ship surface mail (6-9 weeks enroute) for about $27. I will try to hold to this price until postage increases or a larger edition is printed (IF and when...). I'd appreciate your helping me inform everyone of the price changes. Thanks much!

Sincerely,

Serge Krauss

P.S. Regarding recent comments concerning the utility and practicality of tailless aircraft: There are some of us who just love the wonderful challenge and beauty of flying wings. If there were no possible advantage to them, we'd be "just as happy as if we were smart!" As things stand though, one has only to look at the cover of Popular Science and read the military aviation press to see that some pretty high rollers see some merit in them too. Growing availability and sophistication of computer software and hardware make even the fly-by-wire outfits of the most esoteric of these appear imminently accessible to the grass-roots enthusiast. Even without such advantages, the tailless aircraft remains an ultimate aeronautical engineering ideal, and those who pursue that ideal should be cheered on in their quest. May they take pride and find joy in their aspirations...So enough of this grumpiness! I've gotten enough new pains with ensuing age without anyone giving me a further one in the posterior! See you after the racing season!

(ed. - In addition to printing the information about your fourth edition above, I have also updated the classified ad in the back of the newsletter to include a change in narrative

and the pricing. I hope that some of our new members will see this as an opportunity to obtain a definitive work on what information is available throughout the world on tailless aircraft.

Thanks, also, for the comments on flying wings. There are some other similar comments in letters which will be published in the next several issues. Enjoy the racing season, and stay in touch.)

4/20/94

TWITT:

I've enclosed an FYI for you so you'll know the story a little ahead of time (time being when I go to press , is there any other time?).
(ed. - Chuck is referring to the material condensed at the end of his letter.)

Say, have you tapped into the Internet yet? What a place to get material for your newsletter. I only have the HG (hang glider) Net, and they send me digests every day, sometimes twice a day, where people post letters talking about every kind of hang gliding topic imaginable. What you'd do is send a paragraph or two about "flying wing this or that," and everyone'd give you an opinion. I swear, you could write your entire newsletter on material off the HG Net alone! Then there's the SSA file server. Just plant a few flying wing comments, sit back, have a homebrew, and harvest the responses off the "information super skyway."

Well, you've got the press release, and now you can wonder, as I do, how this "third organization" stuff will play out. What a tangled web we weave, eh?

Best airtime,
Chuck McGill

(ed. - Due to the length of the news release, I have attempted to take out the more important and interesting portions of it for re-printing here. I hope I got the right stuff!)

"It is with great pleasure and anticipation that I announce to the soaring community that Danny Howell will assume the presidency of a new soaring organization to be known as USUSA, or United States Ultralight Soaring Association. Finally, constituencies engaged in activities centering on two like activities, rigid-wing hang-gliders and ultralight sailplanes, will have an organization to call their own, and a common identity through which to meet the unique challenges in the future of ultralight sport-soaring.

"An organizing convention will be held during the Summer or Fall of 1994 somewhere in the Southern California area. Prospective agenda items will include an election of officers, the appointment of some attending founding members to committees to establish policies and bylaws consistent with the role USUSA will play in soaring, organizing a volunteer staff to carry on the day-to-day business of USUSA, and determining criteria for the election of directors for regional representation.

"A number of factors have led to a decision to go ahead with USUSA. Foremost among these is the fact that rigid-wings have not been recognized as a "core" interest in USHGA, and ultralight sailplanes are not the "core" interest in SSA. These two constituencies, however, have many common interests and characteristics.

"As a result of this, rigid-wing enthusiasts on the one hand, and ultralight sailplane enthusiasts on the other, each currently considered to be on the "fringes" of their respective organizations, will now have the best opportunity to develop a common market and identity, and this will be healthy for soaring.

"There seems to be a growing consensus that USHGA and SSA should allow enthusiasts in the center to organize their own sector, so the effort now formally gets underway. Now, both organizations are in a position to facilitate the inauguration of an organization that truly bridges the gap between them, promises to empower an important soaring constituency, allowing the existing soaring organizations to concentrate on their core interests.

