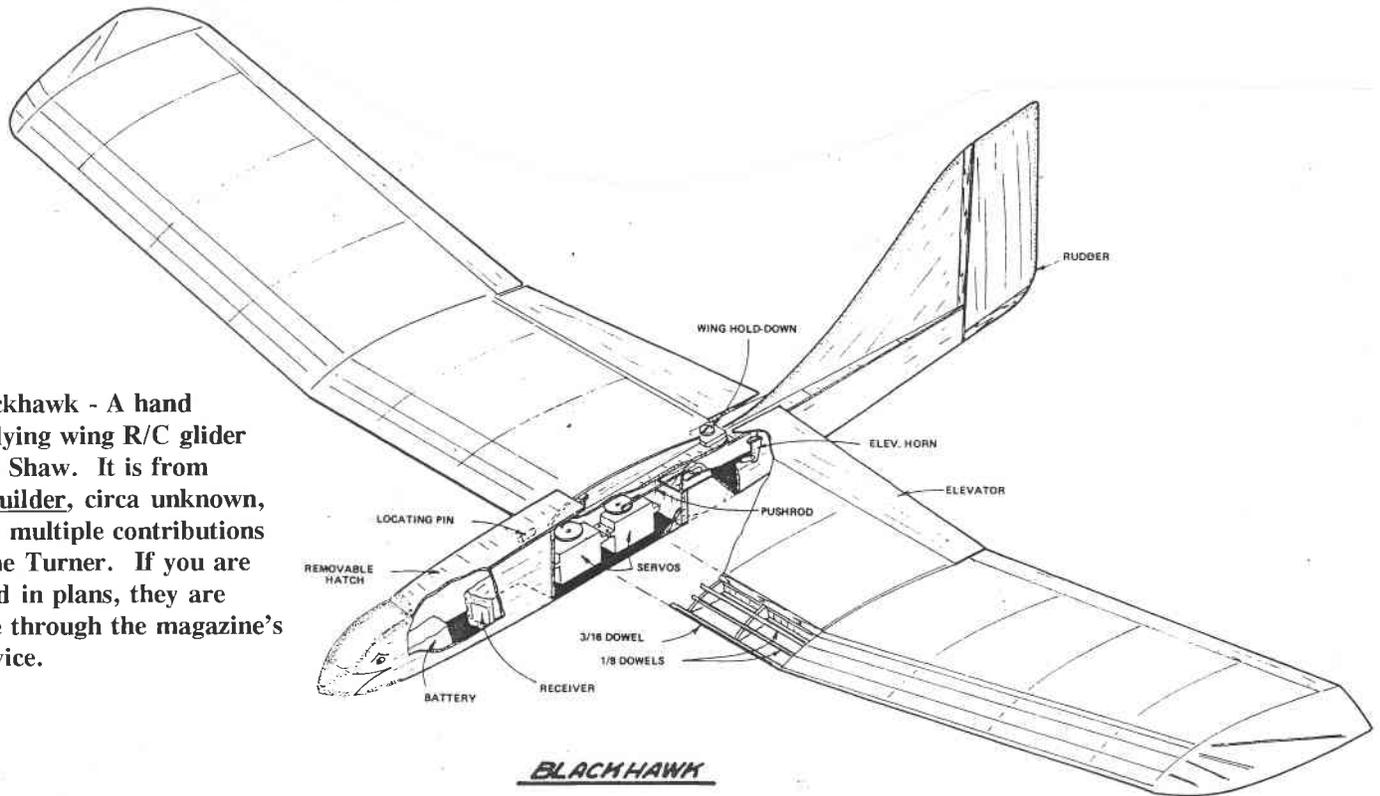


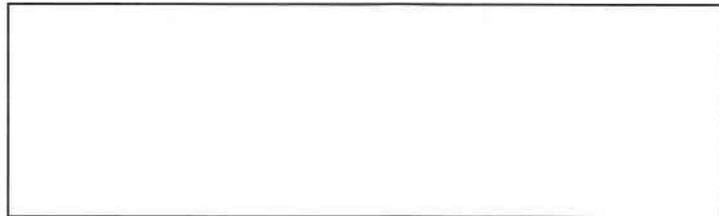
T.W.I.T.T. NEWSLETTER



The Blackhawk - A hand launch flying wing R/C glider by Keith Shaw. It is from Model Builder, circa unknown, from the multiple contributions of Eugene Turner. If you are interested in plans, they are available through the magazine's plan service.

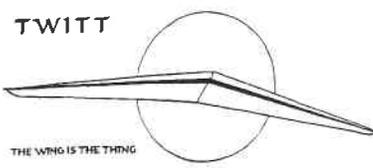
T.W.I.T.T.

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., **9407** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, July 16, 1994, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - East 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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- President: Andy Kecskes (619) 589-1898
- Vice Pres: Bob Chase (818) 336-5485
- Secretary: Phillip Burgers (619) 563-5465
- Treasurer: Bob Fronius (619) 224-1497

Editor: Andy Kecskes

The **T.W.I.T.T.** office is located at Hanger A-4, Gillespie Field, El Cajon, California.

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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



Well, at last the final copy of the video tapes is on its way to the last member who ordered one. I am sorry for the delay, and will try to keep some in stock for any future orders so you will receive them in a more

timely manner.

I was sorry to receive a letter from Chuck McGill announcing the Rigid-Wing Reader & Ultralight Sailplane News will no longer be published. His request for subscriptions did not result in a sufficient number of responses to justify continuing the effort. He encouraged his followers to subscribe to Sailplane Builder, TWITT's newsletter, and Kitplanes Magazine as a means of staying in touch with current events.

I need to correct a couple of editorial & spelling errors from last month, which were brought to my attention by Raul Blacksten. First, as noted in the highlights of the dedication there was a "plaque" placed on the stone, not a "plague" which would have killed it. Secondly, Raul and "Steve Lowry" are restoring the Albatross, not "Harry Irvine". Raul and Harry own a Cinema.

