

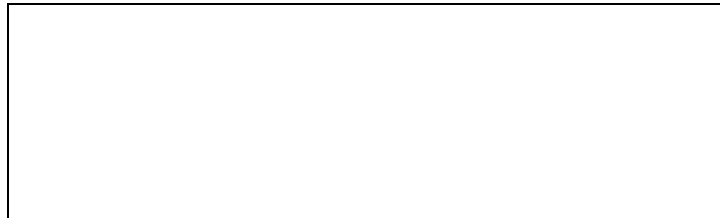
T.W.I.T.T. NEWSLETTER



The FLAC 2, with all the upgrades, shown in flight. For more on this interesting aircraft, see the meeting recap inside.

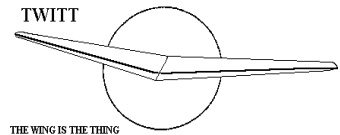
T.W.I.T.T.

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



The number after your name indicates the ending year and month of your current subscription, i.e., **0609** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, September 16, 2006, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



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

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

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

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PRESIDENT'S CORNER

Well, we all had a good time at the July meeting talking about flying wings and listening to Ken Striplin tell us about the FLAC and other interesting projects he designed and built over the years. The cake and ice cream were a welcome break to the heat of the day, especially in that all metal hanger.

There were a lot of pictures in Ken's presentation and I hope to eventually put them on the web site for everyone to enjoy. In the mean time for those of you with an Internet connection try this link for some of those pictures and more.

http://vula2.org/images/land_planes/FLAC_Ken-Striplin/

This issue is just a little later than the past couple, but I have just gotten so far behind in all the work I have right now it just sort of got pushed to the back burner. Having the work is good since I was out of work for a lot of the early part of the year and I need to make up the lost income. But it also means I have to start traveling again to some of the job sites. That makes me a little less accessible during the week, so if it takes we a day or two to get back to you, please be patient.

I hope all the hot weather across the nation is actually helping everyone get in some long flights in whatever sailplane or motor glider they are using. I still haven't gotten back into the air, but am hoping this is the year.

Everyone enjoy the rest of the summer and have great vacation trips.



**SEPTEMBER 16, 2006
PROGRAM**

As of right now I don't have a program identified for the September meeting, so if anyone has a contact or an idea I can follow-up on please let me know as soon as possible.

**JULY 15, 2006
MEETING RECAP**

We got started a little late due to people having troubles with traffic in the Los Angeles basin. But as Andy tried to get Ken Striplin's PowerPoint file into the laptop, Ken began with an overview of his career in the aviation industry.

Ken started by noting that everything they have done has been a family project with his wife, four sons and one daughter. Everyone worked on all the projects that he will later describe. Since we were running a little behind, Ken elected to sort of quickly go through the slides of his early days so we could get to the flying wing part of the program.

(ed. – So you can get the most of the flying wing part I have only included those pictures from Ken's presentation. There are also a lot of pictures that may not have a full explanation in the text, but I thought you would enjoy them anyway.)



ABOVE: Motor Floater

He started with a KR-1 by Ken Rand because of the construction techniques. Then Ken decided it needed to be a two-seater so at least one of the kids could fly along. The first aircraft he designed from scratch was a 1/2 scale P-51 Mustang in partnership with Darrel Coleman.



His son Ken got interested in hang gliders and found one called the Wing-Ding II and bought the plans. About that time Ken met up with Witold Kasper and got to thinking the BKB would make a nice motor glider. He visited with Kasper on numerous occasions to learn more about the BKB design and how he could adapt it to his purposes. Kasper did not give him any plans and Ken couldn't call it a BKB, but other than that Ken was on his way.



ABOVE: 12 hp engine with homemade belt drive in the Motor Floater.