"I's sure there will be a great deal of discussion (and eventual agreement) about the need for a third organization, and many will be asking what they can do to become part of USUSA. Comments may be relayed through the HG Net, sent directly to my information super-skyway mailbox, rwr-usn@win.com, or snailed to me at P.O. Box 464, Olympia, WA 98507-0464. To reach Danny Howell, write to 23114 Joaquin Ridge Drive, Murrieta, CA 92562, or leave a message on his answering machine at (909) 696-0887."

12/3/93

A quick answer to Alan Lewis' question about an aircraft he spotted at the EAA Fly-in. It is the Whitaker "Center Wing" as described in the May 1993 issue of the TWITT Newsletter. The information was provided by Serge Krauss and Al Backstrom. Additional information is available in Homebuilt Aircraft, July 1984, pp. 24-29. Larry Whitaker, 321 Brandt St., Dayton, OH 45404.

12/4/93

From Raul Blacksten:

"Sweepback Research", by Charles Prower, Aeroplane Monthly, (Publisher Unknown), December 1993, pp. 20-23.

Tailless gliders with "trafficators", together with the first helicopters, are among the oddities recalled by the late Charles Prower in another episode from his account of a long and varied career in the British aircraft industry. Included in the article is material on the GAL 56 and GAL 61 series of flying wings. A "trafficator" is a drag bar that slides horizontally in and out of the wingtip to provide yaw control (as introduced by Horten on the Ho IX).

2/23/94

The Cocke *Nighthawk*, flown by Lt. William A. Cocke, Jr. in December 1931 to set the World and US Endurance Records at 21 hours 34 minutes, has become available to the National Soaring Museum (NSM). The only "catch" is that NSM must come up with the funds to transport the glider from Los Angeles, CA to Elmira, NY. Then there is the on-going cost of properly displaying the aircraft with the appropriate precautions to prevent any damage to this nearly 100% original glider.

The cost to support the people and equipment necessary for the trip is about $6,500. Any funds collected above the amount needed for transport will be applied to supporting the NSM exhibit of the *Nighthawk*.

(ed. - I am not sure if the transfer has taken place, since it was being planned for Easter vacation but could be delayed until summer, however, funds are still needed to cover the loan negotiated by the NSM.)

Donations are tax deductible since they are going to the NSM. If you can afford to help out, make your check payable to the National Soaring Museum with a note that it is for the *Nighthawk*. Send it to:

The *Nighthawk* Fund
The National Soaring Museum
James Swinnich, Director
RD #3, Harris Hill
Elmira, NY 14903

1/18/94

TWITT:

This was written for Chuck McGill's Rigid Wing Reader & Ultralight Sailplane News (RWR&USN), but may be of interest to a few TWITTers. I know how you like just about all wing info to sift through, so here's a contribution along with my subscription renewal. Feel free to edit to best fit your format. *(ed. - Portions of his article are presented below.)*

"This letter is in response to a query published in RWR$USN, Vol. 1, Issue 8, Winter 1994, from Peter W. Dall of Australia. Pete wants to know what happened to the Swiss Aerolight "NIMBUS" referred to in the '91 Jane's All The World's Aircraft.

"The NIMBUS was designed by Dominique Loupe of Geneva, Switzerland. It was an evolutionary refinement of the Catto Brothers CA-15, which was a cousin of Taras Kicinieuk's Icarus V. I became intrigued with the NIMBUS after reading a pilot's impression written my Chuck Rhodes for Whole Air Magazine, July, 1985. After much correspondence with Dominique, I arranged for a materials kit to be shipped to my residence.

"The kit was basically rudimentary materials like uncut tubing, foam, and sheet metal except for the leading edge "D" tubes. The "D" tubes are each a one piece molded Kevlar structure with smooth compound curves to form the dihedral and sweep. There are no sharp angles or straight lines and are said to have been a moldmakers nightmare to fabricate, but they are beautiful.

"By the time I had made contact with Dominique, it had already been decided that the NIMBUS would not go into production. Less than a handful had been built in Europe and I got the last two leading edges. The molds had been destroyed in a fire that gutted the Decision SA racing boat factory where they were made.

"My own construction has been delayed by a desire to further optimize the design. I have spent many months investigating and rejecting the feasibility of incorporating a Klein-Fogleman step in the airfoil. I have also been involved in a long effort to procure and/or fabricate and test composite tubing to replace aluminum, at a "reasonable" cost. I am progressing, although at a snail's pace.