Chuck McGill sent along a copy of some material from Delta & Parapendio, a Hang Gliding and Paragliding publication apparently from Argentina. It mentions RWR&USN, TWITT, Serge Krauss' bibliography, the Genesis I project, Sailplane Builder, and Higher Planes, giving information and addresses for those interested in a particular subject area.

I am gradually getting caught up with your letters, so if you don't see it this month, please be patient. We will get your questions answered as soon as possible. Some of it is a little out of order, but this is due to the timeliness or relevance of the material to a previous issue. (For me it is great having this much backlog for the newsletter each month, but I know it can be frustrating for you, so please bear with me.)

Finally, there is more information on the active stabilization system in the February 1987 (No. 8) newsletter for those who are interested in learning more about the initial beginnings of TWITT.

Andy

JULY 1994 PROGRAM

We still do not have a formal program for you this month, but I am sure Bob will come up with something interesting by the meeting.

Don't forget, this is our annual meeting and will include the traditional birthday cake and ice cream.

Also, if you have a video of something of interest you would like to share with the group, make sure to bring it. These types of programs often become the most fun and more interesting than a specific one, since everyone begins to interact, sharing experiences and finding common grounds in design philosophies, etc.

IT SHOULD BE A FUN MEETING, SO DON'T MISS IT.

LETTERS TO THE EDITOR

6/8/94

TWITT:

Thank you for your help with locating Walter Horten so that we could advise him of his selection as an Honorary

Fellow in the Society of Experimental Test Pilots. I thought I would give you an update on this story.

I have received a letter and phone call from Mr. Horten's brother-in-law, Karl Nickel, who advises me that Mr. Horten has been in and out of the hospital and is not well. In case any TWITT members would like to write Mr. Horten with best wishes on his selection as Honorary Fellow or a "Get Well" card, his address is as follows:

Walter Horten's home address is:
Dimpfelbachstrasse 3 a
D-76534 Baden-Baden
GERMANY

Walter Horten's hospital address is:
Ebersteinberg Krankenhaus
Reha-Klinik
near Baden-Baden, GERMANY

Sincerely,

Paul Metz
Fellow
Society of Experimental Test Pilots

(ed. - For those of you who do not know, Karl Nickel is a long-time member of TWITT, and has written a book (yet to be published in English) on flying wings.

I am sure Walter Horten would be pleased

to receive letter from you showing that there is still a great deal of interest remaining in the development of flying wings.

5/?/94

TWITT:

A few month's ago someone wanted information on the "Raiders" wing. Well, I just found it. *(ed. - from an unknown source comes the following letter and editorial comment that might be of assistance to Michael Brennan in Australia.)*

"Raiders" Flying Wing Unmasked...

"In reference to your question about the flying wing used in the movie Raiders of the Lost Ark, I understand your dismay in trying to find out what it was! It took me quite a while to find out myself.

"Actually, the plane never existed. The design was taken from a prototype for the Northrop Corporation, and was also modified by Ron Cobb, a studio designer. This plane, which was actually an oversized stage prop, was built in England by Vickers Aircraft Company. In order to be shipped, it was disassembled and sent on location, then reassembled. It was built just to be blown to bits!

"I myself thought the plane to be very unique and different. I hope the above information helps you. I make it my hobby to know planes and I specialize in jets.

Kenny
Kenny's World of R/C
Streetsboro, Ohio

"This seems to be a month of numerous letters on certain specific subjects. In the case of our request for identification of the aircraft in Raiders of the Lost Ark, we received dozens of responses. Almost all identified a Northrop background modified for the film producer's purpose. One letter, however, insisted that the aircraft was an ultra-secret German aircraft. According to the respondent, that's why nobody know what it was! We thank all of you who wrote on the subject. AFS"

(ed. - I any of our Ohio members could come up with a better address for "Kenny", would they please forward it on to: Michael Brennan, 7 Uranna Street, O'Sullivan Beach, SA 5166 Australia. It may be just the starting point he needs to find some plans.

Michael might want to try contacting the Vickers Aircraft Company to see if they have any scale plans they would reproduce.)

4/4/94

TWITT:

I saw in your September issue you had an offer for a limited time of \$6 per year for full sets of newsletters, but you only had 5-6 sets left.

I am interested in getting a full set - are they still available? - full sets? - at the bulk price? If so, please let me know. I will plan on getting them.

I've joined too many organizations/ newsletters and was thinking of dropping this one until the back issues I received. I was very satisfied with the articles here and there of the full-size "ultralight" glider information. The supersonic and modeling doesn't do it for me, but I know a lot of the readers love it.

You had written to ask if I was building a new (design) wing. Maybe one day in the future, but right now the Mitchell B-10 will fill up my program. Until I have more information, I would not build a design of my own. I'd like to see an article on wing camber - high lift and asymmetrical. and the reasons for the placement on some mixed camber wings.

Looking forward to the next issue.

Fly Safe & Have Fun

Pete Olson

(ed. - Thanks for the comments on the newsletter. We are glad you enjoyed your back issues and decided to stay with TWITT.

Hopefully your request for an article will inspire one of our members to contribute such an item in the near future, since I know there are others out there with some of the same questions about airfoils. What to ya say guys.)

5/20/94

TWITT:

Enjoyed the last newsletter, thanks.

I am well aware that the Horten brothers knew their aerodynamics. The analysis done at Mississippi State University and printed in the Soartek Journal, Flying Wing issue, pretty well proved that issue. Also, the latest Horten design, the PUL 10, was described in Kitplanes magazine a couple of years ago.

I would like a reference to a source of information on the design and operation, including simple instruction, of a small wind tunnel. I would like to build a small (2-3' diameter test section) open circuit tunnel to learn more about very low Rn flow.