Kasper did give him enough information and sketches to build the Motor Floater. You can see the resemblance in the pictures. It took the family about 5-months to complete the aircraft and this is where they started transitioning from traditional wood construction

to using foam and fiberglass. They took it to Kasper for a look and he said the control surfaces were too loose, so Ken tightened them up.

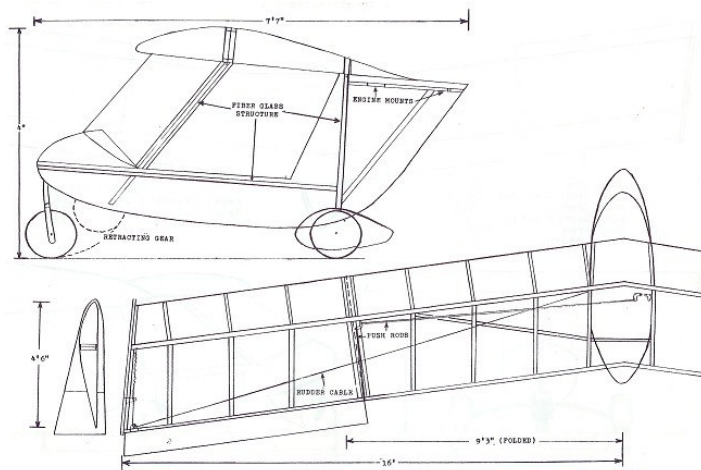
It was at this time the family moved to Lancaster, Calif. (Mojave desert area around Edwards AFB) to ease his wife's joint pains. It was at the Mojave Airport where they finally flew the Motor Floater, since it had a ten thousand foot runway. They did some auto tows and found it had a very bad pitching moment problem and was underpowered for the way the landing gear was rigged. Apparently it never really flew well enough to go any further with the project and Ken wasn't sure whatever happened to it.

They then moved on to building a model Kasper wing for testing. From the picture you can see the control surfaces and notably the flared trim system tips. This is basically where Ken parted ways with Kasper, especially since Kasper wasn't really providing much support in the design and building efforts.



ABOVE: This is the model used to prepare for the FLAC prototype.

They moved on to the Striplin version using standard elevons and a modified tip rudder that just went outboard without the spoiler type of inner type that had been used by Kasper. The vortex generator was designed to either turn it on or fly without it. The test flights found it really wasn't worth the effort and after a wing tip scraped the lakebed, which sort of rolled the aircraft up, they decided not to pursue this option any further. They has also experimented with this strake using a large scale model before moving on to the prototype.



ABOVE: FLAC 3-view.

Ken then moved on to how the Foot Launched Air Cycle (FLAC) came into being. One of the things they wanted to eliminate from their prior experiences was the low angle of attack at takeoff. So the extended nosewheel leg was added to improve the takeoff performance, but it was also retractable and could landed that way to keep the AoA down to make the aircraft stick to the ground. (See top of next page.) The takeoff didn't take any up stick and it would leave the ground after about 150'.



It could be folded up for trailering and storage and was equipped with a BRS recovering parachute. The propeller drive for the 12 hp MAC engine was homebuilt, since at that time there was nothing off the shelf that could be used.



ABOVE: This is a shot of Paul Striplin showing the drop down doors that qualified FLAC as an ultralight. They also put in a harness system so the aircraft could be lifted off the ground. There were never any attempts to do an actual foot-launch.

Ken related a story about being at Oshkosh one year with the prototype when the FAA came by and took exception to this clean looking aircraft qualifying as an ultralight. Paul Poberezny stepped into the cockpit, put on the harness and lifted up the plane and took a couple of steps. The FAA was impressed that the aircraft was so light and walked away satisfied it fit into the ultralight category. What Paul and the FAA didn't realize was that the engine had been taken out for some repairs. This was the heaviest part of the plane so the airframe itself was easy to lift.



ABOVE: This shot doesn't show it, but when Paul picked it up the propeller had been temporarily attached so it would look normal.



ABOVE: This is a front view with the nosewheel retracted in what can be used as the landing position. It actually makes the plane look much sleeker.

