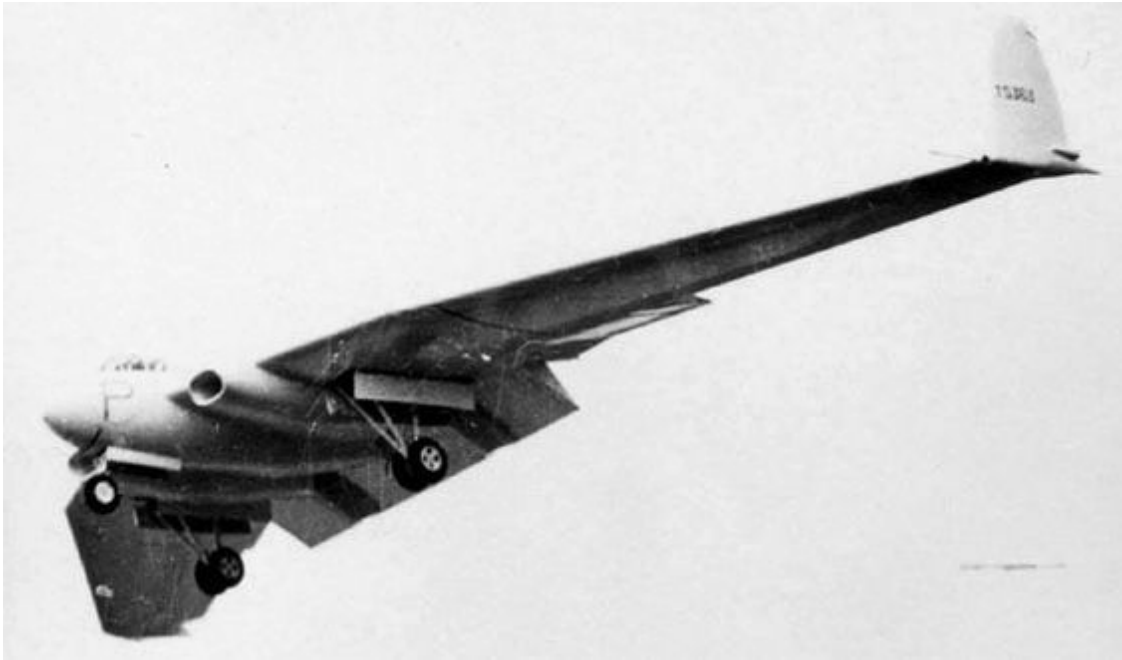


# T.W.I.T.T. NEWSLETTER



A British Jet Powered Flying Wing (1947-1954). The Armstrong Whitworth A.W.52.

Source: <https://www.pinterest.com/pin/540502392754853680/>

## **T.W.I.T.T.**

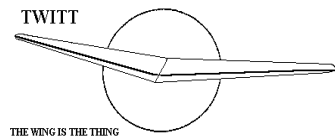
The Wing Is The Thing

P.O. Box 20430

El Cajon, CA 92021



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**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. Officers:**

**President:** Andy Kecskes (619) 980-9831  
**Treasurer:**  
**Editor:** Andy Kecskes  
**Archivist:** Gavin Slater

The **T.W.I.T.T.** office is located at:  
 Hanger A-4, Gillespie Field, El Cajon, California.  
 Mailing address: P.O. Box 20430  
 El Cajon, CA 92021

**(619) 589-1898 (Evenings – Pacific Time)**  
**E-Mail:** [twitt@pobox.com](mailto:twitt@pobox.com)  
**Internet:** <http://www.twitt.org>  
 Members only section: ID – 20issues10  
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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).**

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**PRESIDENT'S CORNER**

**M**y thanks to those who contributed to the letters section this month. It is always good to see and hear about what our members are doing. I hope more of you were able to read Al Bowers paper since it is obviously being well received in the aviation community.

A lot of times when I end up with empty space in the newsletter I turn to the Nurflugel or Mitchell U-2 forums for material I think will be of interest to everyone. So I found it interesting this month that there has been very little activity from both groups. I don't know if it is a function of everyone being busy with other things or an indication of interest waning in developing flying wings. I have noted several articles in aviation magazines where blended wing bodies were being considered for doing heavy cargo lifting so obviously the commercial firms do see the benefits of this design for certain applications.

