No. 357 MARCH 2016

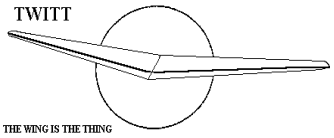
T.W.I.T.T. NEWSLETTER

The de Havilland DH 108 "Swallow" was a British experimental aircraft designed by John Carver Meadows Frost in October 1945. The DH 108 featured a tailless, swept wing with a single vertical stabilizer, similar to the layout of the wartime German Messerschmitt Me 163 *Komet* rocket-powered point-defense interceptor. RAF Capt. Eric Brown (now deceased) flew it after the first prototype crashed attempting to break the sound barrier.

Source:
https://en.wikipedia.org/wiki/De_Havilland_DH_108

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., **1603** means this is your last issue unless renewed.



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.

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TWITT gatherings are held on the third Saturday of every odd numbered month, 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).

TABLE OF CONTENTS

PRESIDENT'S CORNER

Sorry for the delay in getting this issue of the newsletter to you on time. I just couldn't get in the mood to sit down at the computer and put the various pieces together. I finally got enough ambition late last week and worked it in while baby-sitting our twin grand kids.

It does contain a lot of various types of aircraft both full size and model. It also contains some information on the passing of Capt. Eric Brown who flew over 400 different types of aircraft during his career with the RAF. These included a number of flying wings over the years. You can probably find a good bio of him with a quick Internet search.

Not much else to report this month. As always I am looking for material from our members whether it is something original about your project or a historical piece that we haven't featured yet.

I hope everyone is ready for the upcoming soaring season. I am finally getting some work done on my trailer so it will be fit for the season and am looking forward to participating in a couple of soaring safaris this year.

LETTERS TO THE EDITOR

Hello Andy,

While looking up information on North Korea's missile (or satellite) launch yesterday on the "38 North" website http://38north.org , I came across photographs of several tailless Chinese UAVs (see them in this article: http://38north.org/2016/01/jbermudez011916/), which North Korea is using and/or copying for its own use. These UAVs are model airplane size, which would make 1:1 scale models of them practical.

Jason Wentworth

(ed. – You will need to scroll down a little ways to find the images of the UAVs and some text.)

While looking up plans for old model rocket B/Gs (boost-gliders), I came across the plans for the SAI (Space Age Industries) Mini Bat kit (see: http://oldrocketplans.com/sai/saiK17/saiK17.htm), which was a tailless boost-glider. (Front motor boost-gliders which do *not* have V-tails, including the Mini Bat, have inverted vertical stabilizers so that the rocket motor exhaust will not impinge upon them.) Also:

Looking at the plans for the conventional (swept-wing, with conventional tail assemblies) Estes Falcon (see: http://www.airplanesandrockets.com/rockets/falcon.htm and http://www.spacemodeling.org/jimz/estes/k-13.pdf) and the similar AMROCS Hawk (see: http://www.oldrocketplans.com/amrocs/amr101-150/amr101-150.htm), it occurred to me that a tailless variant of such a boost-glider type is possible. By locating the swept wings farther back on the fuselage boom, or by using more sharply swept-back wings (or by doing both), a tailless front motor boost-glider having a planform like that of the tailless Northrop SM-62 Snark cruise missile (see: http://www.designation-systems.net/dusrm/app1/sm-62.html [this site also has material on the XSSM-A-3 Snark test vehicle]) could be built. In addition:

As well as being an effective tailless boost-glider (which could use either the motor-ejection method or a separating, streamer- or parachute-recovered motor pop-pod), a boost-glider of this design would eliminate or greatly reduce a problem of motor-ejecting front motor boost-gliders with conventional tail assemblies (which is discussed *here*: http://oldrocketforum.com/showthread.php?t=4843). The rearward-ejecting motor can break the model's tail boom just ahead of the horizontal stabilizer; this occurs because the tumbling spent motor case can strike the tail (which is often pitched up into the motor case's path by the model's reaction to the motor's ejection impulse, which causes a nose-down pitching moment). As well:

A contributory (or even primary) cause of tail boom breakage can also be the downward bending load that is suddenly imposed upon the boom by the upward-pitched horizontal stabilizer at ejection. In both cases, the tailless configuration could eliminate or reduce these stresses. Having no horizontal stabilizer, the rear end of the tailless model's tail boom presents a smaller "target" for the randomly-tumbling motor case to hit. The rear end of the model's tail boom is also not subjected to bending stresses at motor ejection, because it has no horizontal stabilizer (those loads are distributed among the larger area of the wings' outer portions).

