No. 196 **OCTOBER 2002**

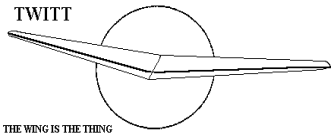
T.W.I.T.T. NEWSLETTER

Left are the three models that Bob Hoey brought along for his presentation in September. Clockwise from the left are the Pelican, Seagull and Turkey Vulture. Right is an in-flight shot provided by Bob showing the Turkey Vulture model on the bottom with real ravens circling overhead.

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., **0210** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, November 16, 2002, 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

First, I need to apologize to some of our southern California members who drove down from the Los Angeles basin on Saturday, September 14th thinking it was the meeting day. I would like to thank them for the loyalty to come back on the 21st to the real meeting. This came about because the newsletter came out a week earlier than normal due to an error on my part in the timing. Most years, the Labor Day weekend represents the first Saturday of the month and I get the draft proof read while at Tehachapi so it is published before the second Saturday. This year was different, I missed it, and behold the newsletter went out early.

I did find out that the "meeting" on the 14th went really well and everyone there enjoyed themselves talking about everything related to flying wings or other aeronautical subjects.

Talking about meetings, I was rather disappointed in the 21st turnout by the membership that normally attends. This is the third or fourth time we have scheduled very good speakers and had dismal turnout, which is embarrassing to TWITT and unfair to the speakers who often have to drive a long distance.

Bob Hoey was very gracious about the low turnout (only 11 people) and gave us a new look at what he and his group have been doing with a Pelican model.

I need to find out what we will have to do in the future to improve meeting attendance, especially when we have a good speaker giving us a presentation on a relevant subject. I would appreciate your feedback on this subject in order to determine if there are some basic changes needed in the meeting process. Do we need to only have them quarterly or perhaps just two a year in months not containing major holidays!!!! Is a different Saturday of month the answer or does it need to be earlier/later in the day to make it easier for traveling? Please let me know your thoughts. Thanks.

Andy

NOVEMBER 16, 2002 PROGRAM

As of our publication date, we didn't have a lead on a November program, but are continuing to explore several possibilities. As usual, if you know of someone who would be willing to do a presentation on the appropriate subject, we would love to hear from you with the contact information. Sometimes they don't work out, but if we don't try it might be a lost opportunity for everyone to learn something new. Your input is welcome.

SEPTEMBER 21, 2002 MEETING RECAP

Andy opened the meeting by welcoming the small, but dedicated group to the September meeting. Before getting started with the program, he updated the group on the latest events concerning the website. TWITT now has its own domain name of www.twitt.org and is being hosted by a new Internet service provider.

The site is up and running under the new name and people will be routed to it through the old site for as long as it is necessary. He also mentioned that this will give TWITT almost unlimited expansion capability and provide an opportunity to offer a members only section for selective viewing of things like newsletters that are in color. He is still exploring all the new options available and will keep us informed.

One of the items added to the site were some pictures of Eric Raymond's electric propulsion system (above) on his SunSeeker motor glider. Andy mentioned it has an application on many types of aircraft and could be an effective self-launch mechanism for a flying wing. Based on the total wing area of a flying wing, it will hold a lot of solar cells for charging the batteries and providing enough energy for a good launch.

The upgrade also included some new pictures from Richard Avalon on his trip to Europe. There were some of U-2 under construction and another in-flight, and a B-10 motor glider that has over 800 hours of flight time.

For you old timers, Andy announced that Gus Briegleb had passed away on September 5th. Gus was the owner/ operator of the El Mirage Gliderport in the Mojave Desert of California from the 1940's through 1960's. It was a family affair with his wife Ann running the office and cafe and, the kids, Ross and Kenny, helping on the flight line, eventually becoming instructors and tow plane pilots. He was also the designer behind the BG series of all wood sailplanes. *(ed. – One of the first gliders my father built on his own was a BG-7.)*

Andy noted that Serge Krauss had sent a message updating us on his bibliography work and results of his extensive patent search. See more on this in the Letters section below.

With all that said and done, Andy introduced Bob Hoey, our speaker for today. Bob's presentation will cover his past and present status on radio controlled bird models, how the Leonardi de Vinci project came about and, an explanation of the methods he has devised for calculating sweep angle and CG locations in irregular shaped wings.