If any TWITT members would like to chat please call in the evening after 6:30 and before 9:00 PM (EDT) as I get up real early

for the commute to Boston. I have a fairly good library and love to talk about airplanes.

Sincerely,

Greg Warner
(603) 423-8949 (home) (New Hamp)
(617) 556-1074 (work)

(ed. - Boy, are you in luck. We just received a slope fun fly announcement for the July 4th weekend which was too late for the newsletter, but it contained a business card for Bob Reynolds, Wind Tunnel Model Builder. The card states wind tunnel installation/test technician. He is not a TWITT member, but you might want to contact him to see what type of plans might be available for purchase.

K & BR Model Products
Box 537
Lakewood, CA 90714
(310) 633-5654

If there are any other members out there with information which might be of help to Greg, please give him a call.)

6/10/94

TWITT:

Thanks for sending me the extra issue of TWITT. I delayed paying up for '94 because I hoped to have something to put in the newsletter. I got so involved in other stuff that I clean forgot to do my duty to TWITT. I'm also going to blame Ray Atkinson of San Mateo for my delinquency. Ray sent me a great letter concerning my project and included several drawings of the Waterman Arrowbile. It was gratifying to learn that was on the same wavelength as the great Waldo.

Connecticut was a wretched place for a Coloradan to be this winter (92 days of snow on the ground and 8 days of sunshine). I went slightly crazy about the middle of February and dug out Ray's drawings. I was nutty enough to believe that if Waldo could do it, so could I (with LOTS of help from my friends). In a fit of creativity I cut the wings 3½' from the center line which divided the wing into three equal sections that fold up and over onto the top of the fuselage and each other. That gives me a compact vehicle that can be parked anywhere and stored in the average garage.

I added a snowmobile belt drive to the front (accessory end) of the Subaru engine, twisted it through a Yamaha right angle gearbox and connected the left rear wheel with the Yamaha shaft drive. Talk about problems!!! Right now I'm consulting my astrological charts to decide whether to drive it like a plane, fly it like a car, or get a saddle.

The model is coming along well and we hope to be flying it this summer. I am constructing a full sized mockup as you can see from the

enclosed photos. Things get a little tricky when you try combining auto functions with aero ones, but everything seems to be falling rather nicely into place (I might still be a little crazy).

My primary aim is still to get a good flying airplane into the air. If I can also drive it to the airport or through a cold front or from an empty airport to a motel, that will be a goody but not a necessity. Once I get the airplane flying the way I want it to, then I'll start working on the ground operating functions and mechanisms.

I enjoy the newsletter very much and hope you all out there in SUNNY California can keep up the good work.

Happy driving...I mean flying!!!

Jim Loyd

(ed. - Thanks for the update on your project. Although we may be in SUNNY (and now very hot) California, there doesn't seem to be much building going on here. We have included your pictures and drawings to show everyone just what it is you are talking about, and its similarity to Waterman's vehicle. Keep us apprized of your progress at the end of the summer.)

tailless information he sent me. I will send more photos later on this project. I've got it covered now, almost ready to paint. I hope I can start the wings this fall.

I've also sent you a drawing of a flying wing, hang glider, sailplane? A long time friend and fellow hang glider pilot Gary Cordell of Jacksboro, TN, has agreed to finance the material for 2 gliders! They are built like the old quicksilvers and should be completed very quickly, hopefully by this fall or early Spring '95.

I think we can keep the weight well below 100#. We want to be able to foot launch them with the option to land on the single wheel glider style. I can't say what kind of performance they might have, but I hope we can better the hang gliders by some. I'll send photos and spec's when we get more construction done!

Larry Watson

(ed. - I am glad we accomplished what we set out to do, and that was win you over into joining our group of tailless airplane nuts. We will be looking forward to your future stories of how the projects are going, and hope that all works out well.

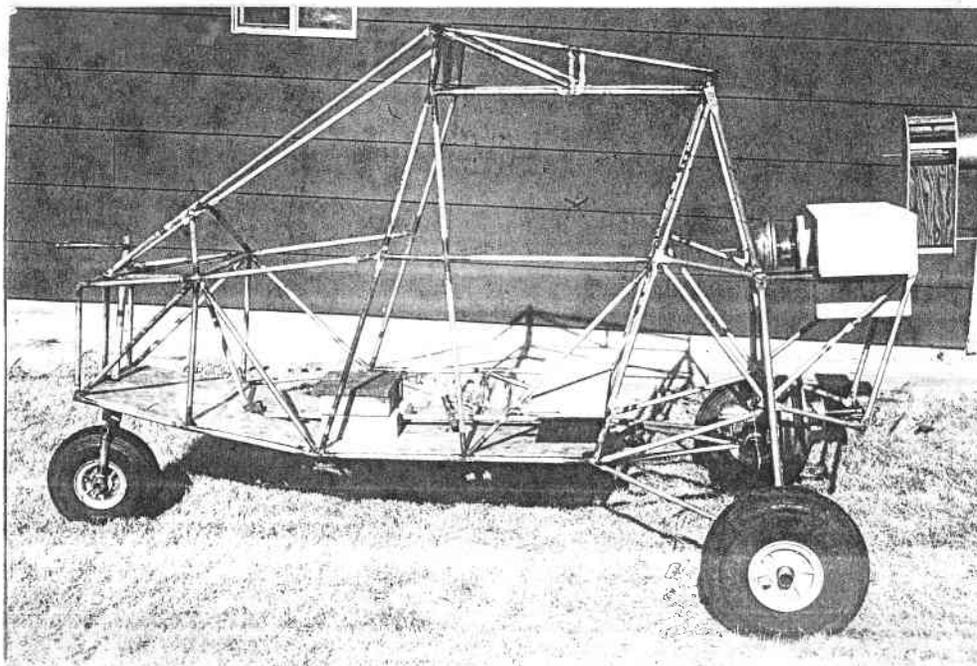
You might be interested in back issues No. 76 and 80 which have more material on Jim Loyd's design (shown above) since it is somewhat similar to yours, and comments by Bob Chase on various aspects of the design from his perspective. [See page 1 for back issue rates.] See page 5 for a view of his proposed hang flying wing, hang glider.)