"I intend to finish what may be an obsolete design, because I enjoy the learning process, the experience gained, and the contacts I have made in the composite industry, which is a secondary interest.

"If I had it to do all over again and know what I know now, I would probably start saving up for a Danny Howell APEX. Since I became involved with the APEX project, I really appreciate what Danny has done to attack many of the undesirable characteristics of rigid wing ownership far beyond that of anyone else to my knowledge.

For more detailed information on the NIMBUS or to contact the designer, I may be able to help. I can be reached by all the usual methods when we aren't quaking *(ed. - this was written during the aftershocks to the "big one" that hit Los Angeles)*.

Larry Witherspoon
4260 W. 182nd Street
Torrance, CA 90504
(310) 370-9793/ (310) 522-3107

Specifications:

Span	33.5'
Chord	4.8'
Area	161.5 sq'
Aspect Ratio	7
G Loads	+8 -6
Weight	79.4 lbs
Sweep	18°
L/D	18
Sink Rate	147.6 ft/min
Max L/D Speed	29.8 mph
Min Sink Speed	26.1 mph
Stall Speed	17.4 mph
VNE	74.6 mph

Fledge Style Controls

(ed. - the accompanying copy of a copy photo was not suitable for publishing.)

2/15/94

TWITT:

Just to introduce my self, I have been building and flying RC gliders for about 5 years now. About 2 years ago while I was visiting France for the first time I picked up what looked like an RC magazine. Inside I found the plans for what was called a "MINI-HORTEN".

This was a 2 meter flying wing glider. It used Horten airfoils, made by covering foam core wings with balsa skins. It had no vertical surfaces except for a keel for landing and winch launching. I built this sailplane and would like to report that it flies very nicely. I does move very fast and is probably more suited as a slope soarer then thermal chaser. You have to be careful to keep up the speed especially during turns (and landings). It is also easy to become disoriented as to its attitude when it is at any distance (a problem with most flying wings, I think). It is because I have had so much fun building and flying this plane that I subscribed to your newsletter.

I was very excited when I received my first issue. This was issue No. 89 which had a montage of incredibly beautiful designs by Jerry Blumenthal. In particular I am intrigued by his RATTLER and have a great desire to build and fly this plane. Can you tell me where I can obtain plans for this plane? In fact, I am fascinated by all his blended wing designs and would deeply appreciate any information you can give me on obtaining plans for these planes, also.

In closing I would like to say that I think your group and your newsletter serve a valuable role in disseminating ideas and in encouraging innovation. Keep up the good work.

Dr. Glenn Sembroski
Physics Department
Purdue University
W. Lafayette, IN 47907
(317) 494-5172
Internet E-Mail: sembroski@128.210.68.43

(ed. - A related welcome to TWITT, Glenn. We appreciate the report on your "MINI-HORTEN", and perhaps you will hear from some of our modeler members who might be interested in duplicating your efforts.

As for the designs of the late Jerry Blumenthal, there are no formal versions for any of this creations that we are aware of. Jerry was a dreamer and was constantly sketching new blended wing concepts as they came into his mind. At the time of his death, he was building an initial scale test-bed of the RATTLER, from which he probably would have drawn up a set of plans, but now it or the plans will never be finished. There was someone on the east coast that had undertaken a larger scale model, but we never heard whether or not the project was ever completed, and we do not know his name.

Jerry put out his concepts for everyone to enjoy and/or build if they so desired. He felt that the blended wing was the best answer to the normal flying wing problems, and worked constantly at improving the concept. If you have the talent, we know he would be pleased to see you build and fly one of his dreams.)

2/28/94

TWITT:

Do you know if "Nurflugel" has yet been translated into English? Availability & price?

Was out to see Jim Marske in Ohio late last November with Serge Krauss (bibliography) and Jeremy Harris (ornithopter, see AeroJ., 3 issues, 5 pg 1994). His "Genesis" semi-tailless will take your TWITT breath away. I'll let Jim Marske make the proper and timely disclosures.

