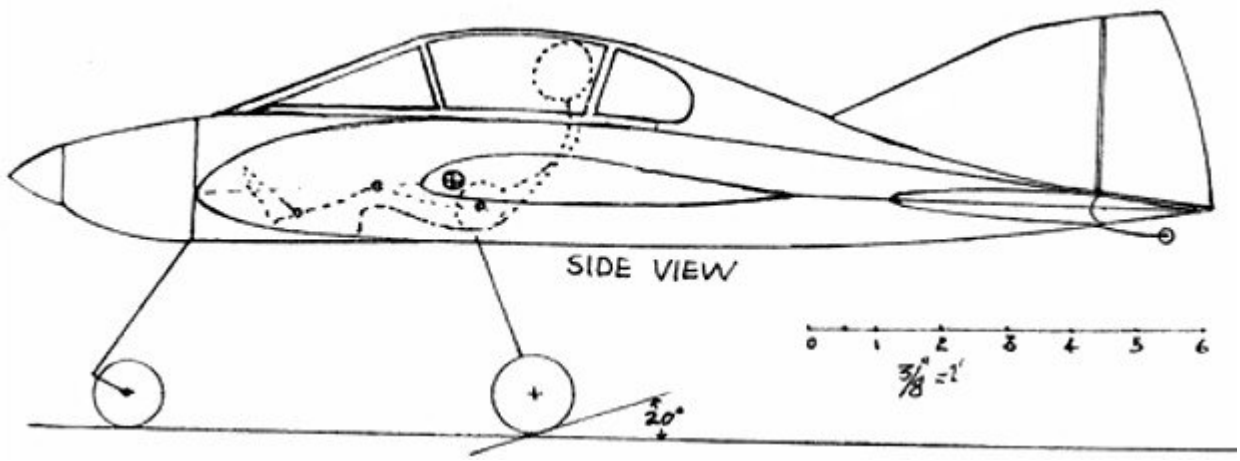
No. 237 MARCH 2006

T.W.I.T.T. NEWSLETTER

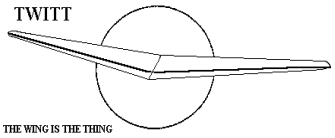


This is the side view of Jim Loyd's LARA low aspect ratio flying wing. It has its roots in the ARUP design concepts and other low aspect types of the era. Learn more about this project on page 2.

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., **0603** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, March 18, 2006, beginning at 1:30 pm at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - Southeast side of Gillespie).



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

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

T.W.I.T.T. Officers:

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Editor: Andy Kecskes
Archivist: Gavin Slater

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Subscription Rates: $20 per year (US)
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Information Packages: $3.00 ($4 foreign)
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48oz/48	40.00	42.00	30.00
60oz/60	50.00	53.00	37.00

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

I think you will really enjoy this issue. I would like to thank Jim Loyd and Jim Marske for their contributions that have made it really good. If you have an Internet connection this is one you want to view on your computer screen so you can see the great color shots of both the aircraft.

I finally got some work done on the web site by getting rid of links that no longer worked, updating the home page and getting the back issues of the newsletter converted to the PDF format and linked in the members only section. I won't get much more done until I have the next issue of Sailplane Builder sent to the printers later this month.

Although I didn't include any message traffic from the U-2/B-10 group they seem to be very active and it appears there is a lot of interest in building the U-2, especially with the fuselage shown in the German version build by Wolfgang Uhl and featured on our July 2002 cover. It is much sleeker overall and includes retractable gear to improve performance even more.

Since our speaker will be doing a projected presentation it will be a good opportunity to also show the video the Chuck Tucker sent of his VORTEX low aspect ratio R/C test model. It is really interesting to watch it come in very slowly but under complete control. It was also fascinating to see it doing loops, aileron rolls and barrel rolls.

I hope everyone is having a great 2006 so far and getting lots of work done on your projects. Unfortunately, all my projects are handyman things around the house versus airplanes.

Andy

MARCH 18, 2006 PROGRAM

The March program will feature Martin Hollmann who will be talking about the design of wings and history of all flying wings. It will include the early history of the first all metal aircraft of Hugo Junkers, which include canard, flying wings and the first commercial airliners of the world. Then the design of the Lippisch and WWII flying wings (Me163) and the design of these wings and how they influenced the design of Northrop and, Convair's delta wing designs after WWII. Why such design features as sweep back and leading edge devices are needed. A comparison of aircraft configuration will be made for: flying wing; canard; conventional wing & tail and; three surface aircraft.

LETTERS TO THE EDITOR

February 1, 2006

I am renewing my membership in TWITT after an absence of about 10 years. I have newsletters from numbers I to 107. During 1995, I got involved in several projects and situations that adsorbed all of my time and energy and I dropped my membership.