As I am working on this issue I am also getting ready for a 3-day soaring camp in Aguila, AZ where I hope to get in some good flying with my Schweizer 1-26. The weather forecast is looking real good for the general area so flights of several hours for me should be possible. Others at the camp will be trying speed triangles or setting new class records. It should be fun for all.



## LETTERS TO THE EDITOR

*(ed. – The next couple of letters were in response to the paper written by Al Bowers.)*

Hi Al,

**C**ongratulations on publication of all of your hard work on Prandtl's 2nd theory. I have scanned through the paper and found it to be very thorough and complete. It also completely validates all of my hobby activities over the last 20 years with R/C bird models. Of course, my work was far less professional, and based strictly on observation and trial-and-error tests, but we ended up at the same place.

I received your paper as an attachment to an email from a friend, and fellow bird model enthusiast, in Australia, so it is now "out there" and I'm sure will be scrutinized in great detail. Hopefully we will see some direct application, maybe in the soaring community.

Job well done!!

Bob Hoey

Hello Andy,

**A** great issue for flying wing enthusiasts!

I've read Al Bowers paper on BSLD via the link you've published. A superb job, that will be a present and future top reference in aerodynamics!

I've also focused my attention on your question about the interest to see the Backstrom EPB-1A drawings and the other material. I am definitely interested in this historical information for study.

Regards

Artur Gonçalves

*(ed. – This is a response I got back after sending Van a copy of Al Bowers TWITT presentation on the Horten designs. This is available in either VHS or DVD format and the details can be seen at:*

<http://www.twitt.org/CLASSIFIEDS.dhtm - bowers>)

Good morning,

I got it and I'm very excited to watch it.

I'm working my phase two NASA SBIR right now for wing morphing to support BWB air craft.

So anything Al Bowers says is of great interest to me.

Thanks.

Van

Andy,

It was with considerable interest that I read the letters in the April newsletter about the Flying Plank plans. Would you be able to send me the link to the PDF file?

I would like to build a scale model of the Plank but haven't been able to find any good drawings or reliable documentation.

Regards,

Rodney Lord

*(ed. – Since some Internet Service Providers don't support importing larger files I went ahead and put the drawings on the TWITT web site so they could be downloaded easily onto your computers. The link to them is:*

[http://www.twitt.org/Backstrom\\_Plans.html](http://www.twitt.org/Backstrom_Plans.html))

Hi Andy.

**A**s you know, I started out to design a compact flying machine that was easy to build and safer to fly and could be stored in a 2-car garage and towed out to the airport.

Ten plus years and 20 1/5 scale RC models developed model 18B (see drawing). Further fiddling with 18B produced model 20 (photos) that removed the wing mounted elevons (white shapes on aft wing area) and placed them below the wing as shown in the photos. They may seem too large but my tests and research indicate the shape and 14-foot chord wing takes more force to change its basic attitude than the usual long narrow wing. That's also why the trim tabs

are so large. The final size and shape of the elevons will result from the road runs on my test boom. The vertical braces from wing to elevons will be moved inward to shroud the elevon control push rods.

Thanks a bunch for putting out the newsletter. I look forward to getting it because it almost always has info I've never encountered anywhere else.

Jim Loyd

*(ed. – My thanks to Jim for his project update. I am looking forward to seeing the final aircraft and learning more about its flight characteristics. The photos and a drawing are included on the following pages. You can see more about this project from 2009 at the link below.*

<http://www.twitt.org/LoydLowAspect.html>

*(ed. – The following was forwarded to me by Murry Rozansky and involves the resurrection of the Sgian Dubh design we highlighted in 2001.)*

**Engine Choices for a SSSR Project.**

I am currently midstream of getting an Aircraft that was built in 1999 by a very gifted Scottish Aircraft Designer into the air.

A bit of background into the project: The designer did ' Battle Royale ' with the UK Microlight Association & UK CAA for all the years from 1999 until late last year, sadly the designer has health issues where he can no longer battle with these authorities, this is where I come into the Frame: This designer has built 3 aircraft to almost completion & with a renewed enthusiasm I have put ( in principle ) 2 out of the 3 aircraft into the UK SSSR category. These projects are being released to me on a strict " Get Project 1 CLEARED FOR FLIGHT & then you can have Project 2 " type of set up. Once Project 2 has also been CLEARED FOR FLIGHT I can then move onto Project 3.