After the initial prototype they made some changes including lowering and gapping the elevons to have more effective elevators, and adding a counter balance. They moved the main landing gear back, allowing for a better takeoff angle and a shorter landing without bouncing. Installed twin Soarmaster engines (*although there were no pictures with this configuration.*)

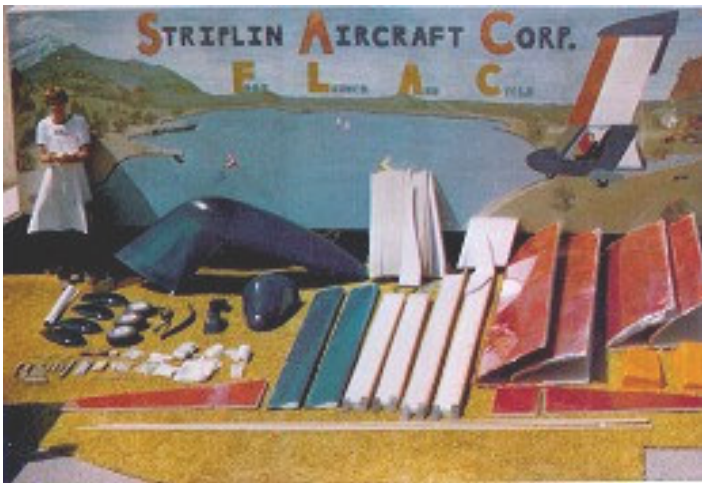
One of the other things they changed was moving the airspeed tube from inside the cockpit area to an outside location. They discovered during a photo shoot that when a door was placed on the cockpit it



changed the static side of the pitot system and the pilot was getting a very erroneous reading. When he thought he was only doing about 38 mph, he was actually cruising along at about 90. The Piper Cub that was trying to take photos just couldn't keep up so there weren't as many shots as they had

hoped to get.

They started building kits with pre-colored fuselages and leading edges. The spars were constructed with sandwich material between two sheets of foam, glued together and, then trim off the top part to add wood cap strips. This made it an I-beam that was very light and strong.



They then hit the air show circuit trying to promote the kits and make this a profitable business. They had a promotion flier that said FLAC A Blast In the Sky playing on the words. Well, during a flight demonstration at Porterville, the propeller broke and cut off a piece of the aileron. This produced a shower of white foam coming down and one young spectator yelled out about seeing the true blast in the sky.

During a flight demonstration on the east coast, there was a tragedy when Ken's son Paul was killed in an accident while landing a FLAC over a row of trees. They think it may have been partly due to the bad placement of a airspeed indicator, but couldn't really determine it. As a result of the accident, they did split the elevons into two sections to reduce the pitch sensitivity. And, with over 60 kits sold they needed to find a way to train the new pilots to this type of accident wouldn't happen again.



They came up with a rig on a back of a truck where the pilot could use the controls while tethered. It also had a way of letting some of the line out so the pilot would be free of truck for short periods. The one flight condition they were trying to show the pilots was

a flying wing's ability to self correct when upset by a gust. By leaving the controls alone during a momentary change in AoA due to a gust the wing will automatically return to the original trimmed position.

The pitch problems and training were a little more than they could overcome so a tailed version was introduced. The tail kits were sent out at Ken's expense and, of course this took its toll on the going concern nature of the business. About that time an investor came along and they went into the plastic molding business with the Sky Ranger model. This was a kit that would go together very quickly for the homebuilder. The picture below shows the prototype tail assembly that was added before they started the kits. At the top of the next page you can see plastic plane kits that eventually resulted from the change.



Ken had promised he would tell us about how Kasper was able to make the BKB tumble, even though he was a small man. The answer was an accident around the mounting of the pilot's seat on a set of rails that allowed it move back and forth to reach the peddles. According to Kasper, apparently the rail latch came loose while he was doing some aft CG testing and slammed him backwards. Over the glider went until centrifugal force pushed the seat forward again brining him out of it. With that information he now had the method for being able to do it whenever he wanted too.