Re Marske, I have a ready to fly Pioneer 2 For Sale for about $4,000.

Tell us more about the Northrop out your way which is about to fly (?).

Bill Foshag
Heishman's Mill
1206 Creek Road
Carlisle, PA 17013
(717) 249-3753 (phone or Fax)

(ed. - To the best of our knowledge Dr. Nickel's book has been translated into English, but he has been unable to find a publisher. We hope this problem will be resolved in the not to distant future.

Of course, by now everyone has had a chance to see the Genesis project. It will be interesting to see if the "tail" eventually disappears.

We have been able to determine that the rebuilt Northrop N9M will be transported to Edwards AFB in the Mojave desert for the first flights sometime around September of this year. Apparently they are having trouble with the engines and some other mechanical components.

For those of you who might be interested in more information, and perhaps get on a list of spectators allowed access to Edwards for the flight tests, contact Ed Maloney, 7000 Merrill Box 17, Chino, CA 91710.)

3/17/94

TWITT:

Time for renewal; enclosed please find our check for the coming year. We'll also take this opportunity to say how much we find of interest in the March issue. This is one of the best issues TWITT has put out. Serge Krauss is a real wonder!

And, a possible direction for TWITT: One of our readers has suggested a round robin type approach to obtaining material to build upon an idea or design. Although this is probably not truly workable for TWITT, The regular monthly newsletter would serve this purpose IF contributions were made by a number of people. TWITT and its newsletter are just the venue for presenting a broad spectrum of material.

Since TWITT members are interested in tailless aircraft and are continually searching for information, the newsletter should continue as a "clearing house" for what individual members find in the media. This will allow it to remain focused, economically feasible, and not leave a bad feeling when meeting attendance is low. Maybe elimination of the meetings and a move to "corresponding membership" would do as well. We bring this up since it appears meetings are a real difficulty - not just for TWITT to put on, but for members to attend. On the other hand, the printed word (and pictures) is relatively inexpensive, can be equally as informative, and is available for perusal at a later time.

Thanks,
B²

(ed. - I hope this condensation of your notes turned out okay. As you can see from this month's President's Corner there has been a big increase in the material sent in by the members. You will see in the next several months more comments on low aspect ratio aircraft in response to Serge's article. I don't recall any previous material generating as much return mail and follow-on discussion.

I challenge the members to come up with more of this type of material that will wet the appetites of others and generate a lively discussion of theories and facts leading up to improvements in flying wing design.)

2/17, 3/16, &4/11/94

TWITT:

(ed. The following is a composite of 3 letters received from Edwin Sward that have not found room in the prior month's newsletters. Enjoy.)

I'd like to thank editor Chuck McGill of RWR&USN for introducing me to TWITT. And thank you for your publication of my letter in the November '93 issue of the newsletter as regards circular type wings that resulted in voluminous material on the topic in following issues.

Thanks to Karl Sanders for his December issue reference to Chance Vought V-173 and XF 5U1 Flying Pancakes, a book that I read with great interest. Also thank to Larry Nicholson and Serge Krauss for their comments and illustrated material in the February '94 issue, plus planned publication of Serge's article in the March issue.

Thanks to Robert Marriott (ed.-another TWITT member) for a recent letter regarding interesting/intriguing circular wings; same way I felt when I first read about them. For instance: test pilots of the V-173 including Charles Lindbergh could neither stall nor spin it; or also the wonder of the Hatfield Little Bird data. Hatfield, I believe, was one of the test pilots of the 1930s powered Arup (there was a prior Arup glider) and Little Bird. I think it was an Arup version from memory.

Important circular wing references:

Incredible Flying Machines, by Michael T. Jerram, Exter Books, New York, Marshall Cavendish, London & Sydney.

Unconventional Aircraft, by Peter M Bowers, Tab Books, Blue Ridge Summit PA 17294.

Chance Vought V-173 & XF5U1 Flying Pancake references in Dec '93 & Feb '94 TWITT Newsletters.

As to an area universally neglected, I now feel that using 1990's knowledge we can confidently look forward to some of aviation's best minds coming up with a practical use for the long neglected circular wings.

