

T.W.I.T.T. NEWSLETTER



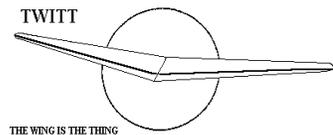
Northrop Grumman's concept is based on the extremely aerodynamic "flying wing" design. This design is among those presented to NASA at the end of 2011 by companies that conducted NASA-funded studies into aircraft that could enter service in 2025. *Image credit: NASA/Northrop Grumman* Source: <https://www.nasa.gov/content/flying-wing-goes-commercial>

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.

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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

T here were some interesting threads on Jim Marske's Pioneer sailplanes that was started when Jim reported more test flights of the Pioneer 4 and further development of the Pioneer 3. I think you will enjoy the information.

The 1-26 bulletin board had a thread on "buyer beware" when someone bought a 1-26 sight unseen but given assurances the sailplane had a current annual and was flyable. Turns out it was not quite what he got and is now in negotiations with the seller to rectify the problems. I think this is some good information for all of us so will make the threads generic and publish them next month so you can file it away until such time you might be in a position to buy any high dollar item without first seeing it.

I hope everyone is getting into the summer flying mode and having a great time.



LETTERS TO THE EDITOR

Nurflugel Threads

(ed. – It was noted that the Nurflugel group had been a little quiet lately then these threads appeared. The first one originated by Jim Marske with an update on the Pioneer 3 and 4. The second talked about a light, swept wing tailless design.)

Jim Goebel flew the Pioneer 4 prototype flying wing again Wednesday. Took 4 winch tows before he climbed out for 1.75 hour flight. This brings total test flights to 45 and total airtime 8 hours. Seals were installed on elevator and rear spar connection. Jim reports a quiet cockpit. He's getting pretty comfortable with it as you can see from videos I posted.

<https://www.youtube.com/channel/UC7cscDUEM4QnZld90F2ki-g>

The Pioneer 3 is flying well and was flown against an ASW-27, which has a measured glide ratio of 44 to 1. Performance was identical from 40 kts to 70 kts. In a thermal the Pioneer 3 easily out climbed the ASW-27 mainly due to its lower wing loading. The Pioneer makes a great ground effect machine. I take my P-3 down to 2 meters at 50 kts and it will run forever without losing airspeed. More info on,

<http://www.kollmanwings.com/>.

We have 2 P-3's flying and 1 P-4 flying. Two more P-4's are under construction. I have been flying my P-3 for 3 years.

The P-4 wing was hot wired from a solid foam block and glassed. It still needs contouring and painting.

Jim Marske

"Forever" might be a bit of an exaggeration, but flight in ground effect can double L/D and, in the case of the P3 or P4, doubling a large number has a huge effect. A P4 can probably coast the length of any runway one is likely to find.

Tangentially, (But perhaps a cautionary tale.) I just returned from the US Nationals at Nephi, UT. The landing protocol was to stop at the far end of U14's 6,300' runway where pilots deplaned, tail dollies and

wing wheels were attached and the glider pushed off on a stub taxiway where the crew took over to tow their glider back to its tie-down.

On most contest days, the 60+ contestants arrived back in a 30-45 minute interval. Watching the landings revealed a number of pilots were surprised at how difficult it was to get their gliders down through ground effect and stopped before crashing into the traffic jam at the end of the runway. (And ground operation people were surprised how long it took to match up dollies and wing wheels with gliders.) Many gliders arrived with smoking brakes, others elected to depart the runway into the infield when stopping looked doubtful. Lesson: Don't aim a landing glider at anything you want to keep.

An amusing moment happened when a pilot leaped from his cockpit shouting what a wonderful flight he had flown - not noticing the still draining left wing ballast tank was pouring water into his shoe. His "squish-step-squish-step" walk off the runway was hilarious. Lesson: Dump ballast early so as not to carry extra weight into the braking run.

Bildan

I have noticed that. Its ground effect performance is amazing. The only problem would be that adding power for transporting payload would affect the CG. So one may still think (I know you do not like the idea) of something like the Genesis with tail. The other problem would of course be the impossibility to turn in GE, 'cause of the aspect ratio.

My Bolide Nemo two seat GE craft, 85% completed, is still sitting in my covered and enclosed backyard since five years ago, when both my sponsors and I ran completely out of money. I am wondering if I will ever be able to finish it and fly it. I add the photos of the first assembly and a link to the model's video (here below), in which you will be able to see one of my sponsors as well. He is now in his nineties and not very movable.

<https://www.youtube.com/watch?v=w1s9ZKWcFT8>

Cheers

Bruno De Michels

Jim, I am sooooo happy to finally see this Pioneer 4 airborne. When I found the video, my mouth dropped open. Aaaawesome glider!