Bob opened with a recap of how this whole thing with bird models got started. After retiring in 1990 he decided he could learn how birds flew without a vertical tail by building radio controlled models. The first model bird was a Raven, which was about 10% larger than the bird to make room for the radio equipment and weighed a little over a pound, which is half the weight of a real bird. So this meant operating at the same wing area but half the wing loading. Lateral control was done through drag flaps on the bottom of the wings.

At this point Bob put on a video of the first series of test flights and narrated it as we watched the Raven being

launched with a high-start. He commented that you could see it flew just like an airplane with no vertical tail, until he figured out he needed to stay off the drag flaps and just fly it with pitch. So at that point he had a stable airplane but just no lateral control, yet.
After one of the launches, the Raven appeared to be doing a classic dutch roll. He was able to measure the frequency from the video footage and found it to be about 3.8, which he thought was about right.

ABOVE: *Here is the Pelican being launched from the mother ship. This is how a majority of the test flights began. The landing gear on the plane was extended several times to make room for the particular glider being launched. Photo courtesy of Bob Hoey.*

The next step was to launch the Raven from another radio controlled model and this lead to some basic changes for the next generation. This was patterned after the first one, but it had more refined lines to it and was about 30% lighter. The lighter model allowed the drag flaps to work more effectively without a vertical tail. The shape of the wing is providing the lateral stability. It flew very well and eventually was published in R/C MODELLER in January of 1994.

He had a lot of fun with the Raven flying with real birds and making more modifications to the basic design to try new ideas. One of the major changes was to build a new wing tip that had no dihedral but has an equal amount of sweep in the tip. It is swept more than that of the bird, but it has no dihedral and he figured it would fly about the same, which he found it did during subsequent flights. So now they have a plane with no vertical tail and no dihedral that is stable as a glider.

One of the next experiments was to install a rotating and tilting tail surface similar to what birds really use for flight. After several false starts and adjusting the CG he was finally able to demonstrate turns and maneuvers with just the tail, but the airplane moves in the direction opposite to the tail tilt (the way birds really fly). In order to get this the CG was moved far aft so the tail was lifting upwards. Bob noted this was not the most efficient method for turning since it is very slow. For the real birds, they have the option to throw in some wing twist to speed up the roll, but this wasn't a real option in the model. This was the closest he thinks they have come to duplicating the soaring flight of birds. Bruce asked about pitch sensitivity to which Bob responded it was hairy flying it in pitch, partly due to the reflex airfoil.

ABOVE: *The Raven in flight where you can see how real it looks to other birds. This also gives you a good view of the sweep angle on the tip feathers referred to by Bob. Photo courtesy of Bob Hoey.*

He put an electric motor on the nose of one model and tried for a year to make it work. It would do all right at one speed, but if you got it too slow it would do a snap roll into a spin. Recovery was straightforward by just pulling the power back. They knew this configuration was de-stabilizing, but they kept trying until it was obvious the most efficient for launching was from the power plane.

He has found that if you bring the tip feathers up to about zero incidence the model picks up a lot of adverse yaw while turning and will eventually have roll reversal going in the opposite direction. But when it is put beyond the negative 27-degree point you can actually see some proverse yaw and the results are crisp, sharp turns. At the negative 27-degree point he has found a sweet spot where the aircraft flies nicely with well-coordinated turns.

Someone asked whether or not the tip feathers were flexing up during flight. Bob commented he hasn't been able to observe the vertical movement of the "feathers" in flight, but assumes they are moving somewhat since they are only 1/16th balsa. He said that there are several of these models flying well for other builders that he has heard from over the past several years. He also said that all the bird models

have been approached by ravens, but to his knowledge a raven has never touched one of them.
On one occasion while a raven was flying formation with the model, Bob did a loop to see what kind of reaction he would get. The raven just moved off to the side, watched the loop and then joined back into formation. When Bob did a five turn spiral dive, the raven watched then did a typical raven maneuver to lose altitude and rejoined on the model.
Obviously, ravens were the most fun to fly with. Bruce noted that he had seen ravens at Elsinore go up in a thermal, spiral down and then ride it back up again.