Many design systems of traditional flying wings would be applied just as well to circular wings. For instance the pilot take-off accommodation system of the Horten X foot launch 7.5 meter flying wing, (front page TWITT Newsletter, Nov '93) except that pilot positions could be more roomy in circular type flying wings.

Safety packaging of the pilot and passengers, if any, should be a top priority in the construction of any type of flying wings.

Maybe circular wings have the potential of becoming lean, mean soaring machines, maybe they don't, but I do think that they might make fun short hop gliders or human powered aircraft.

There is nothing analogous in fluver aircraft to be mass produced like Ford Model

A and T fluvers. Snyder/Hoffman/Hatfield type flying wings might have that potential, because of their sturdy compactness, stability in flight, and modest take-off and landing space needs.

Possibly one of the reasons that such types wings were never mass produced is a public relations problem. Aircraft called Flying Pancake, Flapjacks, Flying Saucers, et. al., could present marketing difficulties, and it might also be because they don't look like what most people expect an aircraft to look like (again a marketing problem).

You are to be commended for concentrating on the quality of material in your fine newsletter. Also to be commended is Chuck McGill, in his promotion of gap gliders which is gradually bridging the difference between USHGA and SSA; such are the fine results of top quality newsletters such as yours and Chuck's.

It would be a long commute from many members to Hanger A-4 at Gillespie Field. The newsletter is a great source of information on flying wings. For instance, I've learned more about circular wings and low aspect ratio gliders by reading TWITT in the past few months than I have in well over 50 years, since first reading about the American Memuth parasol (circular wing) and such esoterica as flying bikes in a grade school publication.

Commentator Serge Krauss outlined many exciting possibilities in the March '94 issue. How would a low aspect ratio glider of best design compare in thermalling and cross country capability with one of USHGA's best quality rag wing designs? That is a remaining question that would fill out my understanding of such gliders.

(Including myself, how many others in the past have had the "new idea" of helium filled foam for aircraft? Re: Wilcox/Kozloff helium filled, foam, plastic flying barn door.)

Yours very truly,
Edwin Sward
47 Beaver Street
Worcester, MA 01603

(ed. - Thanks for the compliments for both our publication and RWR&USN. I, too, have been amazed at the response to the circular wing, low aspect ratio topic. And there is more to come with some new comments on Serge's article by Karl Sanders presented below.

You pose a good question for our membership to ponder over the coming months. Perhaps a circular wing glider could become the next generation of 1-26 type performance aircraft to introduce a larger number of people to aviation and soaring in particular. Hopefully, we will hear more from our readers.)

4/2/94

TWITT:

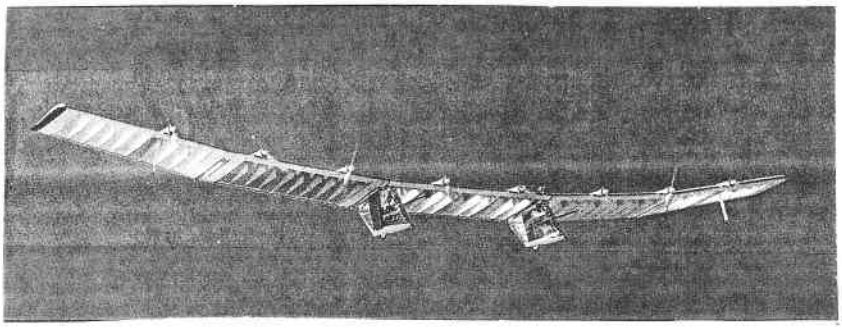
Here are my thoughts about the poor meeting attendance discussed in the last two newsletters. I see the causes as a direct result of our -hopefully temporary- aviation depression we are plodding through, particularly so in San Diego and Los Angeles. The second probable reason could be the sort-of-infatuation with the flying wing/tailless species which -except for a few special purposes (missions)- really are not the best nor the most practical and economic solutions, for a number of reasons which I summarized in my TWITT presentation 6 years ago. I suggest TWITT reach out to the general light/home-built/kitplanes community offering be become their technical forum for the exchange of information and ideas. I believe we have the right mix of member talents (designers, builders, aero., thermo, old and young) to give this some honest thought! Sure the time are not the best, but the opportunity to affirmatively act in this direction for tomorrow might be now!