Project 1 is a very futuristic design ( despite being 17yrs old ) & will be quite a learning curve for the Test Pilot.

Project 2 is a fairly conventional design & will be a WALK IN THE PARK to get airborne.

Project 3 is at best a weird looking aircraft, but if the

designer has built it I know it will fly ( unofficially it has done one test flight already )

Now to the Nitty Gritty: Project 1 ( Sgian Dubh ) needs an engine, it has been designed to take a Rotax 447 or Rotax 503 in the plans so we are hopefully going to find a 447 or 503 somewhere, however so far we are struggling.

I am putting it out there to you all to assist us in finding a suitable engine for Project 1..... a 447 or 503 is ideally what we need but anything of comparable size & weight would suffice ( assuming it has 40-50hp available ).



We are prepared to Beg, Steal or Borrow to get a suitable engine (not steal in the literally terms as that is a problem we are already suffering in the UK)

Any help or Advice/assistance would be wonderful.

The dream shot would be if someone had a 447 or 503 that was cluttering up their yard that they wanted to loan us to get this 'old girl' in the air ;-)

Thank you for your time ;- ) *(ed. – There was no name associated with the post but this was the e-mail address in the original message.)*

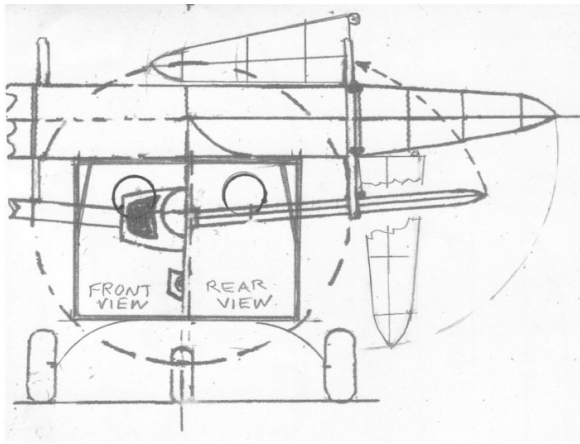
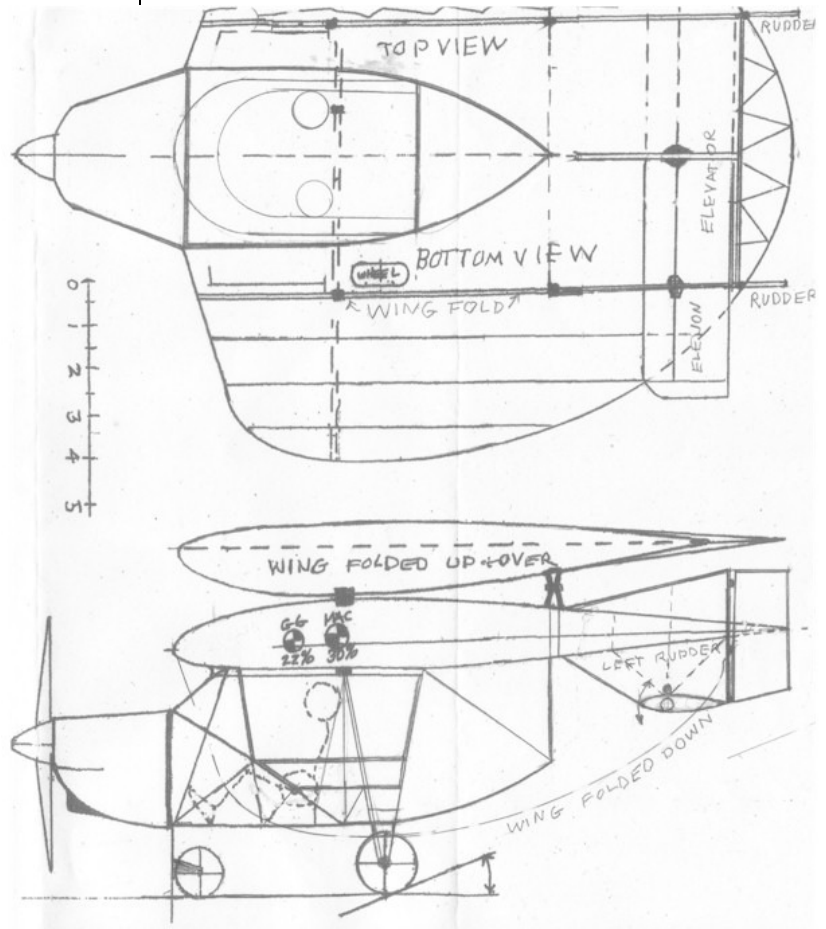
[Small4-strokeEngines@yahoogroups.com](mailto:Small4-strokeEngines@yahoogroups.com)