ABOVE: *Bob is demonstrating the detachable stability fin now being used to high start the models, in this case the Turkey Vulture. The fin is actually slipped into a slot in the belly.*

High starting the Raven was difficult since it had a tendency to fall off on a wing and not recover very well. He installed a fin that was attached to the towline, but when the model rolled the fin stayed aligned with the line. He has now installed a fin that slips into a slot in the bottom of the body that holds it rigid during the tow to provide a true rudder. The towline then pulls it out of the slot during the release. So now high starts are much easier and it eliminates the need for the power plane launch vehicle.

The group then moved on to building a model with simulated tip feathers and all the future models included the same basic configuration. The front three feathers are mounted on a spanwise axis and driven by a servo out close to the tip. The key to this is the initial angle of the first feather, which needs to be almost 30 degrees negative relative to the wing. He thinks they are operating in the up-flow around the vortex outside the tip vortex. It seems to work very well as noted in the video. No dihedral is needed and the drag flaps could be eliminated.

ABOVE & BELOW: *Here is a good look at the Turkey Vulture's tip feathers, where you can the extreme angle of the lead feather reducing in angle to the rear feather.*

Bob showed us his Turkey Vulture model and how the controls now worked. The tip feathers can be moved together to adjust the incidence or differentially for roll control. For the Vulture he has found that the front feather needs to be at negative 27 degrees to obtain optimal performance. Flight is quite normal and appears to be much like a real Turkey Vulture in that it rocks around. He has flown with real vultures and they tended to just ignore it. He noted that the tip feathers were now being controlled with a servo mounted inboard next to the body and driving a carbon rod that is directly connected to the control surface. This has removed some of the slack in the previous configurations and gives it much smoother operation.

The next part of the video included the Seagull model, which has a solid tip instead of the split feathers. The movement is the same as with the vulture, but the incidence was only negative 10 degrees. It turned out to be a nice flying airplane and he could fly it very aggressively. He tried to improve the performance by putting a flexible covering on the section inboard of the tip to supposedly smooth out the

flow at the joint. Test flights have seemed to show that it didn't make much difference, but it looks sort of neat.

ABOVE: *Bob is showing us where the aileron servo is now located driving a carbon rod out to the tip feathers.* ***BELOW****: You can see the feather angles, especially those at the leading edge from this shot.*

He noted there was always a problem with pitch on the Seagull. It was sort of discontinuous, requiring constant trimming during the flight. He thinks it might have something to do with interference at the fuselage (body) and wing juncture so he is building a new wing that is flatter. The last time he flew it he increased the negative angle of the tips and it appeared to be flying better, so now he also thinks there might have been flow separation at the tip due to the high sweep angle and anhedral. He did change the tail from being flat to having some V-shape, but has noticed no real difference in performance.

Now that he thought he knew all there was about building bird models, he decided to try a Pelican, which he knew would be a real challenge. He knew the big beak would be de-stabilizing along with the wing crank. The wing has

ABOVE: *You can see the negative angle on the left wing tip in this shot and how it puts twist into the wing. You can also see the slight "V" shape of the horizontal tail and elevator.* ***BELOW:*** *Here is the Seagull in flight, with the radio antenna trailing. Photo courtesy of Bob Hoey.*

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mostly anhedral and a very complex shape. The first flight was a heart stopper as it went into a spiral dive a few seconds after being dropped from the launch plane. Bob was able to get enough control just before it reached the ground to save it for a later flight. It turned out the CG was about a half inch to far aft and the large beak just made matters worse. They went back and increased the dihedral a little bit, added a couple of feet out of the lower body area and, adjusted the CG location. It is flying better but still not great.

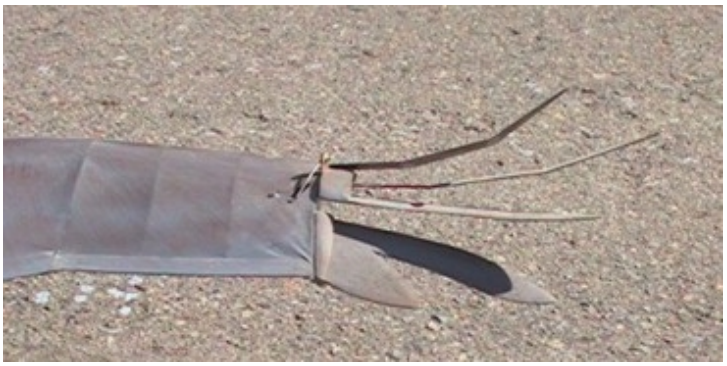
Further test flights have found the Pelican to be spirally stable making it hard to make turns. If the turn command is removed once the turn is established, the model rolls back into straight flight. The team is still working on it to make it fly better, but they still are not there yet.