Now some comments to Serge Krauss' equations (TWITT Newsletter, March '94, pp. 7-10). Low AR vortex lift was probably tested systematically first by Winter in 1935, as reported in NACA TM 798, "Flow Phenomena on Plates and Airfoils of Short Span." It is intriguing that already in the 1914-1930 timeframe most of Anthony Fokker's planes had 45° LE sweepback on their low AR horizontal stabilizers which made them virtually unstallable. Did he know, or were his planforms gleaned (as was common) from those of birds? The most recent, authoritative and practical references are: Journal of Aircraft (AIAA), "Prediction of Vortex-Lift Characteristics by Leading Edge Suction Analogy," by Ed Polhamus (NASA LRC), April 1976, pp. 193-199, and "Prediction of Vortex Flow Characteristics of Wings at Sub-and Supersonic Speeds," by John Lamar (NASA LRC), July 1976, pp. 490-494. The formulas are based on rational theory, easy to work with, proven by test data, and take the place of the old purely empirical though well meant but ambiguous ones. The phenomenal lift claims made by Mr. Kaspar in the late '70s for his "vortex glider" (not mentioned by Serge) are explained by Polhamus' work!

The primary advantages of the low ARs (i.e. wing spans) are light weight, larger thickness and volume and moderate gust response for a give area. Even though the L/D's are lower, the power match is often better than with the right ARs. The specific range (mi./#fuel) however is usually lower. Combining these features to the extreme can result in various exotic configurations such as those mentions by Serge and which, in some cases, can offer attractive structural simplifications at lower construction costs. That is, as long as the

shorter spans still meet/exceed the minimum lateral control (aileron) response and handling qualities requirements (pb / 2v). But again: only for a few special purposes (missions) these configurations are potential candidates, with few of them selected/enjoyed and more rejected/detested.

Finally, a comment on Serge's equations in the March issue. In the first equation he uses AR_e, the effective aspect ratio, which really is = geometric aspect ratio x **e** !! Since AR = b^2/S, then AR_e = **e** x b^2/S! - and that **e** is absent in all of his other formulas including in the list of symbols at the bottom of page 10. For example his $V_{L/Dmax}$ (eq.2) results in a velocity that is lower than it should be by the factor $\sqrt[4]{e}$; so if e is = 0.75 his $V_{L/Dmax}$ is $\sqrt[4]{.75}$ = 0.93 of the correct value. I suggest Serge reexamine his current and publish a new set of equations in a future TWITT NL issue. I also would like to know how in his second formula $\sqrt[4]{a_o a} / a_o$ - a was derived or comes from.



Finally the user must keep in mind that all of this formulas are limited to a "flaps up" parabolic/symmetrical drag polar shape! Camber, twist and flap deflection cause the polar to be displaced upwards (unsymmetrical, due to lift increments), and to the right (due to drag increments)! Rather than "Lifting-line Equations," they are the derived expressions for the performance characteristics of the parabolic/symmetrical drag polar, regardless of whether lift and drag were obtained from lifting line, lifting surface or vortex-lattice theory, wind tunnel or flight tests.

By the way, **e** is the span efficiency factor which, in a catch-all fashion, accounts for the lift-dependent drag effects of non-elliptical lift distribution, twist, camber, taper, sweep, tip-shape, profile and parasite drag variations (of **all** components!) with lift coefficient (i.e. angle of attack). This e-factor usually varies from 0.7 to 0.9 depending on the chosen combination of these variables. Due to their cumbersome nature - at least in the early design stage - our good old-timers (NACA's W.B. Oswald (1932), et al) devised this handy tool for which many (+I) have developed empirical correlations and formulas for instant use. Well, so much for that.

With best regards,
Karl Sanders

(ed. - As always, you are a wealth of information and help keep everyone of us honest. It will be interesting to see Serge's response to your thoughts and equation adjustments. All of you engineer types out there probably understand more of what Karl is getting at than I do, and I hope this all helps you to better prepare your own designs.

As you can see from his comments, Karl is not a true believer in the concept of flying wings. However, he is a great supporter of new kinds of development in aviation design, and short of his playing the "devil's advocate" on occasion, has been a great source of information over the years. We all owe him our thanks.)

