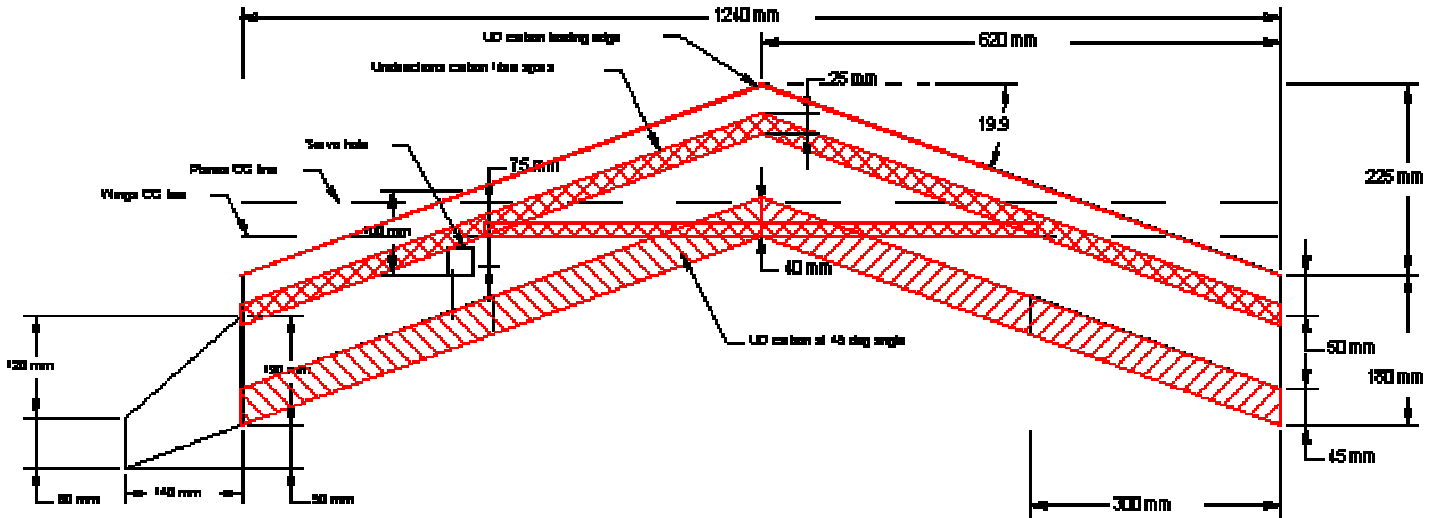


T.W.I.T.T. NEWSLETTER



This page describes small flying wing (Libell) I'm building. If you have any comments or suggestions please send me an e-mail. Arne Anspers <arne@cyber.ee> Source: <http://home.cyber.ee/arne/small.html>

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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 \$33 per year foreign electronic

Information Packages: \$3.00 (\$4 foreign)
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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

We have a mixed bag of things for you this month. Some of it is a crossover from my communications through the Experimental Soaring Association (ESA) and some of it from the usual Mitchell U-2 or Nurflugel flying wing groups.

Speaking of ESA, don't forget their annual western workshop is coming up over the Labor Day 3-day weekend at the glider airfield in Tehachapi, CA. This is a premier event with aviation experts making presentations on a variety of subjects of interest to everyone. Although I haven't seen a schedule yet, I imagine it will cover regenerative systems and the growing interest in electric powered flight. So see the basic information on page 3 along with a teaser from Phil Barnes on his subject for Sunday morning's opening session.

Phil Barnes has also given you an engineering puzzle to solve and I have included two answers you can compare to what you think is the solution. Have fun with it.

I hope everyone is having a great summer and getting in a lot of flying. For me it hasn't quite worked out with weak soaring conditions much of the time in the local area or the temperature being in the high nineties making it a hardship to rig and di-rig my 1-26. I used to be able to tolerate the heat but now in my early seventies this is no longer the case so going out to fly becomes less frequent this summer. Oh well!!



LETTERS TO THE EDITOR

(ed. – Phil Barnes sent this in as a mind game for all of you engineers out there. I haven't seen anything further from him to say someone has come up with the correct answer, so if you think you can solve it please e-mail him at the address below and include me as a cc:. Thanks. I have included two of the responses I have seen so far as food for thought.)

All:

This week at Northrop Grumman, a propulsion-class student dropped by my desk asking for assistance with his homework problem. He was told that a high-pressure air cylinder or bottle resting on a frictionless surface experiences sudden, simultaneous opening of sharp-edge orifices, one at each end, and one orifice larger than the other.

The student was to describe and quantify the response of the cylinder, given its volume, internal air pressure (P), and metal mass (m). An additional task was to describe the effects of internal air temperature, if any. The student was advised that the problem statement may or may not contain extraneous information.