6/13/94

TWITT:

A friend of mine, Bill Haavisto, recently made me aware of your organization. As I have been interested in flying wings since I can remember, it is hard for me to believe that I haven't been aware of TWITT, but it's true. Anyhow, Bill outlined TWITT and suggested I drop you a line to find out about becoming a member, getting back issues of your newsletter, etc. Please send be all information in this regard as soon as you can.

There is also something you may be interested in, if you don't know about it already. In Wolfgang Spate's book Top Secret Bird, The Luftwaffe's ME 163 Comet he mentions a lecture or symposium by the Lilienthal Society for Aviation Research at the Berlin-Adlershof Airfield on April 14, 1943. The purpose of this was to gather the cream of German Aircraft industry and debate the pros



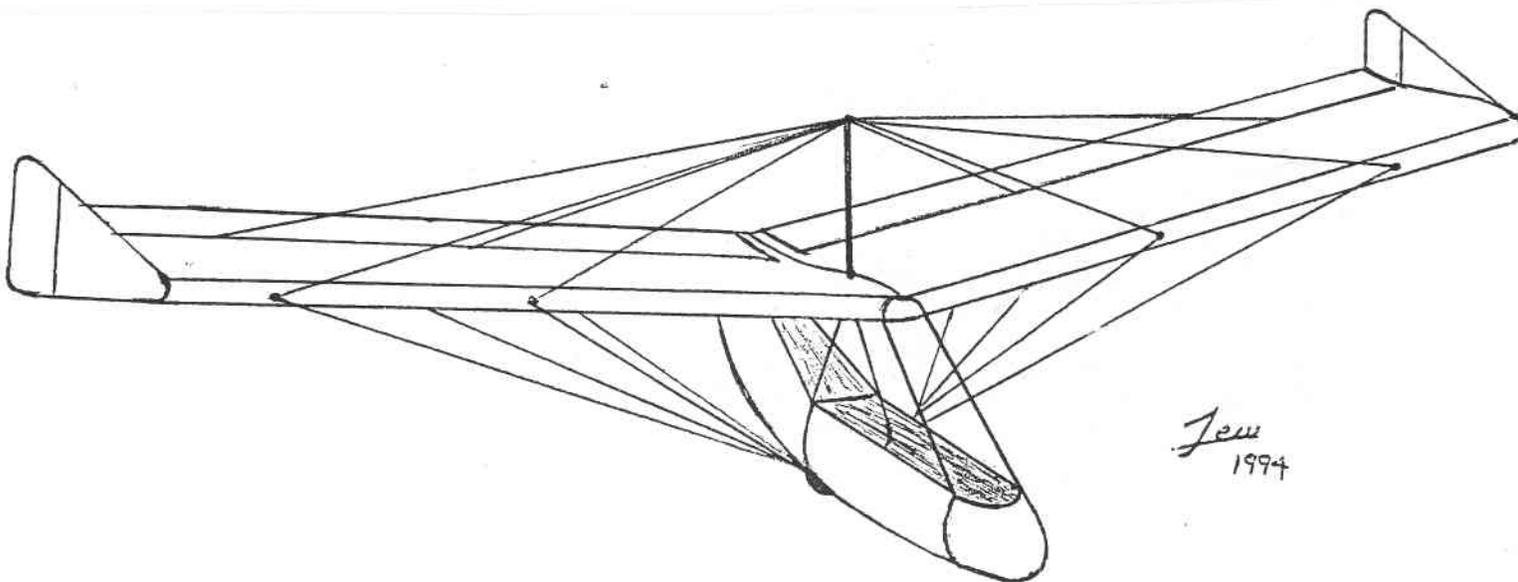
6/16/94

TWITT:

You sure make a great invitation for joint TWITT! My subscription is enclosed this time. Thanks again for the newsletter copy from Chris Tuffli, also thanks to Alex Rodgers for some

BELOW: Larry Watson's concept drawing of a flying wing hang glider. Specs: Span - 36'; Chord - 6'; Empty Weight - 100# or less; All

aluminum construction with wheel for landing; Performance - ??.



and cons of the flying wing. The few excerpts from his notes are very illuminating. I am very interested in getting a copy of the minutes of the meeting, if one exists, and have no idea as to how to go about it. Any suggestions would be greatly appreciated, as I believe the information would be well worth the effort.

I hope to hear from you soon, and Bill says hi.

Best Regards,

Paul Spatrisano
20581 Painter Street
Bend, OR 97701

(ed. - Bob has sent the information off to Paul, so we hope to see him joining us soon.

In the mean time he has pointed out something that might make a good addition to the TWITT library if we can find a copy, either here or at a German source. Perhaps Karl or Peter know of this meeting and where any records might be available. We would also appreciate Russell Lee of the Smithsonian taking a quick look through their material to see if the "consummate" library has any reference material on this.

Thanks to all of you who put in some effort to locate this "new" revelation.)

6/8/94

TWITT:

I didn't think I'd be writing to you for awhile, until a letter from Gunther H. Rudat proved otherwise, as he indicated my circular wing references needed some amplification and I've added some further information in the enclosure.

Plus a few more brief comments on circular wings as being already compact, but they could be made more portable by folding them in halves and thirds or quarters. Some years ago a really rare and exotic version of a circular wing came to mind; it would be deployed like an umbrella and after deployment the raising shaft would become part of the circular wing structure; simple and elegant.

Is the dream of a portable, compact, quick setup, light weight, rigid wing glider finally within reach?