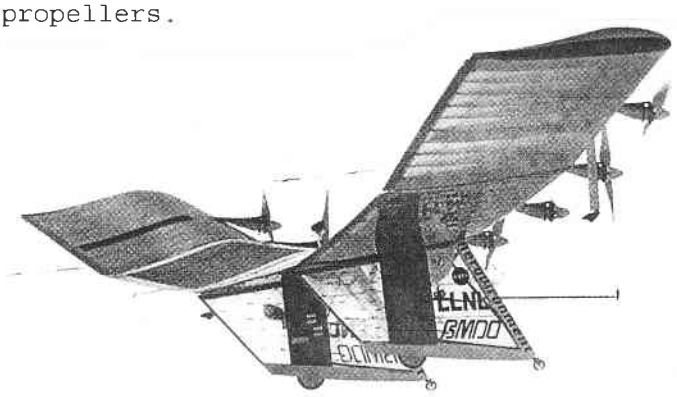
3/29/94

In the February '94 newsletter we carried a small filler article sent in by Bob Eastgate on the first test flight of the solar-powered Pathfinder flying wing.

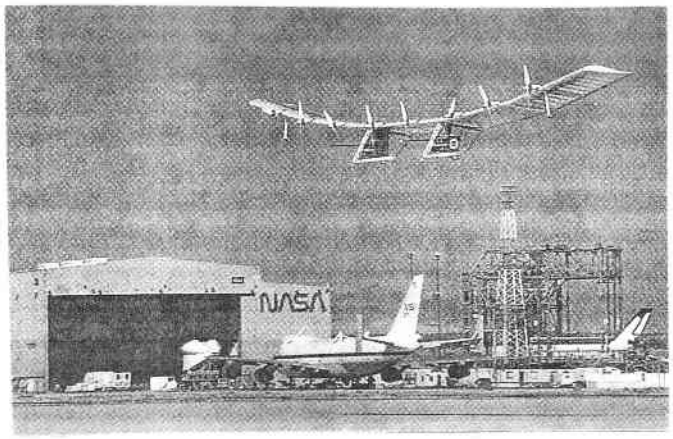
He now brings to our attention the latest article on this aircraft published in the April 1994 Popular Science Magazine, pp. 70-100, written by Stuart F. Brown. There are some good quality photos of it in flight, which we have tried to bring you below.

A brief description of the aircraft from the article states:

"Viewed from above, the Pathfinder looks like a plank of lumber 100 feet long and eight feet wide. There's no taper or sweep. Just eight electric-powered propellers on the leading edge, and a row of 26 individual elevators on the trailing edge to control pitch and dampen turbulence. No rudders, no fins, no tail. Not even a pilot. Where's the rest of this airplane? The upward bowing, or dihedral, of the wing in flight is its only other feature. Turns are made by slowing down or speeding up individual propellers.



"Optimized for low-speed, high altitude flight, this machine is a flying wing in the purest sense of the term.



"Pathfinder was developed and built by a small team at AeroVironment, Inc., in Simi Valley, CA, the engineering firm headed by Dr. Paul MacCready, noted builder of human-powered aircraft and other ultra-high-efficiency vehicles. The plane, he admits, 'is a technological stretch.'"

WALTER HORTEN TO RECEIVE HONOR

March 30 & April 25, '94

I am a member of the Society of Experimental Test Pilots (SETP), a non-profit organization of 1900 test pilots from around the world. On March 29th I spoke with Bob Fronius about the recent selection of Walter Horten as an Honorary Fellow in the Society. The award will be presented to Mr. Horten at our annual Symposium and Banquet in September at the Beverly Hilton Hotel in Los Angeles. We are currently working through our German members asking them to help with Walter Horten's travel arrangements to the US in September, and also determine his health. I believe that he may not be well and may have lost all or a large part of his eyesight.

As part of the presentation, I will be putting together a film and narrative review of the Horten brother's lifetime accomplishments. I have several reference works, (Nurflugel, The Horten Wings, etc.) which have good black and white still photos which can be used in the video as still shots. I do not have any motion pictures of Horten wings in flight or on the ground. Could you research your files and determine if you have any video of the Horten's work? Bob mentioned that June Wiberg may have given SETP a video of the Horten IV flying in Texas some years ago. I will check with Society headquarters in Lancaster CA, to see if they might have this video clip. Any other references you can give me would be appreciated. All material will be returned to the individuals loaning it to the Society for this occasion.