The instructor, who had copied the problem from one of his textbooks, failed to solve it when the class reconvened the following week. It has now become a classic, as it quickly leads us astray from its simple and precise solution, and can generate quite a laugh when we think about the many phenomena involved and multitude of solutions which may be offered.

Those interested are invited to try their hand, and respond with an answer if they think they have it. I will recognize the "Lion's paw" when I see it.

Phil
pelicanag@aol.com

My ability to do the math has long since left my brain. A common sense approach says that the cylinder would move away from the orifice if their were only one exit. (like when you turn loose a balloon.) The amount of movement would depend on the ratio of the two orifice areas.

OK Phil. Are you just going to leave us all hanging?

Bob Hoey

This is a good one, Phil.

Here is my conceptual approach to it: the cylinder is not going anywhere.

The energy stored in the cylinder in the form of compressed air, the cause for the thrust exerted by the air flowing through those orifices, is common to both flows through orifice "1" and orifice "2" at opposite end, and so, we have:

$$m1.v1 = - m2.v2,$$

$$T1 = - T2.$$

... so (a) the cylinder does not move and (b) it is clear that the air cools down (I know this one is right!).

Let me know how wrong I am.

Phil Burgers

Andy:

We have over 8 hrs logged on the Pioneer 4 prototype so far this year. All flying has been done off a winch providing a 700 ft release altitude.

Two flights were thermal soaring flights of 2 hrs and 3.5 hrs. Speed runs of up to 140 mph have been made. Thermalling speed is 48 mph. Minimum flying speed is 42 mph.

Have you seen the u-tube videos of the Pioneer 4? Despite its rough condition - wing needs a lot of smoothing - it flies very well so no L/D measurements have been made. . When the plane is painted and smoothed we expect an L/D between 45 and 50.



I developed a new laminar airfoil that requires a minimal amount of elevator travel over its entire speed

range which reduces trim drag. The video was taken off a winch tow to 700 ft and lasted 3.5 hrs. Pilot was Jim Goebel.

<https://www.youtube.com/watch?v=A1C8KloBR8A>



Some specs on the glider are:

Span 15 meters
 Aspect Ratio 17.8
 Wing Area 135 fsq ft
 Empty Weight 460 lbs

(ed. – By going to the YouTube link you will also find some other links to GoPro shots taken of these flights. Great footage.)

36th Annual Experimental Soaring Association Western Workshop 2016

**Friday afternoon Sept 2 to
 Monday September 5, 2016
 (Labor Day Weekend)**

Mountain Valley Airport (L94), Tehachapi, California

(ed. – It is time to mark your calendars for the Western Workshop and make your motel or camp ground reservations for this great event. Al Bowers is still lining up the speakers so if you have something you would like to present or know of someone who has a great topic of interest to the group, please let him know ASAP. He can be reached at:

albion.h.bowers@nasa.gov.

(ed. – The following is a teaser on Phil Barnes Sunday, September 4th ESA Western Workshop presentation.)

L A/LV section member, presented paper AIAA 2016-4711 at the recent Propulsion and Energy conference in Salt



Lake City. With its main focus on *regenerative electric flight*, the paper introduces a new way of modeling and optimizing system performance for permanent-magnet motor-generators with either a battery or fixed-voltage power supply. Revealing the substantial losses of the popular “pulse-width modulation” method for power conditioning at cruise, the paper shows that DC-DC “boost-buck” conversion provides a high-efficiency alternative, yielding about 85% system efficiency for all modes including climb, cruise, and regeneration. The related presentation, which won the 2016 Gohardani Aerospace Presentation Award at the 2016 ASAT conference, can be freely downloaded at the author’s “green aero engineering” website www.HowFliesTheAlbatross.com.

(ed. – Last month I was notified that an ESA member, Robert Michener, had passed away. Through contact with his son Eric I found out Robert had a Pioneer 2, which also made it relevant to TWITT. I asked Eric to give some information about it to share with both ESA [later this month] and TWITT. Eric in turn asked Jim Marske to comments about the Pioneer 2 and he provided some pictures and explained some of the modifications made to the sailplane. At some point in time the sailplane may be offered for sale and I will let you know when I am notified.)

Greetings Jim!

Would you have any choice anecdotes about Dad connected with you originally and morphed into the P2 upgrade project? I distinctly remember traveling with my Dad to Silver City NM to buy the completed P2 from Al Stout (Al had flown ME 163 after WW2 and liked the idea of a tailless craft) We then went to Phoenix to actually pickup the P2 and return to Michigan City IN with it.