Several years ago I read an article about the 1934 ARUPS and Milt Hatfield's "Little Birds" airplanes in an issue of CONTACT magazine. I was (and am) totally discouraged by the directions the EAA is leading the home building movement. I wanted a small, simple, easily and cheaply constructed airplane that could be built and stored in a one-car garage. After much searching and collecting and many hours at the drawing board I settled on the configuration shown in the enclosed photos and drawings. After several models to assess the three dimensional aspects of my design, the RC model in the photos resulted. I used this model to test 'V' tails, inverted 'V' tails, F' tails and ailerons at low speeds (10-25 MPH). The [tail configuration seemed to work best. Because this design was so different from the typical airplane structure, I built the full size mock up shown in the photos. The cockpit area utilizes Tubing because it is easier to engineer changes in this area than with composites. The rest of the structure will he made of common structural foam reinforced by fiberglass. When the flying prototype has proven the design the whole structure will he of reinforced foam.

In September 2005. I made 70+ high speed (50-80 MPH) test runs of the T tailed configuration. To my surprise aileron effectiveness disappeared around 55 MPH and then returned around 75 MPH. The threads' actions showed that the slipstream was flowing almost parallel to the trailing edge instead of across it as it had at low speeds. I assume that the increased speed increased the air pressure on the ailerons to make them effective again. I changed the shape and positioning of the ailerons several times but the results though better did not satisfy me. So it was "back to the drawing board time". I am now making a free-flying RC model of the configuration shown by the three view drawing. I will test it on the boom and if it flies satisfactorily there I will free fly it. If I don't crash before I get some vital info, I will start on the full sue flying prototype.

Enclosed is my check for membership renewal. I hope you have a catalog of articles from 107 to the present.

Happy wings!! Sincerely.

Jim Loyd
Thornton, CO

(ed. – The following pages contain the drawings and pictures Jim commented about in his letter. I found his "wind tunnel" test bed quite interesting and the fact that the van caused significant interference when out the side door versus out in front. I also noted that he has the same entrance problem as the Facetmobile where you have to get in from underneath due to the overall height of the doors from the ground. He has obviously given this design a lot of thought and is going about developing it very methodically. We wish he continued success in this endeavor.)

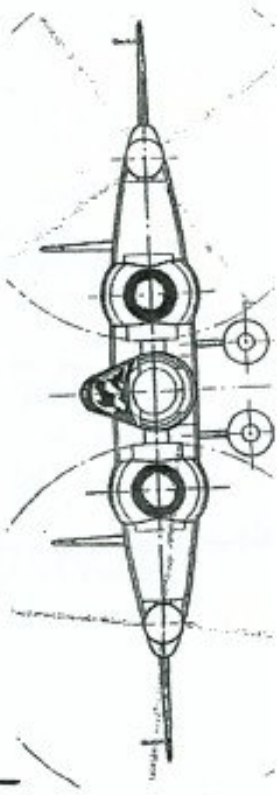
February 14, 2006

Squaring the Circle. Chuck Tuckers Vortex seems to have all the advantages and more of the 1930's circular wings, it flies very well, takes off and lands in a short distance, and is finally aerobatic. Circular wings were not notable for their aerobatic capabilities.

A square wing design would seem to be original, as I don't recall see one before. Although it is said that there is nothing new under the sun.

I agree that the Vortex could revolutionize general aviation with its high performance, no stalls and short take-off and landing capabilities. I often wondered why