Best Regards,

Edwin Sward

PS: Does Serge Krauss' bibliography include many references of circular wing information?

Incredible Flying Machines, by Michael F. Jerram, Exeter Books, Marshall Cavendish, New York, London & Sydney. First printing 1980 by Marshall Cavendish Books, Ltd., 58 Old Compton Street, London W1V 5PA. Exeter Books, distributed by Bookthrift, Inc., New York, NY (no street address given), Chapter 7 on circular wings & "flying saucers."

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

Chance Vought V-173 and XF5U-1 Flying Pancakes, from Zenith Books, P.O. Box 1, Osceola, WI 54020. Well illustrated; pictures; drawings; 8½ x 11", 34 pages.

(ed. - I didn't have time to go through Serge's bibliography to find any references, other than those above, covering circular wing development. Perhaps Serge can do a quick computer search of his database to come up with a separate list that could be made available to those members who have been showing a keen interest in this type of aircraft?)

ADDITIONS TO TWITT LIBRARY

Karl Sanders sent us a copy of the following article along with a note indicating he would comment on Phillip Burgers letter in 4-5 weeks after he recovers from eye surgery.

As he suggested, I have written to Jan Roskam and asked his permission to reprint all or part of the article in the newsletter, but as of publication date no reply had been received. It has enough material to be spread out over several issues, and appears to have a little of something for everyone's interests, so I hope he gives us an approval.

"What Drives Unique Configurations", by Jan Roskam, Dept. of Aerospace Engineering, The University of Kansas, SAE Paper 881353, 17 pages, with references, illustrations, and chronologies.

Karl also sent along some material on the Northrop N-9M restoration project. There was a roll-out of the completed aircraft at the Chino Planes of Fame Air Museum on Saturday, May 7, as part of a salute to Jack Northrop and his design work.

Sometime in the near future, the N-9M will undergo flight tests to be conducted at Edwards Air Force Base, CA. Plans call for the N-9M to be maintained in flyable condition and placed on static display at the Chino Museum.

The Planes of Fame Museum is located at 7000 Merrill Ave., Chino, CA, and can be reached from either Interstate 10 or Calif. Highway 60. They are open everyday, except Christmas and Thanksgiving, with an admission price of \$4.95 for adults and \$1.95 for children 5-10 years old. There are over 75 exhibits. For more information about when the N-9M might be on display, call (909) 597-3722.

From Russell E. Lee, Curator, Aeronautics Department, National Air and Space Museum, Smithsonian Institution came the following letter and enclosure:

"I want to thank you and Phillip for

sending the newsletter. It is well-done, very informative. I will be glad to share anything I find but time does not permit me to respond to anything but small, focused requests.

"I have included a copy of my bibliography for your files. There is probably not much here you and the members have not seen or already heard about. While I have not located all the entries listed, I hope to find most of them. Much of the bibliography came from Serge Krauss' superb work, now in its third edition.

"Thanks again for the newsletter. Please say hello to Phillip."

(ed. - First of all, I would like to thank Russell for this contribution, and hope that we will be hearing more from him in the future. As you can see, I have already asked him for some "small, focused" information to help one of our members.

I will forward a copy of the bibliography to Serge, just in case Russell has not done so, yet. It contains over 350 references of all types associated with flying wings.

If anyone else is interested in a copy of the bibliography, which is cross-referenced to Serge's, please send us \$2 US for domestic and \$3 US for foreign mailing, and we will get one off to you.

We have included Russell on our mailing list since we learned of his interest in flying wings from Phillip's visit with him earlier this year. We hope the exchange of information will be mutually beneficial for all of us, and thank Russell in advance for any assistance he may be in future.)

From Fred Blanton (who sent us the stealth concept shown on the May newsletter cover) a copy of: "Flying a Little Bird - This Unique Homebuilt is Based on the Arup Flying Wing Design of 1933," by Mike Knaack, Kitplanes, February 1990, pp. 18-23. Included within the article is a second piece by Mike Knaack titled "The Flying Wing that Almost Was." Both of these items talk about Milt Hatfield and his Little Bird series of aircraft, including some history of the projects, as well as, how the initial flight tests went.

Fred commented he is building a 1" to 1' scale model of Bird I from the three-view published in the February 1994 newsletter. He also mentioned that Clark Caulkin (who has contributed his flying wing material to the newsletter in the past) is a friend and fellow club member of the Concord Model Engineers (northern California). He goes on to say he can verify that all the wing information Clark has contributed definitely fly.

ODDS AND ENDS

The June 1994 issue of R/C Soaring Digest has a short article on the SWIFT by B² talking

about the ease with which a 1/4 or 1/3 scale model could be built. This would result in a 3-4 meter aircraft, respectively, and use one of the reflexed airfoils designed for model use.

The article mentioned the availability of a video tape from the manufacturer, Bright Star Gliders, which includes information on fabrication techniques and car top transportation, in addition to some beautiful in-flight footage. The tape is available in VHS NTSC format (US) for \$24 US, and in VHS PAL format (Europe, Australia, etc.) for \$29 US. Contact them at: 48 Barham Avenue, Santa Rosa, CA 95407, or call (707) 576-7627.

We received a flyer from Double Digit Publications (British) announcing the introduction of a new magazine, QFI - Quiet Flight Inter-national, for the soaring and electric power modelers. They also sent us a copy of the magazine and asked us to mention it in our newsletter.

After previewing the magazine, it appeared there may be some of you who would be interested in it, as it does have several types of tailless or flying wing aircraft included in the pictures and articles. The split of interests will be roughly 25% thermal, 25% slope, 25% electric, and 25% general interest material. They are working on sales through the hobby shops and expect it to be available there in several months. (ed. - This would give you a chance to preview the magazine before committing to a subscription.)

Subscription information and rates are shown below.