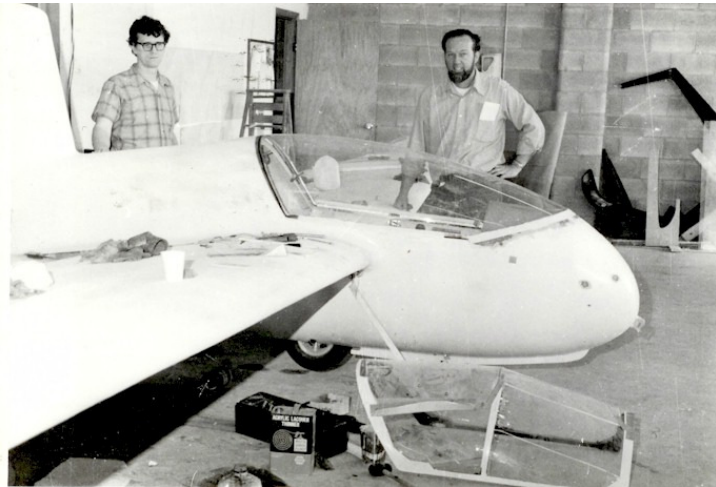
Several memories of working with my father and

Jim doing fiberglass layups of new sections of the P2 and helping Dad with the mechanical linkages, etc.

Anything you have time to write about I am sure Andy would be appreciative!

Warm regards,

Eric Michener



N4SS in what looks like Jim's shop doing some of the initial clean-up work.

From Jim:

I first met Bob Michener in 1974 when he drove down from Chicago to show me a set of Fauvel AV-36 drawings. He had a strong interest in flying wings and wanted to see what I was working on. I was building the prototype Monarch and producing Pioneer 2 kits. Soon afterwards he purchased a completed Pioneer 2 from a fellow in New Mexico. It was the same Pioneer 2 that was appraised in Soaring magazine in the July 1974 issue. It was not a very favorable article stating its performance was only somewhat better than a Schweizer 1-26. Bob brought his new sailplane to my shop for evaluation. I was appalled at its extremely poor aerodynamic condition. It was also 80 lbs overweight. We spent the better part of a year working every Saturday, reshaping, filling and smoothing and sealing the wing, getting it airworthy.

Bob was an exceptional friend, always there when he was needed. He became part of our family and was loved by all. When Bob started flying his wing again its performance had greatly improved. Even the boys at the Chicago flying club were impressed.



N4SS in the 14.5 meter configuration.

Bob became a strong promoter for the Pioneer 2. He always emphasized its stall proof characteristics saying how it saved him in several instances. His glider became my Guinea pig. I always wanted to try new ideas on it. In the ensuing years we installed a CG shifter to act as a speed trim control. Bob loved



This is a Pioneer 3 fuselage with Bob looking on.

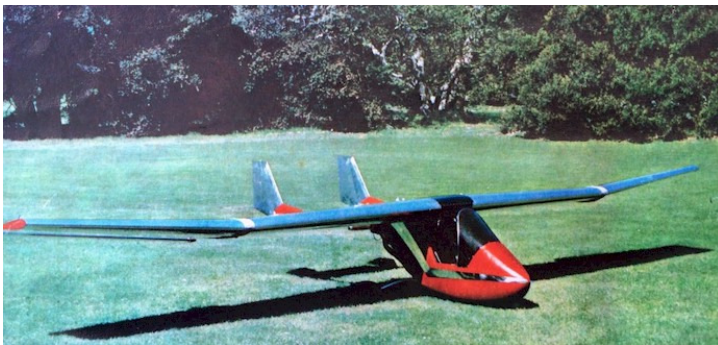
it. We extended the wing from its former 41 feet to 47.5 feet. Bob loved it. We added a longer canopy and lowered the instrument panel to give a better forward view. Bob loved it. We installed a comfortable contoured fiberglass bucket seat. Bob loved it. Thought we would add a swept tail to the glider. Bob loved it And so on it went. Our relationship was entwined with family and soaring for many years afterwards no matter where we both had moved to.

Jim Marske

Mitchell U-2 Threads

Ok people here is a photo of a M10 and we have lower frame and pod!

Jim Gordon



I hope they did more than just change the sweep of the T-10 wing to create that. The NACA 230 series airfoils don't have the positive pitching moment to make forward sweep work and pitch control on the outboard section of a forward swept wing generally isn't a good idea.