Ken talked a little bit about using weight shift as the primary control method for some types of flying wings. He found this with the FLAC where he could just lean forward a little bit on landing and make perfect touchdowns each time without moving the control stick. He also noted that FLAC would make very nice, coordinated turns by just touching the rudder and that by adding aileron he just ended up introducing adverse yaw.



control when the vortex will occur as the nose comes up. The sharp angles on the trailing edge would then cause an opposing vortex to help keep everything under control and not allow a tumble. Since most of the B-2 program is still classified it probably would be hard to prove this is the case.

LETTERS TO THE EDITOR

July 10, 2006

Calculator For Formulae In Horten Paper

The vortex performance chart was put together over a measured mile course doing sink rate tests. He pointed out that as the aircraft approached the 20 mph point the sink rate flattened out so they thought maybe Kasper had something. Unfortunately, they were so busy with the kit building they couldn't really continue with any more testing, so this was the only data they had.

I am interested in the recommendations for a calculator that would display and handle the formulas shown in the Horten paper on tailless aircraft. It would be interesting to come up with the improvements specified by Mississippi State University in a new edition of the Horten IV, and see if those could result in a competitive sailplane with near-current, if not current, aircraft. I would like to see what

differences would be made by use of modern materials, such as carbon fiber and fiberglass for the wing structure vs. wood, as that was noted for flutter near 80mph. I guess that would entail the use of FEA to refine the design of the wing structure.

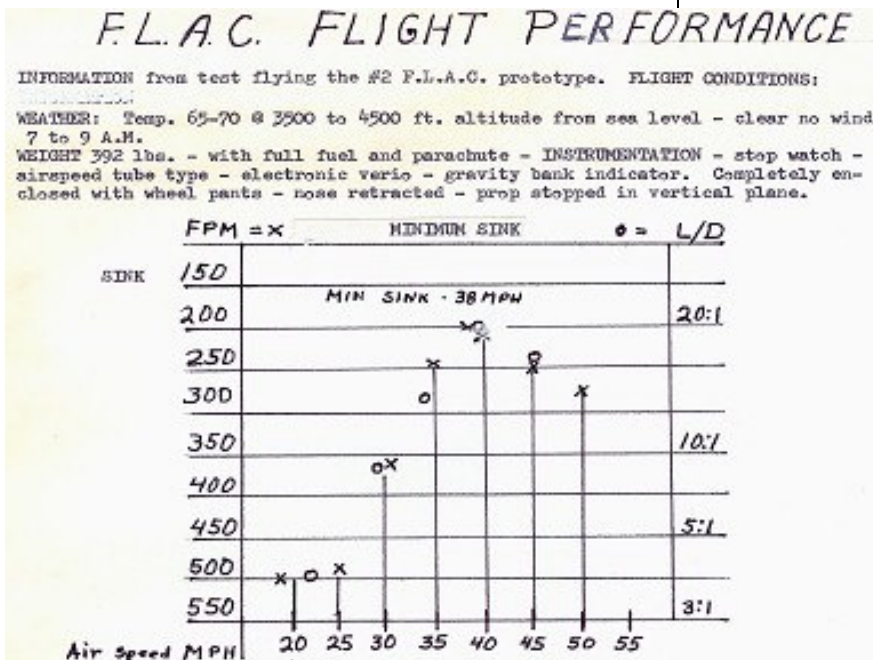
Sincerely,

Michael F. Vandenberg
Pensacola, Florida
<mfvan@earthlink.net>

(ed. – Thank you for writing with your questions and comments. I am not sure which Horten paper you are referring to so really can't give you a good answer on that part of your inquiry.