ABOVE: *Here is the Pelican where you can see how that big beak would cause some directional control problems.* ***BELOW:*** *You can see the spread on the tip feathers, which is basically the same as the Raven's.*

There was a general discussion on the possibility studying the actual structure of a bird wing. Bob has done this with a raven wing and found that you can't really lay the wing out and determine the area and span. When the wing is pulled forward toward the flight position it has a tendency to go down like a flap. The last little bit of motion causes a nose down torque on the wing and he has seen this on other types of birds. Bob took pictures from directly underneath, from the front and side, and then scaled them by projecting them on a wall and drawing up the layouts. While the overall dimensions are good, there is no real way to determine the shape of the airfoil.

So Bob used a computer to generate an airfoil that had a positive pitching moment of .02 at C_{mac}. This way he knew he could fly with the CG at the neutral point and still have a little bit of upload at the tail. Pat Oliver asked if Bob had done any anatomy studies of the bones and muscles, especially along the leading edge of the wing. Bob indicated he had not done this, but sort of figured that the first third of the wing probably didn't change much and that most of it would occur toward the aft portion. *(ed. – I subsequently challenged Pat to look into doing such an anatomy study and get back with Bob on what he found.)*

ABOVE: *Here you can see the "feet" that were added to provide some additional stability.* ***BELOW:*** *Another shot of the tip feathers showing the upward curvature and the flatness of the aft feathers.*



Bob did make a cardboard template of the raven's wing and found that is was highly under-cambered with no reflex. It's a nice looking airfoil but would have a nasty nose down pitching moment, so if the birds are soaring with this they are fairly unstable in pitch. Bob's observations of ravens in soaring flight found that the wings were relatively calm with turns being made with the tail, indicating they are laterally stable but maybe not in pitch.

At this point Bob transitioned to talking about his methods for finding the CG and sweep angle of unusually shaped wings. This has been covered in the July 2002 issue of the newsletter, so we won't repeat it here.

Bob then moved on to tell us how the Leonardo de Vinci project came about and what happened to it. It started in April when they were contacted by a British film company who wanted to a hang glider based on Leonardo de Vinci's sketches. The first problem was that Leonardo didn't have a drawing of a full airplane, just a lot of sketches of pieces and parts. The company was going to launch it off de Vinci's favorite slope in the Italian Alps and take pictures of it flying with a man in it. They also wanted the aircraft to be built using the 1500's construction techniques of leather joint wraps, dowels and other similar things. The concept and actual flight had to be accomplished by October.

ABOVE: *Bob holding the Leonardi de Vinci concept model. You can see the tip aileron configuration and that the aft portion of the wing is a single flat surface. You can also see that the ailerons are in a positive position which is not a normal flight position.* ***BELOW:*** *You can see the planform of this design.*

They decided to start with a Volmer Jensen designed hang glider to save development time. It looked like it could be modified to be a good look-alike of what they thought the de Vinci aircraft would be. Some of the sketches had obvious flapping mechanisms, but this was more than they needed for the project, although they were very interesting to look at.

Now Bob and the team could actually take some of what they had learned with the bird models and use it to come up with something new. They modified a VJ 24 by cranking the wing forward a little bit on the inboard end and, then put in some sweep on the outboard sections. Only two tip feathers were initially installed to make it simpler to build and to see how it would fly without a stationary feather behind them. They mounted an elevator on the back of the back of the stick structure fuselage that would have a cage for the pilot.

Since they had to use old building techniques, the problem became one of how to keep it light enough that the pilot could slow it down for landing and not break any legs. They thought it would end up at about 110 pounds empty weight with a pilot of 130 pounds on a wing area of 160 square feet at 18% thickness. The company had some Boeing engineers working on part of the aircraft, which original had a 14% thick wing and wire braces, but then went to a full cantilever style with the thicker wing section.