Fulco, Inc.
 P.O. Box 3000
 Denville, NJ 07834
 (210) 627-2427 FAX (210) 627-5872
 \$42/year for 12 issues
 Check or Credit Card accepted

One item of interest in the June issue was a delta shaped slope soaring flying wing called the Pecker. It has gone through several variations by designer Keith Thomas (?), with the latest proposal being Pecker V, which is shown below. It hasn't been built yet, and if you look closely at the nose section you will see a canard surface "just to muck about with".

The annual SHA Workshop at Tehachapi, CA, is coming up over Labor Day weekend. This is usually a very good gathering of homebuilders from all over the western region, many of whom have an interest in flying wings.

This year will be somewhat special in that it will also mark the 30 anniversary of the first flight of the Diamant HBV sailplane. Dan Pierson is the leading Diamant supporter here in the US and plans to have a very prestigious gathering of designers and builders at this event. Among them will be Thomas Bircher, Jurg Von Voornveld, and Rene Comte, the prime backer of the early commercial production.

Please mark your calendars for this weekend and plan on attending at least one of the three days. There are numerous workshops covering a variety of subjects which are helpful to every home builder. They are all held at the airport now that there is more hanger space, so cost has been reduced to a minimum. If you plan on staying overnight, make sure to make motel reservations early.

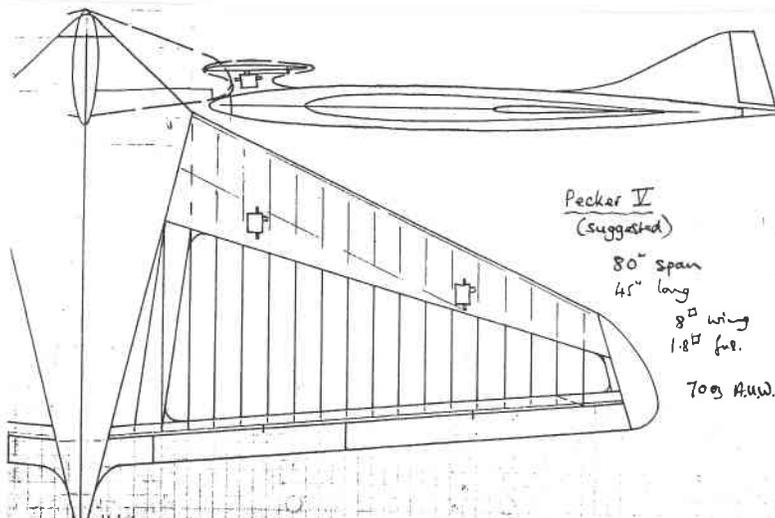
From the Third Winter Issue - 1994, Rigid-Wing Reader & Ultralight Sailplane News, Volume 1, Issue 10.

A Fine Feather Fledge
 by Tom Lanros

The concept of primary airfoils on the wingtip is not a new one. In 1913, an Austrian, Ludwig Schmidt, installed the first fan-like spreading wingtip enabling changes to be made in wind area and span. In addition to increasing performance, it formed a control device to enhance stability. However, with the development of engines and greater speeds, this invention fell into obscurity.

The modern-day developer of this innovation felt the Fledge III, with its truncated wingtips, was the ideal candidate to experiment with. Visually, these primary feathers give a bird-like appearance to the glider, although their purpose is more practical than aesthetic.

As the wing passed through the air, creating high pressure underneath and low pressure on top, the air takes a shortcut around the tip trying to equalize pressures. A truncated tip will



generate a sizable vortex, resulting in drag. But, as with soaring birds, multiple tip-feathers divide this tip vortex up, lessening drag, and creating lift and stability out of otherwise wasted energy.

Each pinion (feather) of this design is a separate high aspect-ratio airfoil. Dacron sailcloth is cambered around a tapered fiberglass rod with a mylar insert in the leading edge for correct airfoil shape. Each feather's base rotates on two bearing races anchored to a common tube running fore and aft.

The feathers quickly move through a 45° arc while maintaining a preset spacing to one another. Although flight testing has not begun, it is hoped the feathers, while in the forward position, will improve sink rate, allowing slower landing speeds, and create drag when swept back. Also, the tips will create lift and forward "traction" when deployed.

The accompanying photos (ed. - we have reproduced them as best as possible) show the feathers swept forward and back, but, of course, one can imagine their being used differentially for yaw/roll control.

(ed. - The following is part of a footnote to the basic article. Perhaps there is one of our readers in the northwest that knows where this particular Fledge might be, and therefore the original feathered tips. If so, please let us know, or you can write directly to: Tom Lanros, P.O., Box 2602, Friday Harbor, WA 98250, (206) 378-6517.)

It must be understood this was a long-ago college project, he has searched for the paper written to reflect his experiences, and cannot find it. The glider was sold shortly afterwards since the Fledge could be re-rigged for its normal controls and flown as a normal aircraft.

Before Tom lost interest in the project, he conducted ground-skimming tests, but no high altitude flights were made. He stressed the fact that no conclusions could be reached about the tests, there weren't extensive, and the glider was sold before anything worthwhile beyond the appearance and mechanics was noted.

It's too bad that no answers are to be had to questions one might expect to be asked about such a project. Will someone be stimulated by the above article and the surviving photos to replicate this project? Can enough be deduced from the photographs alone to encourage a designer to experiment in a follow-up project?

Somewhere in America, probably in or near Portland, Oregon, taking up space in a garage, attic, or basement, lurk some curious looking feathered-mechanisms waiting to be rediscovered and...thrown away, most probably, if this has not already happened.

From the Spring - 1994 issue of Rigid-Wing Reader & Ultralight Sailplane News, Volume 1, Issue 11.