LOYD LARA MK 18B

WNG SPN - 14'  
WNG CRD - 14'  
WNG AREA - 161 SQ FT  
TOTAL LNTH - 17 FT  
EMPTY WT - 450 LBS  
GROSS WT - 850 LBS  
WNG LDNG - 5.3 LBS/SQ FT  
PWR LDNG - 8.5 LBS/HP

STALL SPD - 20 MPH  
CRUZ SPD - 130MPH  
MAX SPD - 160+ MPH  
LNDNG SPD - 25-35 MPH



*(ed. – The following is from a paper we have in the TWITT archives and to the best of my knowledge it has never been included in the newsletter. I will be in two parts so the rest will be included next month. It is interesting to read about the decisions that were made in designing this aircraft considering the time period.)*

March 31, 1969  
 Minneapolis, MN USA

## The John Akerman Tailless Airplane (Model I – 1936)

By John Akerman

### GENERAL HISTORY

**D**uring the depression years around 1930 the P.W.A. work program was functioning in U.S.A. and the University of Minnesota was asked to provide employment for mechanics and students who needed financial assistance. In order to provide employment under this P.W.A. program the Department of Aeronautical Engineering decided to build an airplane, in order to provide work to a couple of airplane mechanics and some Aero engineering students. To build a conventional airplane did not have much appeal and the faculty and student assistants decided and agreed to build a radically different airplane. Professor Akerman laid out general ideas to be incorporated in this experimental radically different airplane:

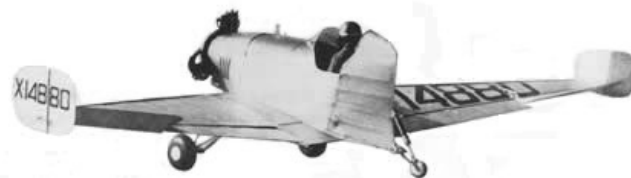
1. It should be a real tailless aircraft,
2. A tractor, single place, incorporating:
3. Wing-tip end plates with rudders acting outward only,
4. Permanent leading edge slot,
5. Center section with rear slotted flap,
6. Elevons and ailerons combined.

### WHY SUCH FEATURES?

At that time there was in existence a Waterman "tailless" airplane which had the straight main wings swept far back, so far, that the wing tip elevons acted as two tail elevators to change the angle of attack of the plane. So really that was not a tailless airplane but it had two tails at the tip of each swept back wing.

In a conventional airplane with the help of the elevator the angle of attack of the wing is changed first, and then the new center of pressure on the wing is

established. In J. D. Akerman's Tailless Airplane the procedure is reversed. By changing the main camber of the wing by means of center section flap and elevons the location of the center of pressure on the wing would be changed and would cause to change the angle of attack of the wing.



For this purpose an airfoil with stable "center pressure" (*Stable: Increase of  $\alpha$  moves C.P. backward decrease of  $\alpha$  C.P. moves forward.*)

travel was selected to achieve longer range of stable pressure travel and higher and flatter maximum lift curve. A basic Clark Y airfoil with a permanent fixed slot, as developed by NACA, was used.

By depressing the trailing edge of the wing by means of the flap of the center section and both elevons in the same direction the center of pressure of this airfoil would move backwards and decrease the angle of attack of the wing. By raising the trailing edges of the flaps of the center section and both elevons, the center of pressure on the wing would move forward and therefore increase the angle of attack of the wing.

The center section flap would be used as a stabilizer for major changes to stabilize the airplane for stable horizontal flight.

This was done by a lever on the side in the cockpit. The elevons would be both simultaneously depressed or raised and would perform the functions of the elevator on a normal aircraft for finer adjustments in vertical plane and were operated with stick movement back and forth.