Tailless boost-gliders, rocket gliders, and powered and glider aircraft of this type (having swept wings and longer fuselages) should also be steadier in pitch, due to the length and mass of the fuselage boom, which would give such models a longer pitch moment arm. (Swept-winged and straight-winged ["plank"-type] tailless aircraft tend to "hunt" up and down in pitch because their pitch moment arms are short. For such short-coupled tailless boost-gliders and rocket gliders, this means that they will lose more altitude faster in breezy conditions because of their pitch "hunting" [this isn't necessarily a bad thing, especially if one is flying on a small field!], while the longer, boom-fuselage tailless gliders should have pitch dynamic stability comparable to that of conventional-configuration gliders with tails.)

For any of the readers who would like to try building and flying a tailless version of a longer fuselage (boom fuselage) front motor boost-glider of conventional configuration, the Sky Slash II (its plans are *here*: http://www.spacemodeling.org/jimz/eirp_12.htm) would be a great boost-glider (B/G) to use as the basis for such a tailless B/G. The Estes Falcon and the AMROCS Hawk had "T" cross-section boom fuselages (which were made of two thin [1/16" thick, if memory serves] sheet balsa pieces that were glued together, with one perpendicular to the other). While their boom fuselages aren't difficult to make, the Sky

Slash II has a simpler, one-piece boom fuselage that's made of one piece of thicker sheet balsa. Also:

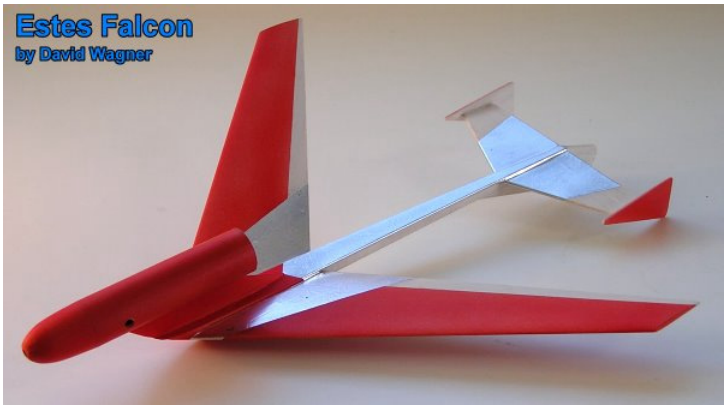
All three of these boost-gliders were designed for use with standard-size (0.69" x 2.75" [18 mm x 70 mm]) model rocket motors, but modelers have also had good results with scaled-down versions of these models that were sized to use the Estes 0.50" x 1.75" (13 mm x 45 mm) mini motors, and tailless, modified versions of these boost-gliders should work equally well with 18 mm and 13 mm model rocket motors. (The SAI Mini Bat tailless boost-glider kit, which used 18 mm motors, could also be scaled down to use the 13 mm mini motors.) [The scale factor--derived from the 0.736" Outside Diameter standard motor [18 mm motor] motor mount tube and the 0.541" Outside Diameter mini motor mount tube [for 13 mm motors]--is 0.7350543; multiplying the dimensions of the models by 0.7350543 will yield the dimensions for the scaled-down versions for use with 13 mm mini motors.] Plus, I've "re-activated" all of the website links below as well, so that you'll have all of the links in one place.

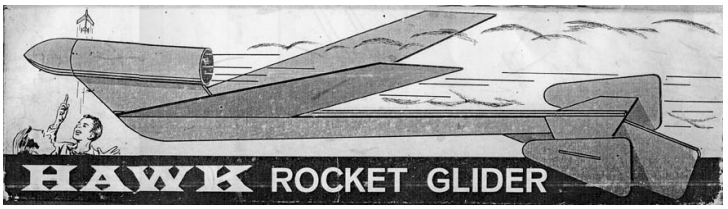
I hope the readers will find these boost-gliders--the conventional originals as well as the modified tailless variants of them--fun to build and launch!