ADVANTAGES OF LOW ASPECT RATIO CONFIGURATION

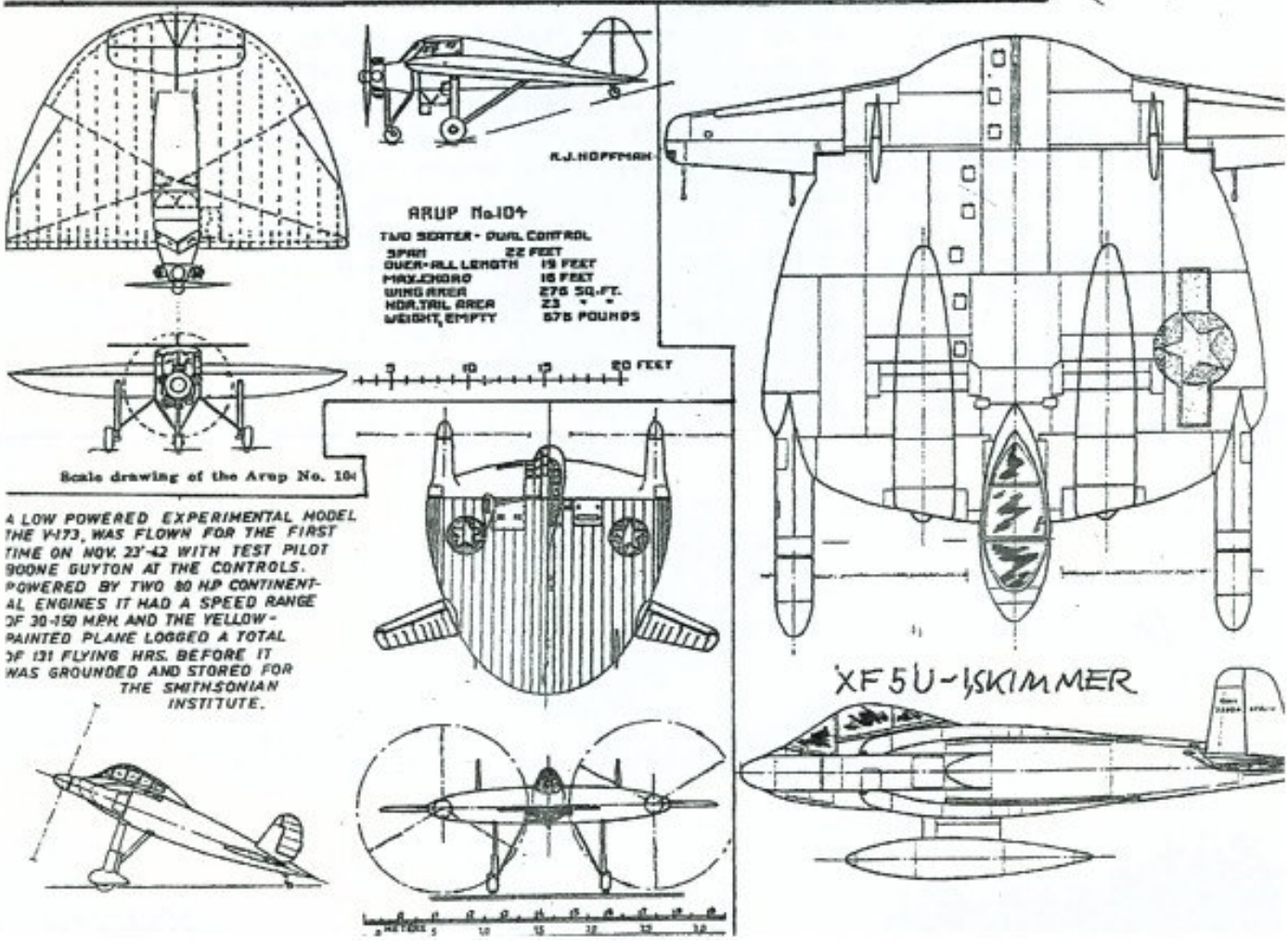


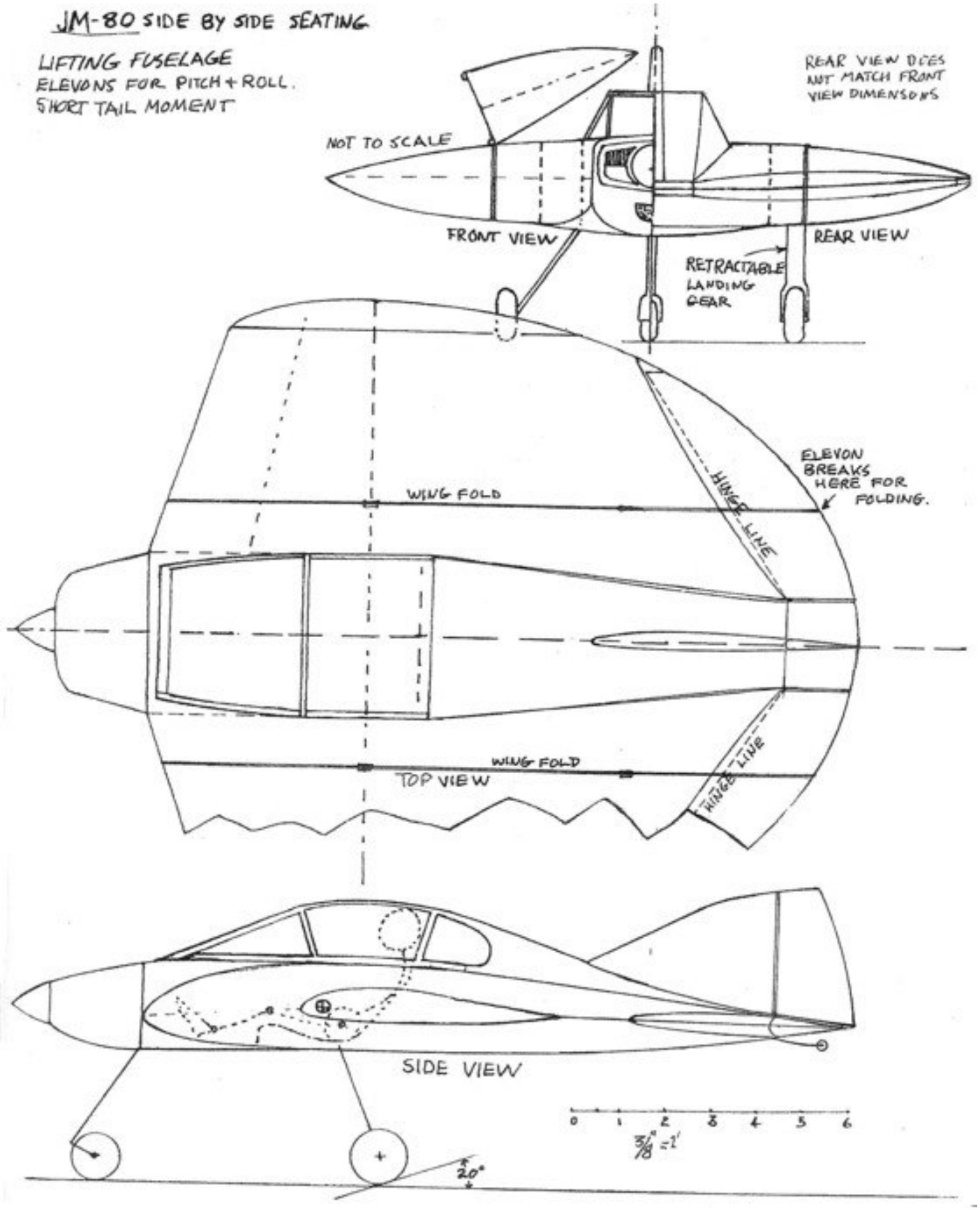
STRUCTURE

1. Small size (L=17', W= 14') with large lifting area -161 sq ft.
   With folded wings fits 1 car garage
2. Form and structure is simple and compact. Can be built in small area.
3. Structure can be very light because thick short wing allows light spars, ribs, etc.
4. Large internal capacity - fuel, baggage, wheels, radiator, etc.
5. Large CG envelope.

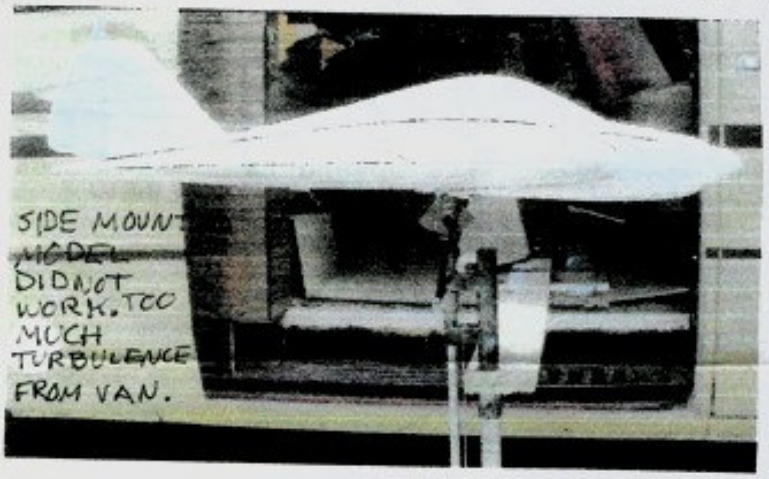
AERODYNAMICS

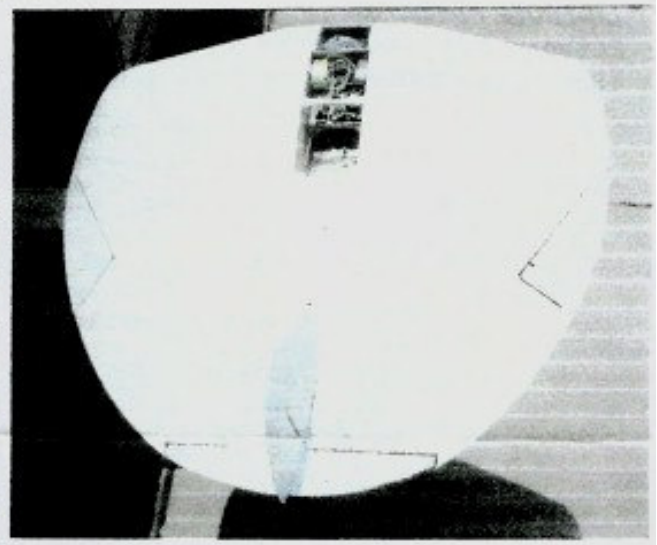
1. A curved trailing edged wing with an aspect ratio of 1.27 to 1.50 performs the same as a typical 6 to 1 aspect ratio wing.
2. The Reynolds Number of the air flowing over the wide chord wing is higher, resulting in a higher Lift/drag ratio.
3. A thicker boundary layer exists over the long chord of the wing that prevents the tripping of the air flow and loss of lift. It also means that bumps, dents and rough surfaces on the wings do not have near as much effect on lift and drag as on a long narrow chord wing.
4. The curved trailing edge allows the air to leave the wing smoothly with very small or no tip vortices. Air stays attached at even at high angles of attack (30-34 degrees). This wing is very difficult to stall. The nose mushes down to flying angle of attack.