Day Chahroudi: Concepts

The three drawings on the following page illustrate a 13-year-old design, his first effort, a self-launchable design intended to fit in the gap between hang gliders and sailplanes. It's a Horten with the wingtips turned up for greater yaw stability. Being too heavy to foot-launch, it would require a small powerplant with a pop-out air scoop to launch, feathered prop for soaring, and a retractable bicycle-type landing gear.

Wings would be laminar flow. The weight of a powerplant pushes the pilot far enough forward to be able to see something other than the wing, and the cockpit is ¼" thick polycarbonate, which has great energy absorbing capacity since it tends to bend rather than shatter.

Wingtip rudders would clamshell open to act as drag rudders, up and down to act as elevators. Flaperons are inboard.

Day thinks the problem with this, like all flying wings, is that for high lift coefficients with flaps down, the elevators, with their low moment-arm, need a large deflection, reducing effective span and increasing induced drag, which is critical for low sink. Ignoring cost, this ship has pretty exciting preliminary data. Minimum sink is 0.46 m/s (90 fpm), stall is 63 km/h (39 mph), and glide is calculated to be about 40:1.

Day says he has no plans to go further than drawings, but would be happy to explain the logic behind his design to anyone interested in building it. He can be contacted at:

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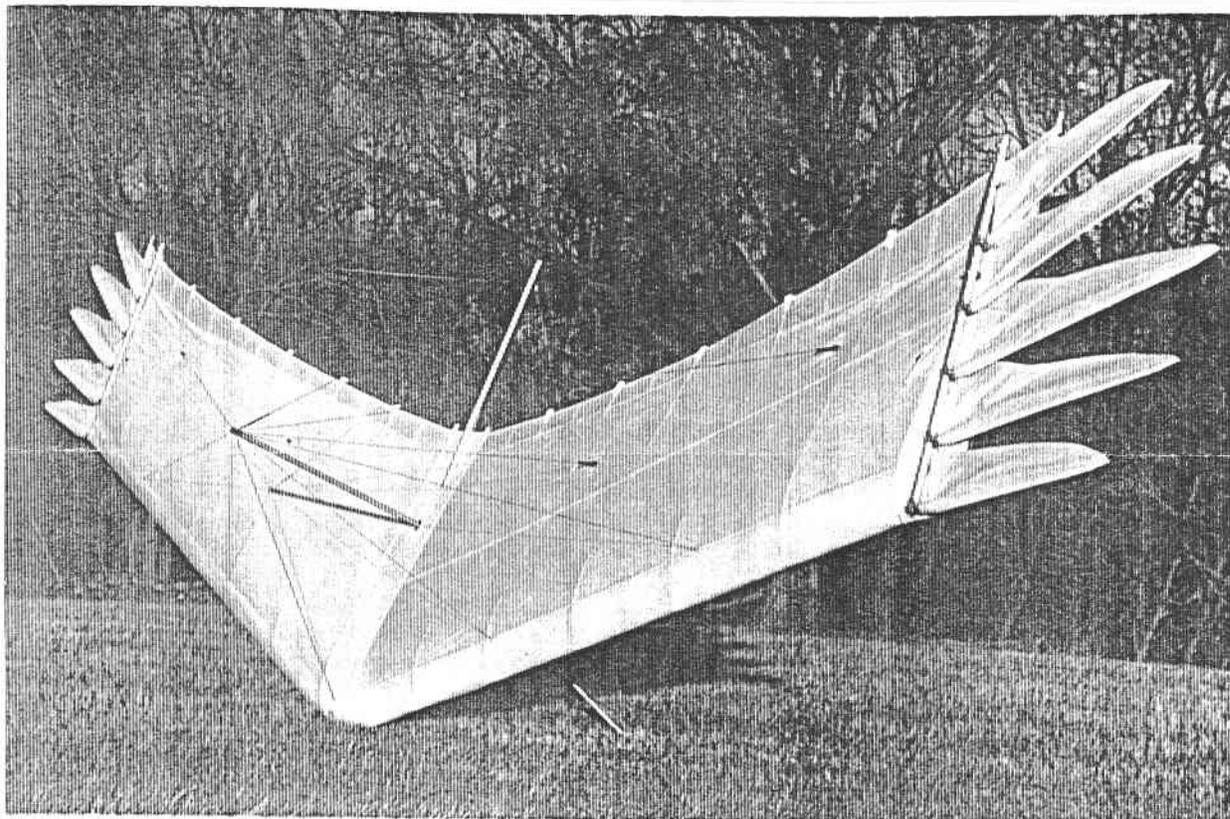
Tailless Aircraft Bibliography