Keep that brain spawning wings,

Koen Van de Kerckhove

<http://www.nestofdragons.net/>

Hello, all, I am back to the group after many years away. As the subject line says, I am interested in learning about light swept-wing tailless designs with fuselage and rudder. The Granger Archaeopteryx comes to mind as do the proof of concept gliders of the Me163 and its Japanese counterpart, but am having a hard time finding any more. My crazy inspiration is creating a full-size, homebuilt aircraft along the lines of Eric Clutton's old Tadpole single-channel RC model: Outerzone : Tadpole plan : download free vintage model aircraft plan http://www.outerzone.co.uk/plan_details.asp?ID=3685

Model plans in Files section and some model pics in Photos section. I'd welcome feedback on the practicality of this layout for a small homebuilt, possible change to the wing location for better visibility.

Cheers,

Matthew

Might be fun to upgrade the Tadpole to electric powered and use one of the small Spectrum receivers.

Warren Bean

I ran it through XFLR5, far too high a drag C for me!!

Paul Schofield

(ed. – This is the last part of the paper written by John Akerman on his tailless aircraft from 1936. I have also included a follow-on letter by Akerman to the National Air and Space Museum in 1970.)

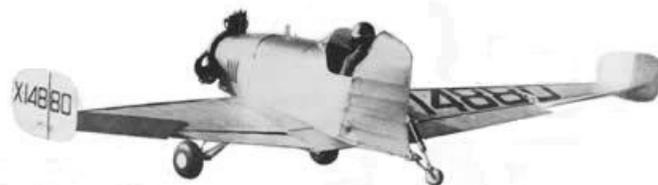
By this time the field was full of cars coming to witness the flight of this unconventional airplane. There was no chance to make another flight because even taxiing was endangered by curiosity seekers' automobiles. The planes had to be locked up in the Navy hangar. The idiot-newspaper man had the nerve to come and try to interview me. With toughest words and clinched fists I advanced on him to knock his head

off for endangering my life and his life and preventing further testing. Only intervention of friends stopped me from committing a murder then and there.

RESULTS OF THIS TEST:

1. Take-off was easy and normal with the calculated and guessed center flap setting for stable horizontal flight. Elevon setting was satisfactory for vertical control and roll.
2. Satisfactory horizontal flight with slight deviations to right and left;
3. Satisfactory response for lateral control and good stability and control at take-off, flight and stall for landing. There is no question that with more experimental maneuvering right and left I would have been able to continue the flight around the airport at higher altitudes;
4. One negative point was that at the very beginning of the flight, being under tension and by old habit, I found myself pushing on both pedals at the same time. This I immediately corrected by relaxing and retracting both feet and applying slight pressure only on the pedals in which direction I wanted to turn. This was the first thing I was going to correct by introducing cross-connection between the two pedals so that uniform pressure by both pilot's feet would be neutralized and only more pressure on the one pedal would activate the corresponding wing-tip rudder.

The next day on the campus hell broke out for me because I had exposed the University to possible liability,



To bring in the plane to the University Laboratories and to install the interconnection between the two pedals would have indicated that I intended to fly it again, what I did intend and which I had determined to do, but in place of that I decided to postpone any

activity so that r could again unexpectedly sneak in another flight.

At the same time the local Federal Aeronautics inspector was alarmed that I did a test flight on a student solo permit license; but that question was squashed in a friendly manner with no mention of a future flight.

In this waiting period after a couple of months I was stricken by a gall stone attack, was hospitalized and operated on to remove gall bladder and appendix at the same time. This is a major operation by itself, but in my case it was complicated with the post-operational tearing of the stitches with a consequent rupture to correct which I had to wait approximately one month before the surgeon could repair the rupture. I was operated on for the second time, but again through clumsy post-operative care, still a small rupture occurred, which I carried until March 1968. Both operations were made by a world famous surgeon, who made a mistake, maybe, one in a thousand, Unfortunately, that one was made on me. The operations eliminated me from renewing my student pilot license. The University took a very strong stand against my test flying; therefore, no more test flights were made and the plane was kept all the time in the University Storehouse. Only once it was taken out for an attraction at the local air show.

CONSEQUENCE! AND INFLUENCE ON MODERN PRESENT DAY AIRCRAFT

A Delta wing was practically established. Elevons, center section flaps are in general use. It rvas established that it is perfectly feasible to make an unswept wing stable by proper choice of camber and C.G. location. The principle of a true tailless airplane utilizing the camber change on a Delta wing was used on Northrop tailless bombers, B-49. A top decision, to make bombers with tails, instead of going to tailless types, was made on the basis of political, financial, personal, conservative considerations and avoidance to do something radically different from the old established line of planes with tails. Wing-tip end plates on Delta wing are used on B70.

(ed. – This appears to be a plea for the Smithsonian to take possession of Akerman’s aircraft as a historic piece of aviation development.

It must have worked since the pictures of it hanging are from the Smithsonian.)