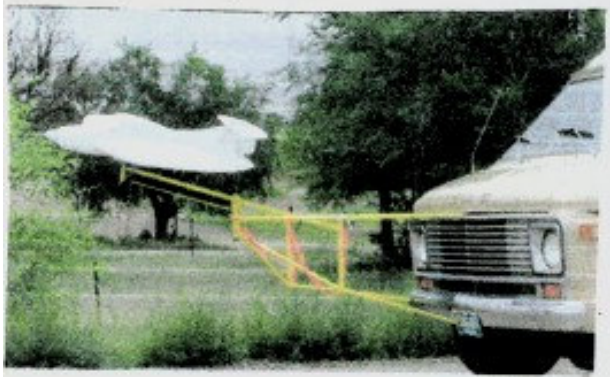

JM-80 SIDE BY SIDE SEATING
LIFTING FUSELAGE
ELEVONS FOR PITCH + ROLL.
SHORT TAIL MOMENT
NOT TO SCALE
REAR VIEW DOES NOT MATCH FRONT VIEW DIMENSIONS
FRONT VIEW
REAR VIEW
RETRACTABLE LANDING GEAR
ELEVON BREAKS HERE FOR FOLDING.
WING FOLD
HINGE LINE
WING FOLD
HINGE LINE
TOP VIEW
SIDE VIEW
0 1 2 3 4 5 6
3/8" = 1'
20°

Aerodynamic Radio controlled model mounted on boom out side door of van





T Tailed mockup of LOYD LARA. 10/10/03



the circular type wings will lesser capabilities than the Tucker Vortex never found a niche in aviation.

Please sign me up for two years of TWITT. If you do go completely on-line before then don't worry about a refund.

Those 1920's and 1930's designs look almost present day state of the art.

Edwin Sward
Worcester, MA

(ed. – Thank you also for the long-term renewal. In reply to your question on square wing designs there was the Horton Wingless that was sort of a square with large end-plates and two big radial engines (was an old Beechcraft airframe). It flew successfully, but was an economic failure that involved some mysterious dealing with Howard Hughes.)

February 16, 2006

Enclosed is my renewal for another year. I hope you received the Backstrom Plank control system per your e-mail. I had sent it earlier but it was returned for insufficient postage.

I bought my Plank plans way back in the early 70's so they didn't print out too great but you can still pick out all the details. Are you considering a plank?

Marske's little yellow book details his experience with the Plank – sold me on the "wing". I also have the plans for the Pioneer D2.

Thanks much. Keep up the great work on both newsletters.

Fred Blanton
Vacaville, CA
<fnjblanton@prodigy.net>

(ed. – I am confused, which isn't a new thing most of the time, in your reference to an e-mail on the Plank's control system. I can't find any references in my in-boxes, but I pleased to have the drawings to add to the TWITT archives. Every once in a while we receive a request for how to build a flying wing control mixer.)

February 25, 2006

Please renew my TWITT subscription for two years. It's good to keep in touch with what's happening.

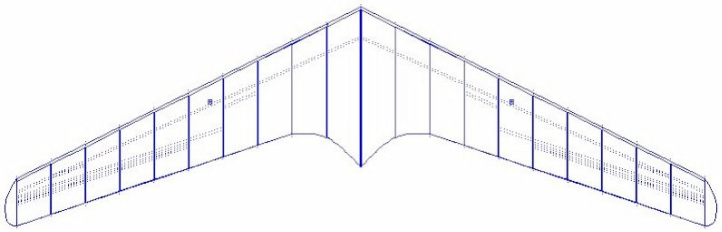
Robert Eastgate
Pasadena, CA

(ed. – Thanks for the long-term renewal. It is always nice to know our members are enjoying the information provided in the newsletters.)