by Serge Krauss

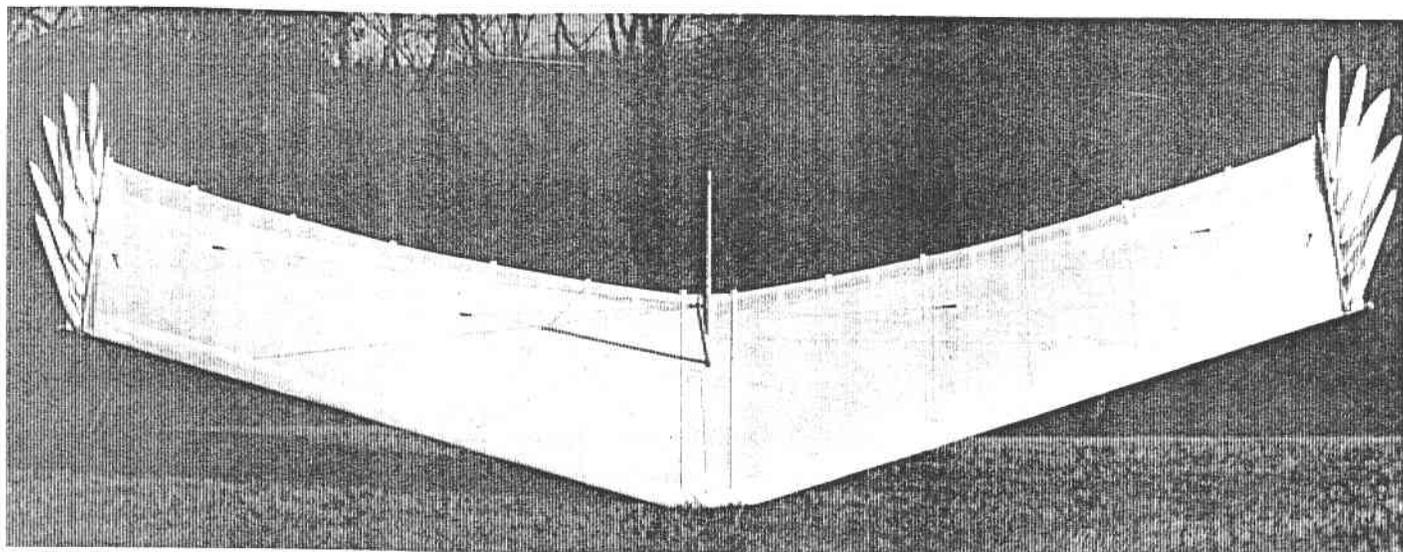
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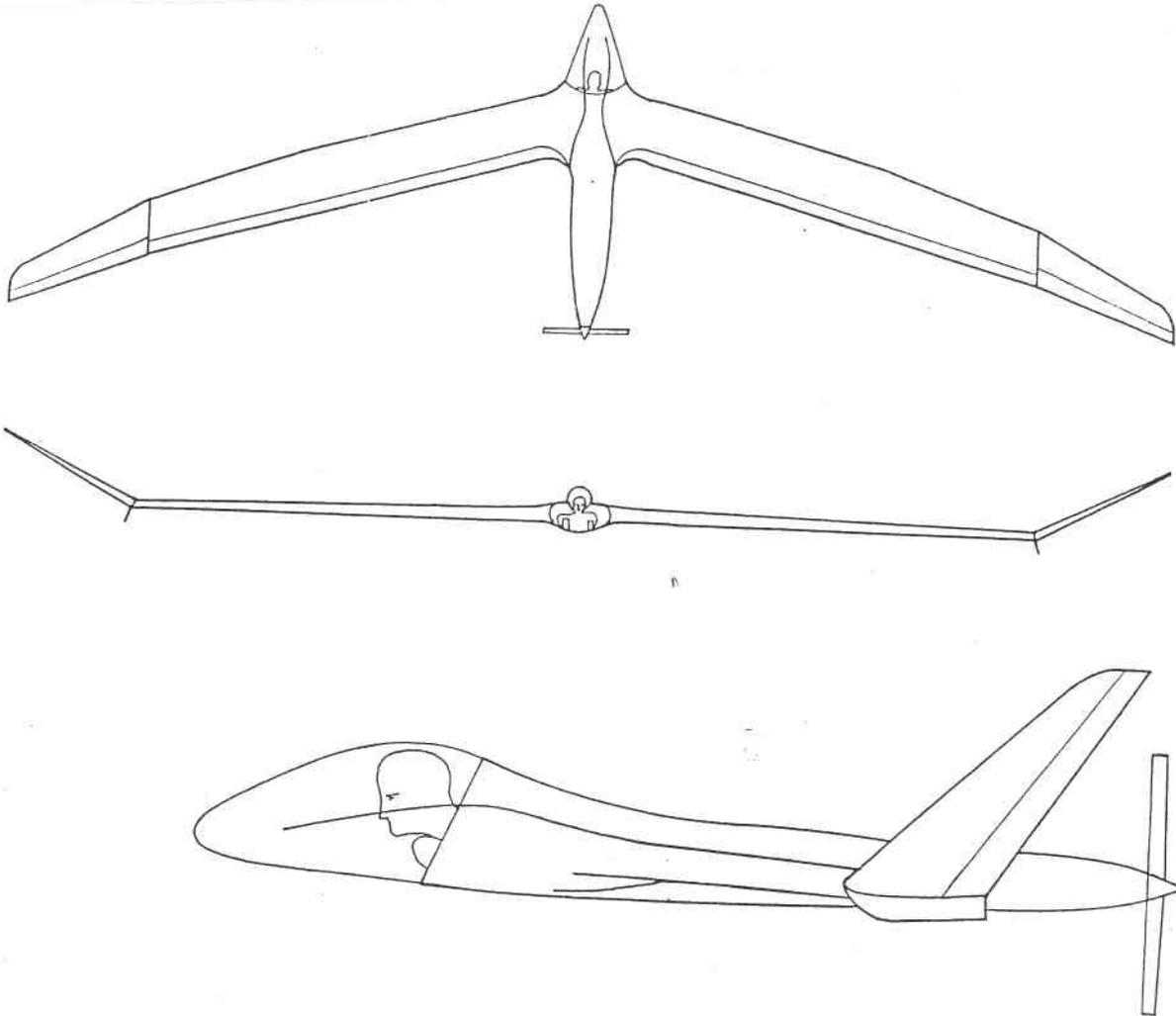
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TOM LANROS' FINE FEATHERED FLEDGE



BELOW: Day Chahroudi's self-launch concept, based on a Horten design (see page 8).



BELOW: Day Chahroudi's illustration of a foot-launchable rigid-wing design (M-wing configuration) for prone position with a good view and safety in landing provided by the extended leading edges. The tradeoff for these advantages is large wing sweep, which may be great enough to give poor stall performance. Because of the streamlined pod and elliptical wings and wingtips (which may be unnecessary,

Horten did not call for them), it should have very respectable performance. The wingtips have 30° dihedral and are all flying elevons for simplicity of manufacture. Construction would be of carbon/foam sandwich without ribs or spar for both simplicity and light weight. The cost of the carbon would be more than paid for by reduced labor.