ABOVE: *Here you can see the left aileron in a more normal flight position. You can also see the slight up on the elevator giving you an idea of its size.*

It seems that after all that work, the British company didn't think it looked de Vinci enough since it wasn't quite like his sketches and, it was felt they perhaps really didn't want it to be an American design. The company moved the project to a British hang glider group and Bob doesn't know what they came up with or how far along the project has gotten towards the October launch date.

Even though the project was cancelled, Bob was intrigued about whether their design would fly, so of course he built a model. They made some initial hand glides while he played with the elevator settings. Eventually they wanted to get rid of the elevator and control pitch with weight shifting of the "Ken" pilot model and lateral control with the tip feathers.

The tests indicated it was a stable aircraft so they attached it to the launch plane and took it up. The leading feather was set at minus 27 degrees and the trailing feather at minus 15 degrees like the bird's third feather. The video footage showed a very high launch to allow for any problems, but it came off the mother ship quite docile. He found it was stable with good pitch control, but the roll control was rather sluggish. He re-thought the tip feather arrangement and figured the 12-degree difference was creating a stall whenever the controls were moved. Changing the second feather to minus 19 degrees solved this problem with better lateral control. Landings were a little on the rough side since the front cross bar seemed to want to dig into the dirt as it settled in.

There was some general discussion on the configuration of the tip feathers on the Raven. Bob explained that through experimentation they found the first needed to be minus 27 degrees, the second at minus 19, the third at minus 15 and, the remaining stationary ones reduced in small degrees until the last one was at zero degrees. At one time he had mounted actual raven feathers on the model and flew it successfully. He did notice that the feathers had a definite upward curvature to them in flight. This is still different than the real bird, since the feathers actually overlap and create more of a single surface airfoil that is slightly reflexed. Pat

Oliver suggested that because the leading edge of the feather was right at the leading edge of the wing it was simply duplicating the steep angle of a normal wing's leading edge.

ABOVE: *Here is a good look at the pilot cage and some of the wing structure. The radio gear was supposed to be placed inside of "Ken" the pilot, but that is another story.*

As part of his final comments, Bob mentioned that every once in a while he thinks he has come up with an answer to one of their questions. In actuality, the answer seems to create about 10 more questions that need to be solved. The team will keep working on all the questions and eventually find answers. Through talks like this one they are able to get more and varied input that all goes into the data bank for coming up with some of those solutions.

At this point it was time for coffee and donuts while doing a little hanger flying and taking a closer look at the Raven, Seagull, Pelican and Leonardo models.

LETTERS TO THE EDITOR

September 19, 2002

TWITT:

I haven't written much in quite a while, but wanted to thank you again for your fine efforts on the newsletter and TWITT programs. The Newsletter continues to serve as a valuable information repository and exchange for a lot of really great people.

I have been neglecting Bibliography work for the past few months, but intend to get back to it next week! However, I need to let everyone know that I have two requests for my last copy of the 6th Edition and am not nearly ready to issue the next. The computer file has grown by over 40 pages, and I have a pile of new stuff to enter.

Most time consuming will be reading and summarizing the many relevant patents that I collected last year in what I think is as large a patent search as anyone has ever done on this topic (printed almost 6 lbs. of hard copy!). I estimate that I have found 95% to 98% of all relevant U.S. patents. While admittedly such patents often enough lack value, many of these are extremely interesting from the technical and historical perspectives. I don't want to reissue the Bibliography without including them. SO...I intend to spend a few months on a really good 7th edition of the Tailless Aircraft Bibliography, but would listen to suggestions of alternate plans.

Andy, on the topic of patents, I think that you might include some interesting patent drawings in the Newsletter periodically. If you're interested, I can give you the URL's of historically or technically interesting U.S. patents, so that you could download them directly. Let me know.

Meanwhile, I suppose we should modify the ad to show that such a publication exists, but is temporarily unavailable. I really appreciate your help, and will of course understand any need to reduce it.

At this point I would like to ask any of our European members who keep up with tailless aircraft publications to e-mail or send me information on any articles/books/reports/ patents that have appeared in their countries during 2000 - 2002 for inclusion in the 7th Edition. Pertinent information would include author, title, periodical name, DATE, page numbers, and any annotative information that seems relevant (number/types of illustrations, description of topic, quality, etc.). I try to give credit to all contributors.

Thanks!

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(ed. – Thanks for the update on the bibliography. I have made the necessary changes to the newsletter and website advertisements to reflect what is coming versus what has been available.