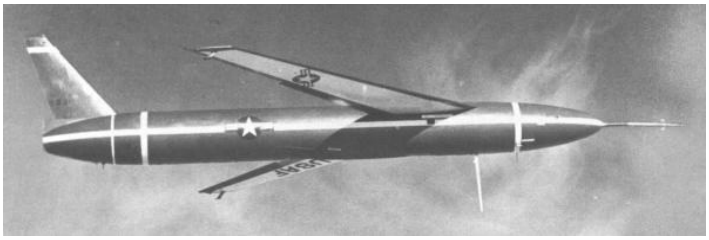
I hope this information will be helpful.

Jason

(ed. I have included some photo examples of what Jason is talking about. A couple of the links contain more photos and some construction instructions.)







I'd forgotten to include the contact information for parts suppliers, in case any of the readers would like to build these boost-gliders. They are Balsa Machining Service (see: http://www.balsamachining.com/) and Semroc Astronautics (www.semroc.com), who supply

the nose cones, body tubes, and (in some cases) actual laser-cut sheet balsa parts sets for old model rocket kits and rocket plans like these, which make it unnecessary to print out part templates and cut out the fins and wings by hand! The Estes Falcon and AMROCS Hawk use the BNC-20A nose cone (so can the SAI Mini Bat, as the nose cone type isn't critical), and the Sky Slash II uses the BNC-20B (it could also use the BNC-20A if the builder desired). *ALSO:*

Another very nice tailless boost-glider (see: http://plans.rocketshoppe.com/estes/estK-34/estK-34.htm and http://www.spacemodeling.org/jimz/k-34.htm) is the Estes Nighthawk. Its swept flying wing glider (which separates from a parachute-recovered "pop-pod" that houses the rocket motor) uses downward-angled diffuser wing tips to give it directional stability, instead of using one or more vertical stabilizers. The Nighthawk is more difficult to build and fly because it separates into two components (the Falcon, Hawk, Sky Slash II, and Mini Bat are all one-piece boost-gliders, in which the rocket motor ejects itself at the peak of the ascent trajectory), but it is a rewarding model to fly because of its high performance, and it has a (physically [aerodynamically]) programmable ascent trajectory. In addition:

Holverson Designs produced two tailless boost-gliders for which plans are also available, the Zoomie (see: http://plans.rocketshoppe.com/hdi/hdi2000/hdi2000.htm) and the Silver Hawk (see: http://plans.rocketshoppe.com/hdi/hdi2002/hdi2002.htm). A Zoomie "clone" can use the Estes BNC-5V nose cone, which Balsa Machining Service makes (it can also be "scavenged" from an Estes Mosquito kit; this rocket uses a plastic version of the BNC-5V). The Silver Hawk can use a BNC-20N nose cone (or the plastic version, which can be "scavenged" from an Estes Viking or Wizard kit). And as with the previous e-mail message, I've also "re-activated" all of the website links below, so that you'll have all of them together in one place.

Jason

I ran across this the other day and thought the group would enjoy seeing an old time flying wing.

https://books.google.com/books?id=9mUJ1PON0esC&printsec=frontcover#v=onepage&q&f=true

Scroll to Page 91.

Gavin Slater

(ed. – I have included the 3-view illustration from this 1929 magazine on the next page.)

Nurflugel Threads

(ed. – These first few messages are in response to last month's items on the Peep Lauk.)

Warren, all I know are the videos we all know. But ...there are not two videos, there are three videos of the Peep Lauk project. Sadly, the third one does not bring happy news. You see the airplane being towed behind a car and it takes off. But ...in the air you see that it now has a canard. So ...I guess the elevons were not able to get the airplane airborne in its original status. I heard that the design was done to achieve the best possible results in performance. But ...to get there at top speed and at max cruise distance, you need to have a take off. Sadly ...the design did not permit that.

That is just my vision on what I found on the Internet. Keep that brain spawning wings,

Koen Van de Kerckhove

You confirm something I have been coming to realize about the difference between elliptical and bell spanloads.