As for building with modern materials, this has been talked about for years but since there are no plans available for the Horten designs, they may not come out as representing what Horten had original envisioned. Let me know which paper you are talking about and I will try to find

Ken's last slide was of the B-2 and we had a short discussion on why the tailing edge and nose that the shapes they do. Apparently they are more for controlling the vortices than for controlling the radar signature of the aircraft. Because of Glenn Edward's accident with the B-49, Ken thinks the nose cusp helps

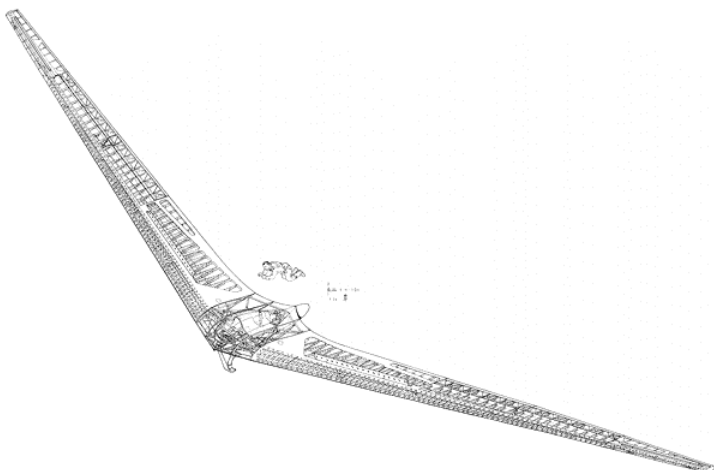


someone who can comment on your question. I am not an engineer so can't really give you any advice, but I should be able to find someone who can.)

Andy:

It would seem to me that from the MSU evaluation, if not also from the Deutsche Technikmuseum as result of their restoration of the Ho IV, that drawings would be available. Reinhold Stadler got those drawings from somewhere! (Attached) Also, Bob Fronius used a source for his scale replica. It is a pity that Jack Bales' family have elected not to make his scale plans available anymore. If I had the right CAD program, I think that some time could see a set of plans developed. As for the calculator, it seems that Mr. Kresse found a program that should suffice.

Mike Vandenberg



July 29, 2006

I have got a question. What happened to the UIUC airfoil database? I haven't had occasion to use the site for some years, went to search it and it, along with all the other airfoil library sites that contained coordinates, are gone.

Regards,

Henry E. Whittle
<Gulfrose@Juno.com>

(ed. – I didn't really have an answer for Henry, so if any of you know where this information now resides on the Internet, please pass it along to him and TWITT so we can update it on our web site.)

August 3, 2006

New URL for 2-175 Page

Old:
http://www89.pair.com/techinfo/MassFlow/2_175.htm

New:
http://massflow.archivale.com/2_175.htm

F. Marc de Piolenc
<piolenc@archivale.com>

(ed. – I have updated the web site with the new URL and I thank Marc for letting us know so people can find the information on this interesting design.)

August 5, 2006

Low Aspect Wings/July comments

I appreciated the comments regarding CG locations on low aspect flying wings. Yes, the outboard "vortelons", as we call them as they are working in a vortex and act as elevons, but do not decrease lift or create trailing edge separation to the main wing. Our wing has triple rudders with trim tabs, (two), between them. High speed taxi tests resulted in poor pitch control with CG at 25-26 % chord. The aircraft configuration was parametered into X-Plane's software and flew with increased controllability with the C.G. at 40%.

The pdf addresses did not connect. I've tried several times without results. There was some good information from the MAV competitions and especially University of Florida's five time winning craft. They found out that a wing covered with a flexible membrane like latex (bats?) handled better and flew with less pilot inputs. Camber seemed to naturally increase when encountering bumpy air and increasing lift. Note; Feathers on birds probably perform similarly. The students' latest design was a peripherally braced wing. Leading edge blending into tip bow sweeping into trailing edge, ribfoils running chordwise. Carbon fiber and resin was utilized to maintain shapes that were cast in a mold. Some of the MAV's wings fold like umbrellas or accordions to crawl through small openings, then deploy their wingspan to fly. Our future commuter craft could be fashioned in like manner and fold up. This subject will expand as we see more innovations and different construction methods.