Mr. L.S. Casey, Assistant Director
 National Air and Space Museum
 Smithsonian Institution
 Washington D.C. 20560

Dear Mr. Casey:

Received your letter of March 13, 1970. I note that the main points of this uniqueness, importance and firstness have been missed in my communication “The John D. Akerman Tailless Airplane March 31, 1969” of which Mr. Robischon has a copy and which you may use as reference. It is my fault that some points havae not been emphasized strongly enough. The main pint of uniqueness is that by changing the airfoil shape by elevons or ailerons, the center of pressure of a stable wing is changed first and then the angle of attack of the whole plane changes. This is contrary to the normal sequence of standard planes and large sweep-back tailless planes, where by tail effect the angle of attack is changed first and then the center of pressure changes on the wing. It is the first tailless plane with no sweep-back and real predecessor and ‘missing link” between large sweepback tailless planes and modern present day delta planes.



As you know in a large sweep-back wing tailless planes the wing tips act like two tails. The an onlooker one elevon and one aileron may look the

same on a tailless plane of the same period but to a scientific aerodynamist the purpose and the functioning may be quite different. The difference and significance is described in my write-up on March 31, 1969 but may be was not brought out plainly enough. Therefore I may repeat some remarks.

If you have Waterman's plane and the one of the present day real delta planes you will notice who changed it to real tailless plane in USA.

Yes! Lippish, Fieseler F-3, Waterman's swept wing pushers influenced my design to the extent that I was convinced very strongly that the need for a real tailless airplane in the USA is great.

Even Waterman's "Arrowplane" two seat pusher, confidentially proposed in 1934 in the USA Bureau off Air Commerce and description of which appeared in Jane's World Aircraft only in 1935, was a sweep-back pusher. The only tailless airplane in England, Pterodoctyl M.K.V. Westand-Hill, pusher had a large sweep-back. So was Short's S.C.I. In USA only a large sweep-back Waterman type was in existence.



As for the sketch of control linkage for elevons and ailerons I consider it unimportant as it was plain engineering design detail. Since the plane is packed, it is now very difficult to sketch it, but if you consider it important it can be produced when the plane is being re-conditioned.

That the question of real tailless plane in USA was not an obvious assumption, can be seen by the

volume of original wind tunnel test data in the University of Minnesota wind tunnel, where test were run and re-run from February 26, 1934 to January 14, 1935. This original data I have not sent to you. I also have the original stress analysis calculations.

Attached is a summary of some points.

In the meantime another complication has arisen which calls for immediate action and with present mail strike makes things more pressing.



The University of Minnesota is closing operations at former Rosemount Aeronautical Laboratories and the tailless plane will be left in an unguarded, old storehouse with only occasional police patrol to check what has been stolen. Therefore immediate steps should be taken to protect this plane. It is so attractive that it wont be long before kids, souvenir hunters and antique plane collectors will make shambles of it or completely steal it. It is so compact and easily towable away, it certainly cannot be left there.

In case the Smithsonian Institution does not want it I have several other plans to take care of it but in that case I will ask you to return the certified copies and the original documents forwarded to you. Those documents have to go together with the plane. If your decision would be reached within the next two weeks and it would be negative, I would have it loaded on freighter plane and flown for safe keeping elsewhere for good. This plane certainly has a definite place in the

history of development of the present day delta in the USA and in some respects in the world of aviation.

Please expedite your decision.

Sincerely yours,

John D. Akerman

(ed. – Here is the attachment information he referenced.)

Here are the “FIRSTNESS”:

1. First tailless aircraft in the world to change airfoil shape, to change CP then angle of attack. I quote an extract from William R. Sears, Dean of Cornell University, Graduate School of Aerospace Engineering, who was the aerodynamist for Northrop tailless bomber. In his letter of February 14, 1969 he writes: (paragraph 5, page 1)

...”I have no particular suggestions to make about the write-up. It is my personal opinion that your distinction between a true tailless airplane and one with ‘horizontal tails at its wingtips’ is a valid one. Perhaps you ought to emphasize even more it is perfectly feasible to make an unswept stable by proper choice of camber and CG location. I don’t know which category you would put the Northrop airplane – you will remember that he used quite a bit of sweep-back – but it would be quite appropriate for your to point out that the principle you used was involved, albeit to a lesser degree.”

2. First in United States and England real tailless airplane built in 1934.
3. First real tailless tractor plane, single seater in the world and in USA.
4. First real tailless delta built in USA.
5. First tailless using Handley-Page flaps – letter from Handley-Page, Canada.

6. First tailless to use front slot and real H. Page slotted flaps.
7. First tailless not to use tip “wash out” – which really makes wing tip tails.
8. First transition aircraft from sweep-back to present date delta in USA.
9. Is the missing link between sweep-back tailless planes to real delta in American aircraft.
10. First delta in America to use differential, independent rudders.
11. The best way to look at plan views of all other sweep-back planes and present deltas and notice the place this plane has in the transition of American aircraft from sweep-backs to present day deltas.
12. It proved that all aerodynamic auxiliary devices: forward slots, slotted ailerons, stable CP travel airfoils, etc. are applicable to tailless airplanes.



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

instructions, constructions photos and a flight manual cost \$250 US delivery, \$280 foreign delivery, postage paid.

U.S. Pacific (559) 834-9107
 8104 S. Cherry Avenue mitchellwing@earthlink.net
 San Bruno, CA 93725 http://home.earthlink.net/~mitchellwing/



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

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