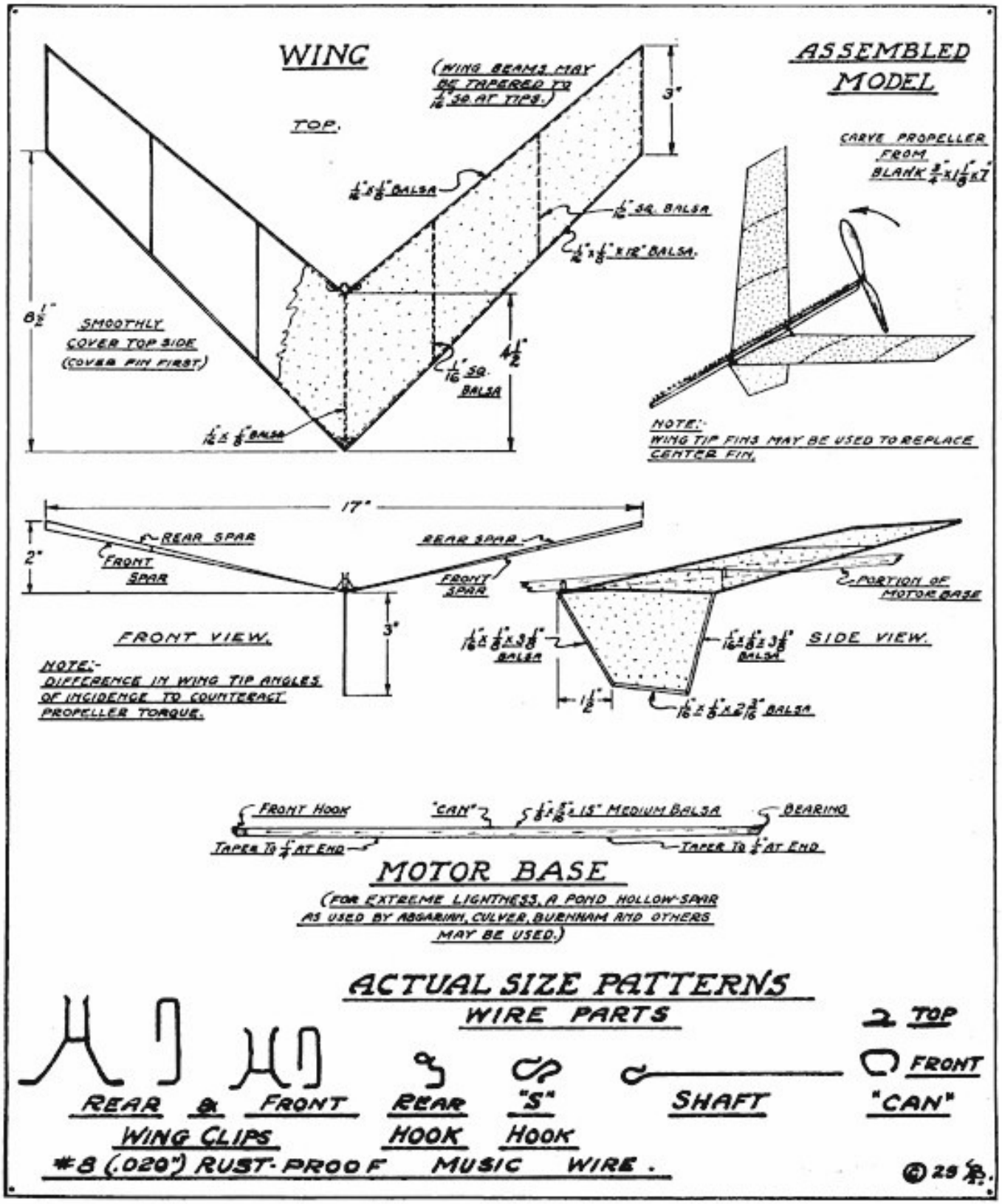
Elliptical spanloads on swept wings are a very careful balancing act. And the balance is easy to upset in the elliptical. The CG range is tight. So the control power must be small, to prevent over controlling the aircraft. However the landing gear stability requires a certain geometry, and this amount of control is usually larger than easily achieved in most designs. The X-56A has a similar problem at rotation as the Cygnus.

Bell spanloads are somewhat more forgiving. The CG range is s little more open. And a little more control moment is desirable with the longer wings of bell spanload aircraft. The additional moment (more leverage and more control) makes rotation somewhat easier. The PUL-10 and the H-1b are both good examples.

Just a random thought...

Al Bowers

Working diagrams and specifications of the Flying Wing Model.



From what I remember reading at the time, was that the canard was there as a precaution to enhance stability in pitch during initial testing. The project seemed to go awfully quiet after that.

Rob Wallis

Hi Al,

I missed something here but what is Cygnus? I can't find anything on the net that would be appropriate. No doubt it is right under my nose, as usual!