Stephen Sawyer
<s-sawyer@sbcglobal.net>

(ed. – Thanks for the feedback on the information passed along by Henry in the last issue. As for the link, it appears to have been missing a “4” at the end (MainID-1214), however, when I tried it the same results appeared, so we need Henry to provide the link again to see what is still not working right.)

August 6, 2006

I thought I'd attach some correspondence and pictures concerning the BKB model constructed by Laddie Mikulasko here in Ontario. He's having a great time with it. I'd love it if you shared some of his news with the membership.

I also have some news from Ken in the Midwest regarding the performance of his model. I have to contact him first to get his OK to forward it.

Stefanie Brochocki
<sbrochocki@yahoo.com>

(ed. – I have included the information from Laddie below along with the pictures sent along by Stefanie.

As for Ken, I think perhaps Norm Masters has beat her to it by posting a link to some pictures of Key Bates' BKB model at the Wood Crafters Reunion, which I have also included below. There isn't any information to go along with these, but maybe we can get something for a future newsletter.)

Hi Stefanie.

Finely, last weekend I was able to have the model towed. Since I am not glider pilot, I asked an experienced modeler from our model glider club to test fly it. Everyone stopped flying to observe the model with such unusual shape.

The model performed beautifully during tow and then when flying. The model was towed to over a thousand feet and then released. The modeler flying it was impressed how well the model reacted to the lift.

The model was extremely stable in all axes. I asked him to do loops. Which he did with no problem. Then I asked him to do a really sharp loop. When he did that at the moment when the nose was vertically, the model flipped around the center of gravity and while full up elevator was held it kept flipping. From what I read about your father's full size BKB-1 his could do exactly that. This is a extremely unique future

of your father's design. I do not think any other aircraft can do this at will.

After that, I took over controls and was flying for 5 minutes. Then I gave the controls back to test pilot. He stayed up for 20 minutes and if he wanted could have stayed much longer. The landing was a non event. Beautiful landing.

I am very please with the model. This summer I am planning to go to more events like this.

Since that time, I have done some flying on my own and I found that I could fly the model with easily. I was towed to 1000 ft. and when released and, was able to stay up there with the models of the latest higher performance designs. Some of these models had wingspan of 12 or more feet.

During the day, several models had problems on take off when towed without the dolly. One or the other wing tip would dig in and they had to abandon take off or, some of them even damaged their models. BKB-1 does not need the dolly. It performs perfect on take off every time. Other modelers are impressed with the model on the ground and in the air.

As far as putting model of BKB-1 into your newsletter, I will be delighted.

Laddie Mikulasko
<lmikulasko@cogeco.ca>





Caption with this one was: "Ken Bates is always first to be ready to fly." Looks like they would easily fit in the trunk of most cars, so you would always be ready to fly.



Items from the Mitchell U-2 Bulletin Board:

Flying wings in Sport Aviation

Posted by: "Tom Winter" c150gpilot@yahoo.com

Anyone else read the current Sport Aviation article on flying wings? Picture over the Mitchell Wing caption is the Backstrom Plank.

<http://aaa-apm.org/apm/collection/BackstromPlank.html>

You'd think they'd be more knowledgeable and more careful!

 These are the Ken Bates model photos. You can see more of the Reunion at the links below.

<http://www.skybench.com/woodcraft/2006/results.html>

<http://rkartman.dotphoto.com/CPViewAlbum.asp?AID=3521335>



Registration: N20WB

S/N: 1

This homebuilt is currently on display at the APM Hanger.

(ed. – Not really sure what the message meant, since the picture and caption were for the Backstrom Plank. I guess maybe the article itself was talking about a Mitchell Wing and then linked to this.)