The motion in roll would be accomplished by deflections of the ailerons in opposite directions from any position both ailerons would be for reasons of their location for motion in the vertical plane as elevons. With other words the ailerons would act as ailerons for roll from any up or down position of both ailerons acting as elevons. The aileron motion was so coordinated that for the same stick motion the ailerons would deflect more upward and less downward (differential ailerons). Actually, physically,

elevons and ailerons are the same parts of the airplane, only with the side motion of the stick they act as ailerons controlling rolling motion of the airplane, but with fore and after motion of the stick as elevons (elevators -from any position of their location as ailerons),

Since the intention was to produce a real tailless airplane, the plan form of the wing was a selected Delta.

The rudder action for motion in horizontal plane, was accomplished by wing tip end-plates which were divided into a fixed forward part and rear movable part. On each wing tip would be the end plate extending up and down from the wing cord to increase the efficiency of the wing when both parts of the end plates would be in straight position, decreasing tip losses.

In order to achieve a right hand turn the rear movable part of the right end plate would be deflected outward, creating more drag on the right wing tip and producing a cross force pushing the right wing tip backward, while the movable part on the left wing would remain straight with minimum drag. This would decrease the lift on the right wing tip and retain the maximum lift on the left wing tip thus producing slight depression of, the right wing and, producing more drag and less lift on the right wing tip, retaining same lift on the left wing and no increase in drag; in total: producing a proper right hand turn. The pilot would depress the right foot to deflect outward the right rudder to make the right hand turn leaving the left rudder straight. To make a left hand turn the pilot would depress the left rudder deflecting the left rudder outward leaving the right rudder straight.

### TEST FLYING

(As retold in 1968 by Professor EMERITUS JOHN D. AKERMAN.)

The plane was completed and taken out to the Wold Chamberlain airport in Minneapolis, Minnesota and housed in U.S. Navy Reserve Hangar to avoid curiosity seekers and amateurs tinkering with the plane. It was handling perfectly in taxiing, since both pedals were connected to the rear wheel. It also made proper turns with rear wheel disconnected from the pedals and turns were made by using wing tip rudders only. I did make several familiarization runs.

The question came up of first flight. There were many good flyers who volunteered to test fly it, but University officials objected, because of lack of insurance for outsiders to do the test flying, since they would not be University employees. At that time on the staff at Aeronautical Engineering Department where were two experienced Army and Navy reserve pilots and Professor John D. Akerman who was a former pursuit pilot from World War I with the French army, (but carried only a current student pilot license to avoid free ride chiselers). The University also refused to allow any one of them to test fly the plane because "test flying was not in the line of their duties for which they were employed by the University" and therefore, they would not be covered with insurance, This argument and tinkering lasted till finally I got disgusted and one day decided to test fly it myself. I considered that the duties of a full professor in Aeronautical Engineering Department included design, construction, testing and flying of a new aircraft. I considered, that in case of accident and liability claims, the courts would consider this test flying in line of his duties at the University Department of Aeronautical Engineering and therefore, would be entitled to all considerations for accidents as for all other professors of the University during performance of their duties.

The plane was fuelled, warmed up, without any notice to anybody except the Navy Commander and the Airport Manager. Particularly no announcement or information was given to the public or newspapers. I taxied the plane to the Northwest-end of the Northwest-southeast 5000 feet long runway. My intentions were to take off and fly close to the ground, find the proper initial adjustment of The stabilizer (center flap) and if everything would be satisfactory then, only, would I circle the field. otherwise, I would land on the Southeast-end of the runway. This decision to land or circle the field would have to be made after the coverage of 2/3 of the runway.

The take-off was easy and normal and at height approximately 10' to 15' the plane took a normal, horizontal position, responding well to the elevon control. In the middle of the runway I was going to examine the response to the wing-tip rudders before deciding to continue the flight around the airport or settle down at the end of the runway. There was a chance that deviations from a straight line might occur on landing, although slight swings to the right and left were tried and the response was satisfactory. At this moment, right when I should have been experimenting

both right and left controls or land, a "dumbbell" and idiot and all the other names that could be said about the newspaperman, had driven a Ford-Sedan across the field and towards the middle of the runway. The driver was holding the Ford parallel to my flight path on the edge and at the far end of the runway. The newspaperman was standing on the running board, holding one hand around the middle doorpost and taking pictures. So if, in the last third of the runway, I were experimenting with steeper turns and if something would have gone wrong or would not have been perfect, I would have slammed right into the Ford-sedan. To avoid such a possibility I cut the gun and settled for a perfect landing in a straight line with the "idiot newspaper" man driving slightly following the plane.

**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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