The addition of some patents to the newsletter sounds like a good idea and I have asked Serge for the URLs so I can download them for printing. I hope everyone enjoys the fruits of Serge's labor.

I have also added his request to the appropriate area of the website, and ask that if any of our members in Europe know of material to get a hold of Serge. He has also informed the Nurflugel mailing list to reach that audience, so hopefully he will start gathering the desired information.

Serge should be applauded for this Herculean project of documenting as much of the flying wing and tailless information out there in the "world". We all owe him a debt of gratitude.)

September 18, 2002

(ed. -The following was posted by Al Bowers on the Nurflugel mailing list in reflection of what occurred over the Labor Day weekend at Tehachapi. I thought you might enjoy it.)

Things have been quiet on the list, and a bit rowdy around here *(NASA Dryden at Edwards AFB)* for a while. I thought I'd throw some gasoline on the fire and see what develops...

I'm sorry I haven't been able to put together a report of the SSA/SHA (Soaring Society of America/Soaring Homebuilders Association) meeting over the Labor Day weekend. The week before that, the OSTIV Sailplane Development Panel was meeting, and I was an invited guest.

OSTIV/SDP

For those who missed it: OSTIV (Organization Scientifique et Technique Internationale Vol du Voile, I think) is the scientific arm of the International Gliding Commission (IGC). IGC is the soaring arm of the FAI (who should need no introduction). OSTIV has three panels, meteorological, safety and training, and the sailplane development panel. Every year the three panels have a meeting at a member-nation technical symposia, and this year it was the USA's turn, and the SSA decided to have it at Tehachapi (if you've missed these in the past, you REALLY should come out for the SHA meet on Labor Day. There are many of the heavy hitters of the soaring world such as Dr Paul MacCready (and the "other" Dr MacCready, Dr Tyler MacCready), and Bruce Carmichael (who's forgotten more about laminar flow control than most of the rest of us put together will EVER know). Other notables usually show up; Danny Howell, Greg Cole, Dan Armstrong, Steve Arndt (on occasion), Gary Osoba, Andy Kecskes, Eric Raymond, Jeff Byard, Raul Blacksten, etc. It's gotta be the best meet of it's kind every year.

Anyway, the SDP meeting was pretty cool. The meeting was presided over by the chair of the SDP, Dr Michael Rehmet (Germany) and in attendance was the president of OSTIV, Prof Loek Boermans (Netherlands). There was an EASA report from Jan Eric Olsson (Sweden) on the transition from JAR to EASA in Europe (this created some controversy, and it appears that few are in favor of some of the changes). Dr Tony Segal (UK) gave an EXCELLENT briefing on his glider crash tests at Farnborough. He has several articles worth looking at for crashworthiness and survivability (http://www.glidingmagazine.com). We're attempting to reanalyze Dr Segal's data for frequency content (all his data is viewed as time domain so far). Francois Ragot (France) reported on motor glider accident causes, which generated some good discussion. Prof Boermans gave a report on changes to the FAI definition of a sailplane: 2 seats or less, and stored or acquired energy can be used for anything EXCEPT direct propulsion. This changes the way some people were looking at laminar flow control suction ideas. Dr. Piero Morelli (Italy) gave a report on the PW5 World-Class glider (lots of countries placing orders, this may prove a viable design though some problems still remain). Dr Rehmet gave a short presentation on the electric Antares glider concept (a recent article in Soaring magazine shows their propulsion idea being tested on a DG sailplane). There was much debate on the max gross weight limit for the open class (750 kg for pure sailplanes, 850 kg for motor gliders) by Prof Boermans. Gerhard Waibel (Germany) gave a short report from the German Sailplane Manufacturers Association (digression: Mr Waibel is a very friendly and funny guy, his jokes are pretty good, even on himself!). Helmut Fendt (Germany) talked about the JAA/JAR regulations in preparation. Stefan Kirchstein (Germany) gave a report on airbrake usage and increased loads on the wings. While his data was quite good, and he did include dynamic effects, he LINEARLY EXTRAPOLATED the dynamic data in time beyond where he had taken data. As a result (and I don't think I was able to communicate this well, the English/ German thing) I don't think his data applies to the PEAK loads he was showing. Some discussion was made of active control "fly-by-wire" capability in sailplanes (of course, I had an opinion and opened my BIG mouth). Peter Kousal (Czechoslovakia) gave a report on sailplane rescue systems (two types, pilot extraction and complete airframe).