"mitchellwing@earthlink.net" responded with:

I saw the article in Sport Aviation and I was a little disappointed. It is the 'Plank' they have mislabeled. I plan on responding and sending them some pictures of the B-10 and the U-2. I hope they will run them. I haven't sent pictures or articles to any of the magazines (that was my job when I was with Mitchell Aircraft, in Porterville). The reason is because I just don't have the ability to deliver parts and pieces. I know if a lot of pilots/builders see the B-10 and the U-2, I would be swamped with inquiries. I just have to get my act together. I am selling my house here in San Bruno, and moving on to a 32-acre farm near Fresno so I will have the space and hopefully the funds to set up shop, properly.

Richard Avalon

(ed. – Sounds like Richard is moving in the right direction and apparently his health has improved to the point he feels he can start taking on more in the way of building and supply parts for these aircraft. I am sure there are a lot of builders out there that will get started on their building once they know they can get some of the parts that are hard for them to manufacture.)

Richard also responded to some comments on the winglets/wingtip rudders on the Mitchell Wings:

Regarding wing tip rudders on the Mitchell Wings. They were designed primarily for drag devices for yaw control. Don said they don't do much for an airplane that flies under 100 mph, 747's, a good idea but a really slow, ship it doesn't do much, except give good yaw control. When Don first designed the B-10, it didn't have outboard rudders, they had spoilers only for yaw control. The reason for rudders was: spoilers were ore difficult to build. He was concerned that the beginning pilots might not service them properly so one could possibly stick open. There was no difference in performance with or without the rudders. When you deploy a spoiler, the wing would have a tendency lower that side of the airplane, The hang glider pilots didn't really care much. They wanted a more level yaw control system, that's why he went to the drag rudders.

When he built the Victory Wing, the rudders actually slant forward, so at very slow speeds and high angles of attack, the rudders would still be in clean air for good yaw control and slow landings.

Alejandro Bonfante wrote:

I searched older messages unable to find the answer, about the possibility to build an unpowered (pure glider) version of the U-2. I will appreciate comments if that kind of conversion was achieved or at least, considered.

Thanks in advance.

I initially was going to build a B-10 as a hangglider but have recently thought about building the U-2 as a class 4 hangglider. Don't know if it could be done or not but that's what it's all about isn't it, the challenge.

Pat Martin

I suppose you could build the U-2 as a pure glider. You would have to check weight and balance carefully. The U-2 would be a bit heavy with too high of a stall speed to be a hang glider, I think the B-10 would be a better choice.

Richard Avalon

**AVAILABLE PLANS &
REFERENCE MATERIAL**

**Coming Soon: Tailless Aircraft Bibliography
Edition 1-g**

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

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

Prices: To Be Announced

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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).

Cost: \$8.00 postage paid
Add: \$2.00 for foreign postage

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

Cost: \$10.00 postage paid
Add: \$ 2.00 for foreign postage

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

Cost: \$8.00 postage paid
Add: \$2.00 for foreign postage

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 cassette tape of Alex's presentation explaining the material.

Cost: \$5.00 postage paid
Add: \$1.50 for foreign postage

VHS of Paul MacCready's presentation on March 21, 1998, covering his experiences with flying wings and how flying wings occur in nature. Tape includes Aerovironment's "Doing More With Much Less", and the presentations by Rudy Opitz, Dez George-Falvy and Jim Marske at the 1997 Flying Wing Symposiums at Harris Hill, plus some other miscellaneous "stuff".

Cost: \$8.00 postage paid in US
Add: \$2.00 for foreign postage

VHS of Robert Hoey's presentation on November 20, 1999, covering his group's experimentation with radio controlled bird models being used to explore the control and performance parameters of birds. Tape comes with a complete set of the overhead slides used in the presentation.

Cost : \$10.00 postage paid in US
\$15.00 foreign orders

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