From the Nurflugel bulletin board:

February 10, 2006

I have got a new flying wing on the building board. You can see a drawing of it here:



Specifications:
Wingspan: 82"
Airfoil: Eppler 334
Twist: Imel twist distribution - produces upwash required at the wing tips to overcome adverse yaw.
Spoilers
Drag rudders
Twin-engine brushless power
Fixed landing gear (removable for hand launch)
Target Weight: Around 4 lbs with landing gear

Designed using CompuFoil 3D and Turbo CAD 9.0

I'd love to install retractable gear on this version, but the wing is too thin to enclose the 3" diameter tires required for grass fields. I'll need to enlarge this design to make room for the retracted gear.

Jeff
<northropn9m@yahoo.com>

(ed. – There were several questions and answers that followed this original message and they are included below with a ***continuation on page 11****.)*

The plan looks like a classic Horten glider. I bet it will flight pretty good. Let us know how it comes out.

Seeing this plan reminds me of a question the group might help me with. What was the reasoning behind the bobtail on most Horten designs? Did it contribute to stability in some way?

Warren Bean
<warrenbean@cebridge.net>

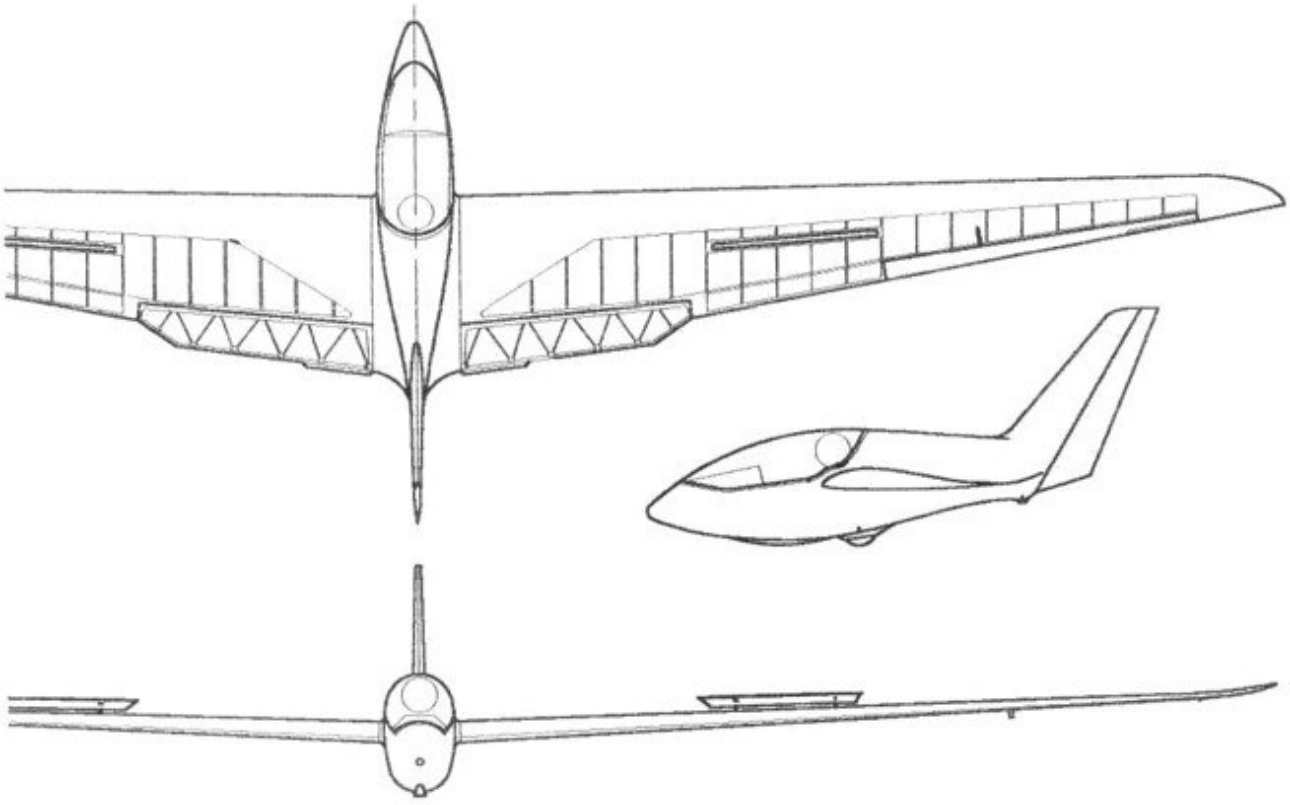
PIONEER 3 TAILLESS SAILPLANE

By Jim Marske

We are now entering the field which is envisioned as being the last word in efficiency, but which is far from perfection, namely, the "Flying Wing." Although many successful men carrying wings have been made, they were all of experimental nature and with one or two exceptions none went beyond that into regular production. In time, when sufficient capital is present to cover the high cost of experimenting and production we may see the "Flying Wing' come into its own.