At the SHA meeting, Prof Boermans gave a pitch on OSTIV (I need to send my check for 41 Euros in to join). Dr Morelli gave another talk on ultralight sailplanes with a number of good examples. He also showed the differences in the FAI "Light Sailplane" class and the "Ultralight Sailplane" class (same mxwt limit, 220 kg) but the ultralights have a wingloading limit as well. Dr David Marsden gave a talk on winglets. Garty Osoba and Taras Kicenuk talked on dynamic soaring. Danny Howell showed the Lighthawk off. Greg Cole had a Sparrowhawk there. Presentation was also made of the Apis sailplane (www.apisgliders.com). Mike Sandlin and his Bug 4. And one and on.
The official Chief of Aero at NASA's Dryden Flight Research Center gave his pitch on flying wings again (some guy named Bowers). All in all a meeting that was excellent.

The final event was the banquet and Gerhard Waibel's Ralph Stanton Barnaby Lecture on "The Sailplanes of 2050." All in all a weekend that was outstanding. I don't know how Bruce Carmichael, Jeff Byard, Gary Osoba, Dan and Jan Armstrong will top this one in the future...

Al Bowers

(ed. – Here are a couple of questions that were asked last year and have been sitting in our request for help section of the website. Vic Riviera posted replies to both and I am passing them along so everyone can benefit.)

November 28, 2001

Question:

Horten IV & VI

Hi. Does anyone know a documentation source for the Horten IV and VI, such that scale models can be built? Please write and let me know.

Thanks.

Steven Seim
sseim@microsoft.com
Redmond, WA USA

Reply:

September 24, 2002

Hi,

I would say you should try to contact the technical museum in Schleissheim near Munich- these guys restored a H IV and it is still hanging there- there is some nice information about that here at TWITT- another resource would be Ingeneer Uden, who has the Horten archive- if
you do not have this information all ready do not hesitate to ask for his mailing address.

Vic
victor.riviera@gmx.net

November 12, 2001

Question:

Ho-XVc

The Ho-XVc was originally built in Germany as a glider by a Tuebinger Soaring club, it was later sold to Mr. Walter Kirschsieper from Zurich, Switzerland. Mr. Kirschsieper modified it to a motor glider, which got the immatriculation HB-SAA. Little is known whether it flew or not, finally the plane was scrapped in the 80's.

I hope to find some more information about the history of this aircraft, probably to find someone who was in touch with it or it's owner.

Markus Christen
SWITZERLAND
Phone: 0041 33 822 4864
mark.christen@gmx.ch

Reply:

September 24, 2002

Hi Christian,

I did some research concerning the "Kirschsieper"- and got some really sad information: the bird was never ever really flying - some short tests failed due to many trouble that were implemented in the configuration of putting an engine to this glider.

Mr. Kirschsieper died and the H XVc was quite a long time hanging around in a hangar near Zurich - after long years nobody felt responsible for the piece and they decided to burn it - what they did in the late 80's (- or was it 90's??) - not sure about that.

Anyway, I once was thinking of building the H XV as it was done in Argentina and I did quite a lot of research concerning that; got all the plan copies (I even scanned them as I was very enthusiastic ;-)) and I even got contact to Mr. Nickel and also to Mr. Scheidhauer by mail and phone. Both said, that it was a wonderful plane but still was very dangerous as soon as it got water drops, or spots of dirt (dead flies for example) it got very unstable - so I decided to quit this project...

But still I am working on the H Xb...

Greetings from Vienna

Victor
victor.riviera@gmx.net

AVAILABLE PLANS & REFERENCE MATERIAL

Available (TBA): Tailless Aircraft Bibliography, Ed. 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.

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Bruce Carmichael brucecar1@juno.com
34795 Camino Capistrano
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VHS tape of Al Bowers' September 19, 1998 presentation on "The Horten H X Series: Ultra Light Flying Wing Sailplanes." The package includes Al's 20 pages of slides so you won't have to squint at the TV screen trying to read what he is explaining. This was an excellent presentation covering Horten history and an analysis of bell and elliptical lift distributions.

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

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