As to wings with bell-shaped lift distributions providing broader C of G ranges, I can endorse that. My latest hardware surprised me when I accidentally flew it without nose weight. OK, it swooped along in a series of stalls but it did not depart from that. I was amazed. By contrast, using an elliptical lift distribution, all you can achieve is the best compromise between stability and control at one particular C of G position, not ideal and a much poorer state of affairs. You need quite a lot of trim to keep it flying at other points on the lift curve other than the design point. The design becomes a one-speed device. With bell-shaped curves you seem to need less control power and consequently less trim to cover the speed range. Am I right? If I am, the effect on overall performance should be considerable.

Chris Bryant

Al, that is a first I hear about difference between elliptic and bell. It is good to know. Will add it to my website.

Please, tell Red he has a FB PM of me. Seems not to get through.

Keep that brain spawning wings,

Koen

I found this nice interview with Al on the AMA site:

http://air.modelaircraft.org/al-bowers-interview/

Preview by Yahoo

Serge Krauss

(ed. – This is an 18+ minute view but well worth watching.)

(ed. – The February 24, 2016 San Diego Union Tribune had an obituary on Eric Brown titled "Heavily Decorated British Navy Pilot Broke Many Records". He was 97. One of his accomplishments was test flying the Swallow trying to break the sound barrier. The item below came from the Nurflugel postings and lists some of the other flying wing aircraft he flew during his career. I was unable to find the original message this was responding to but if was obviously referring the Brown's passing.)

Another great person that I'm pleased to have met while head docent at NASM, just after it opened. I managed to enjoy a lunch with Capt. Brown and had plans to fly gliders together, which might have expanded his logbook to 490. I recorded he recollections of flying the Me-163 and HoIV, both flying wing German designs. He had a poor opinion of the British experiments, based on the roughly similar GAL and DH108 designs, and said that the Germans managed to get it right by comparison.

He had recounted a little known experience landing a Sea Vampire with landing gear removed on a rubberized flexible deck surface. It would be launched using a dolly, and recovered with a belly landing. Even with the reinforced belly, the boffins pointed out that it could save over 25% of the aircraft weight, which could mean much longer range and payload.

https://www.youtube.com/watch?v=f7Lu6LEQ0zo

Brown had also proven wheel less WWII Hurricanes that were catapulted from cargo ships to give them protection against Nazi bombers from Kirkeness on the Arctic supply trips to Russia. The pilots would defend the fleet, and then bail out to be hopefully picked up by the fleet. On one occasion, he launched via catapult, but the heavy and un-aerodynamic dolly didn't release. Another close escape and demonstration of his skills.

https://upload.wikimedia.org/wikipedia/commons/0/0f/Hawker_Hurricane_launched_from_CAM_ship_c1941.jpg

I asked him what his most memorable or surprising aircraft was that he tested, and after thinking, he mentioned the asymmetric BV141. Brown said it

displayed very stable flying characteristics, and was efficient performer with great visual and photographic capabilities. Apparently too odd for even the Luftwaffe.

https://www.youtube.com/watch?v=SV96hXwWN7c

Everyone should read his bio, Wings on my Sleeve or many other books written about him

Cheers, Bob

Capt. Brown also translated 'Flying Wings in Theory and Practice' from German into English. Such a shame he passed away, I was planning to get in contact and meet with him to record his memories of the Horten IV.

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

My book containing several thousand annotated entries and appendices listing well over three hundred tailless designers/creators and their aircraft is no longer in print. I expect *eventually* to make available on disc a fairly comprehensive annotated and perhaps illustrated listing of pre-21st century tailless and related-interest aircraft documents in PDF format. Meanwhile, I will continue to provide information from my files to serious researchers. I'm sorry for the continuing delay, but life happens.

Serge Krauss, Jr. skrauss@ameritech.net
3114 Edgehill Road
Cleveland Hts., OH 44118 (216) 321-5743

VIDEOS AND AUDIO TAPES

(ed. – These videos are also now available on DVD, at the buyer's choice.)

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

FLYING WING SALES

BLUEPRINTS – Available for the Mitchell Wing Model U-2 Superwing Experimental motor glider and the B-10 Ultralight motor glider. These two aircraft were designed by Don Mitchell and are considered by many to be the finest flying wing airplanes available. The complete drawings, which include instructions, constructions photos and a flight manual cost $250 US delivery, $280 foreign delivery, postage paid.

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