These were the words and a quote from one of my boyhood hero's, Frank Zaic, taken from his book "Model Glider Design" (1944). This book and his Thermic series of model sailplanes greatly influenced my interest and dedication to the physics of flight.

The Pioneer 3 continues the evolution of a series of flying wing sailplanes. Any significant advances learned from previous experiments of the tailless type were incorporated into the latest design, the Pioneer 3. Thanks to computer derived airfoils we now have a laminar profile suitable for flying wings. A 25% drag reduction over the Pioneer 2 airfoil is expected. Now that is a considerable amount.



SPAN	15.0 METER (49.2 ft)
ASPECT RATIO	16.8
WING AREA	144 sq.ft.
AIRFOIL	MRL-35
EMPTY WEIGHT	310 lbs
PILOT AND CHUTE	160 to 280 lbs
EQUIPMENT / BALLAST	60 lbs
WING LOADING	3.2 to 4.5 psf
1/4 CHORD SWEEP	-3.7 degrees

CALCULATED PERFORMANCE:	WL = 3.7 psf	WL = 4.5 psf
SINK RATE	100 fpm @ 38 mph (33 kts)	110 fpm @ 42 mph (36 kts)
GLIDE RATIO	40.5 to 1 @ 55 mph (48 kts)	41.0 to 1 @61 mph (53 kts)
CRUISE	L/D=21.5 @ 124 mph (108 kts)	L/D=21.5 @ 136 mph (118 kts)

The popular 15-meter span was also chosen for the P3 to simply in-flight performance comparison. It was best to eliminate the variables to get a more honest evaluation. However, the moderate 16.8 aspect ratio was a compromise to performance Vs the need for a maximum elevator moment arm and an acceptable cg static margin.

An unexpected occurrence was the low empty weight achieved without sacrificing strength or integrity. As seen in the photo, without fabric cover or canopy, the aircraft weighs only 270 lbs. This is attributed not only due to the lack of a horizontal stabilizer and a fuselage tail boom but due to the Graphite carbon rods used in the main spar caps and vertical fin spar.

The construction of the sailplane is mostly glass and epoxy. The only carbon is the Graphite carbon rods. The fuselage has a steel tube frame, much like that of the Pioneer 2, to carry the primary loads such as wing bending loads and landing loads

The Pioneer 3 fuselage design has been greatly influenced by our previous project, the Genesis 2. Although similar in appearances there are many differences. The cockpit section is located 8" further back into the wing root, which shortens its overall length. The cockpit is an inch deeper and wider than the G-2. The wing is more of a mid-wing which gets the pilots head higher above the wing to improve visibility. The main wheel is non-retractable which not only saves complexity but also weight. All pushrods and cables are enclosed in fiberglass siderails giving the cockpit a good clean look. Adjustable rudder pedals and seal back provide the necessary comfort for tall as well as short pilots. The canopy is a forward hinged type with the instrument panel going up with the canopy. The towline release handle is positioned on the fixed lower left hand side near the pilots left leg. Opposite that on the right side is the handle for adjusting the rudder pedals.

An unusual feature is a unique trim device. The aircraft performs best when the elevator is trimmed flush with the wing. The elevator position is counter productive at high and low speed. By installing a tube along the length of the fuselage and inserting a 10 pound weight within it, the weight can be slid fore and aft moving the cg in flight. We can even vary the speed without moving the elevator from its optimum position. We had tried this some 25 years ago and again in recent years in a Pioneer 2.

The wings D-tube leading edge was molded in a female mold. This is not a foam sandwich as is common in most composite sailplanes. The skin is monolithic. That is, it is made of multiple layers of glass fabric without a core material. The nose ribs and main spar is set into the leading edge mold and skin while the resin is still wet and fresh. Once positioned, the mold is clamped against the ribs and spar and then allowed to cure.

Spoilers, or air brakes, are of the plug type similar to those used on today's production sailplanes. Ailerons have a 2 to 1 differential plus anti-servo tabs, which are incorporated into the outboard end of each aileron. This combination nearly eliminates all aileron adverse yaw. This system was tested on the Monarch with great success. Without the anti-servo tabs the rudder would not have enough power to enter a quick and smooth coordinated turn.