Sincerely,

Paul Metz
Fellow, Society of Experimental Test Pilots
1825 Windcrest Circle
Marietta, GA 30064
(404) 793-0830 (Work)
(404) 499-9715 (Home)
(404) 793-1068 (FAX)

(ed. - For those of you interested in helping Paul (also a TWITT member) he already has the material you may have found at the end of the most recent video tapes we have sent out.

We would appreciate anyone out there who has any type of material that would be of value to Paul in putting together his presentation, to give him a call to determine if it is not a duplicate of what me may already have.)

4/11/94

TWITT:

Delighted with most of the content of the April issue and at once I send you $5 for "An Overview of Composite Design Properties" by Alex Kozloff.

Advise Greg Warner that the Horten brothers had a rather outstanding grasp of aerodynamics and they typically used cambered airfoils, and reflexed tips to compensate. Present day blunderers, Northrop included, are still far behind them in aerodynamic theory (witness symmetrical airfoils, etc.), but Northrop is outstanding in his ability to convince the US Government that he knows what he is doing and thus get funds for one mediocre design after another, all based on symmetrical airfoils.

As for your final paragraph, aircraft designers badmouth tailless because: 1) They don't have a sufficient grasp of the subject to do a good job; 2) A tailless is just a conventional with a aerodynamic load on the TE, and; 3) They realize that some ignorant person will load the wing too heavy in the aft edge (this will happen to a Northrop soon and we'll see this terminated).

Syd M. Hall

(ed. - Thanks for the comments. In answer to one of your questions, the 3-view is of the CFM IMAGE that Barny mentioned in his note. The PUL-10 is a Horten design that is being build in Italy using a Rotax engine and side-by-side seating - one view is on page 4 of the May 1993 newsletter. We will try to get more information out about as avaiablity and space permit.)

FOR THE RC MODELERS

We received a letter form Dave Friant of Wright Manufacturing Co., P.O. Box 3281, Bellevue, WA 98009, informing us of his company's line of fiberglass model fuselages. Those in his brochure were of a conventional type, but I thought if enough TWITT modelers indicated there was a need for some type of underwing pod or streamlined wing center section, they might be interesting in developing one.

They can be reached 24 hours a day at (206) 821-1258, or leave a message on their voice mail by entering extension 5 followed by the # sing on your touch tone phone anytime during the recorded message (or FAX (206) 820-0846).

WORLD SOARING JAMBOREE

A Festival of Fun & Competition!

May 28 - June 6, 1994
Richland, Washington

This 10 day event has something for every modeler. There are special seminars (see below) and lots of flying in all categories of model aviation including thermal, slope and cross country flying.

May 29 - **Dr. Michael Selig's** presentation on Low-Speed airfoil design and wind tunnel testing.

June 1 - **Joe Wurts's** presentation on the world of R.C cross country soaring.

June 2 - **Dr. Richard Eppler's** presentation on the history of aviation as seen from his special vantage point. He will also provide entrants with a lecture/experiment on Induce Drag. (It appears he will be at the event for a total of 6 days.)

For more information on registration and contest rules, contact:

Charlie Harris
16735 SE 30th
Bellevue, WA 98008
(206) 641-4492

(ed. - I apologize for not getting this in earlier, but somehow it got overlooked for publication in the March newsletter.)

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

by Serge Krauss

4th Edition: An exten-sive collection of about 2600 tailless and over 750 related-interest listings. Over 15 pages of tailless design

dates, listing works of over 250 creators of tailless aircraft, and the location of thousands of works and technical drawings for the Ho 229 (IX), Me 163, & Me 262.

Cost: $23 (Domestic)
$32 (European destinations)
$35 (Asia/Australia destinations)

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 (B^2) 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 B^2 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.

VHS VIDEOS AND AUDIO TAPES

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).

Priced at: $8.00 (postage paid)

An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio tape of Alex's presentation explaining the material.