All towing, by airplane and winch, is accomplished by a dual set of retractable, flush mounted tow hooks. They are mounted under the leading edge in each wing root a small distance forward of the main spar. To be more specific, the tow hooks are positioned at the aircrafts forward cg. A “V” type bridle must be used for all towing

The Pioneer 3 is ideally suited for auto or winch operations. It has everything going for it. Its lightweight and low wing loading means quick takeoffs and low powered launches. The true cg hook placement provides a steep climb resulting in maximum release height. With an L/D of 40 to 1 and a low sink rate of 100 fpm a lot of ground can be covered searching for a thermal. Its low wing loading of 3.5 psf drops the stall speed to 30 kts. Imagine the tight turns that are possible. Use it to catch those last minute thermals or center the core’s strongest lift,

A feature of the Pioneer flying wing is its overall low drag over a very wide speed range. Several very experienced pilots have stated that the Pioneer runs as though it had twice the wing loading. We have flown the XM-1D Plank as fast as 125 kts and the Pioneer 1 lo 165 kts. Both these sailplanes had a wing loading of 3.5 psf and the glide is still flat. Let’s see you do that in a 1-26. And for the record, the 1-26 and the Pioneer 1 both have a similar airfoil, wingspan, wing loading and aspect ratio. It will be interesting to see how the Pioneer 3 fairs with an airfoil 25% lower in drag.

Continuation of Nurflugel bulletin board items:

In my experiments over the last four years, the model aircraft I have built and flown with the bob or bat tail as it is called provides a little better lift and tends to maintain pitch better over a wider range of air speeds.

The middle section is much thicker and provides more payload room. Plus, it looks good.

Jeff

The "bat tail" was an effort to inhibit the "middle effect." The rationale was twofold:

First, because there was a loss of lift in the center section, lengthening the root chord made that area capable of providing more lift.

Second, the bat tail had the effect of de-sweeping the quarter chord line. As it was the sweep of the quarter chord line at he centerline of the aircraft which was supposedly responsible for the middle effect loss of lift, it was felt the middle effect could be eliminated if the quarter chord lines of the two wing halves were to meet at 180 degrees at the centerline.

Alan Halleck, of Portland Oregon, has built a number of radio controlled swept wing gliders for the slope and for thermal flying, at least one with moveable CG. He has always maintained that the bat tailed wings fly better.

For more details, check out our On the 'Wing... article at <http://www.glide.dyndns.org/on-the-wing2/86-Middle-effect.pdf>.

Hope this has been of some help.

Bill & Bunny Kuhlman
<bsquared@themacisp.net>

Right answer (gold star).

The H IV deswept the quarter chord line completely at the centerline. The H VI actually REVERSED the sweep of the quarter chordline at the centerline.

The rality was that mitteleffekt had nothing to dso with the smoothness oif the transition of the 1/4 chord line, it was simply wing sweep (though the added area of the bat-tail did help the problem).

Al Bowers
<al.bowers@dfrc.nasa.gov>

AVAILABLE PLANS & REFERENCE MATERIAL

Coming Soon: Tailless Aircraft Bibliography Edition 1-g

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

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

Prices: To Be Announced

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

Personal Aircraft Drag Reduction, by Bruce Carmichael.

Soft cover, 81/2 by 11, 220 page, 195 illustrations, 230 references. Laminar flow history, detailed data and, drag minimization methods.

Unique data on laminar bodies, wings, tails. Practical problems and solutions and, drag calculations for 100HP 300mph aircraft. 3d printing. $25 post paid.

Bruce Carmichael brucecar1@juno.com
34795 Camino Capistrano
Capistrano Beach, CA 92624 (949) 496-5191

VIDEOS AND AUDIO TAPES

VHS tape containing First Flights "Flying Wings," Discovery Channel's The Wing Will Fly, and ME-163, SWIFT flight footage, Paragliding, and other miscellaneous items (approximately 3½+ hours of material).

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

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

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

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

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

An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio cassette tape of Alex's presentation explaining the material.

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

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

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

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

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

NURFLUGEL

"Flying Wing"
by Dr. Reimar Horten & Peter Selinger

350 illustrations
German & English text
Limited number of the "flying wing bible" available
Cost: $49.00 plus $4 shipping and handling

SCOTT flycow@aol.com
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Tailless Aircraft in Theory and Practice

By Karl Nickel and Michael Wohlfahrt

498 pages, hardback, photos, charts, graphs, illus., references.

Nickel and Wohlfahrt are mathematicians at the University of Freiburg in Germany who have steeped themselves in aerodynamic theory and practice, creating this definitive work explaining the mysteries of tailless aircraft flight. For many years, Nickel was a close associate of the Horten brothers, renowned for their revolutionary tailless designs. The text has been translated from the German Schwanzlose Flugzeuge (1990, Birkhauser Verlag, Basel) by test pilot Captain Eric M. Brown, RN. Alive with enthusiasm and academic precision, this book will appeal to both amateurs and professional aerodynamicists.

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