Norm Masters

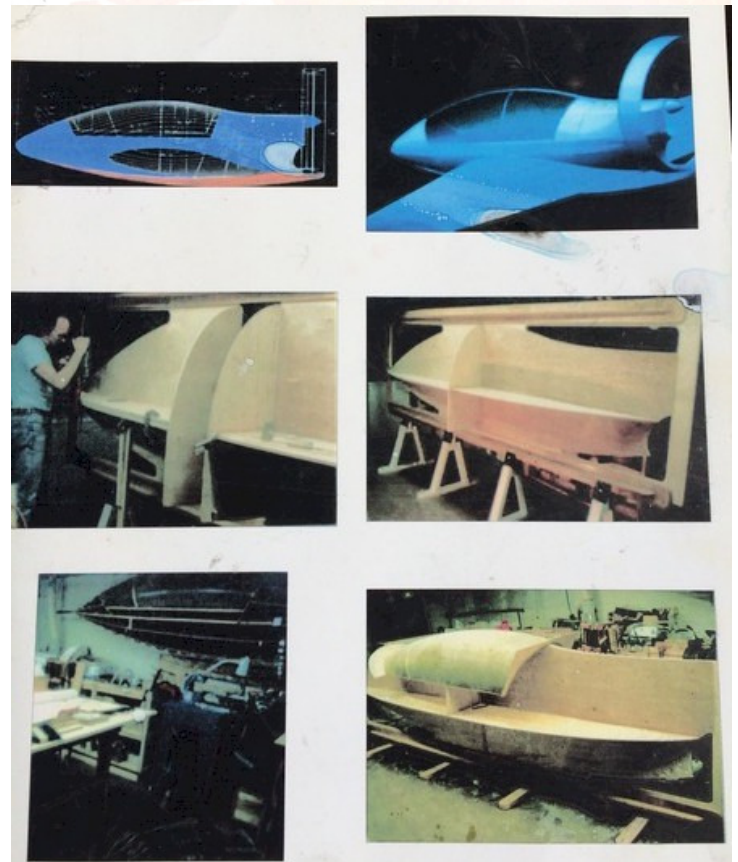
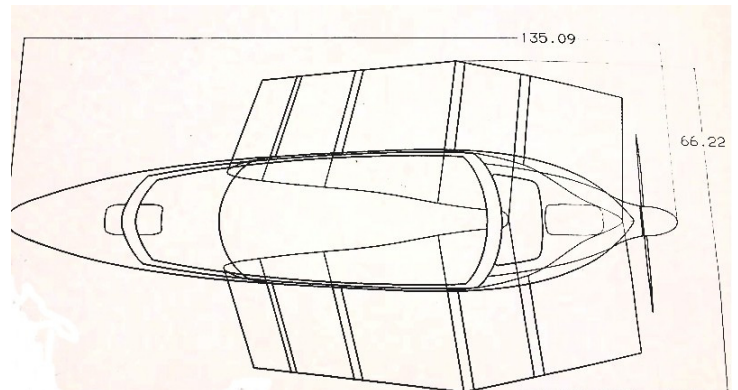
As I gather more information about the M 10 the only thing that I know at the moment the only flying one didn't end well. Supposedly flew into some trees? Lot of the components were from A 10. We did acquire jiggging fixtures that were for this plane.

Hey all Mitchell owners! Any one looking to sell any A10 T10 aircraft flying or not please send me details!!! Little bastards (Mice) damage is ok too, as we can take it apart and replace damage components. And I think someone was looking for an A10 lower frame asked if it would fit B10?

Contact me! We have a B10 D-cell and a A10 lower frame that we can check for you and if you need one I'm sure we can take care of that.

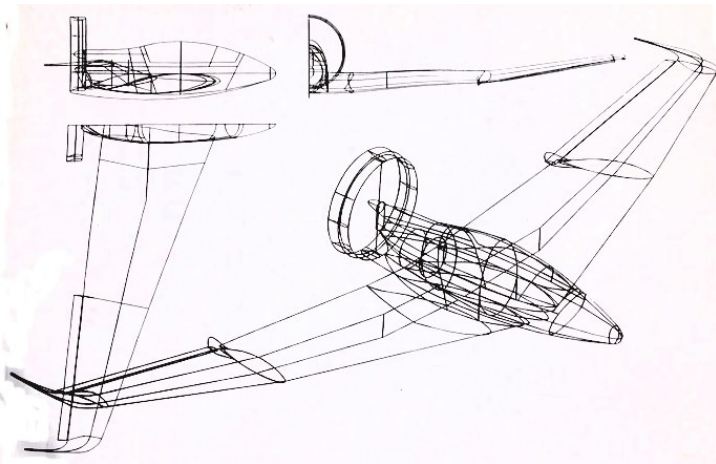
Ok your thoughts on this design. We were asked about finishing a project at Larry's and we now have the jigs and wing.

Jim Gordon



We have a web page up it's not much now but we are working on it! There are 3 addresses below.

if you would like to add photos send them to me this yahoo site. As always if you have any suggestions to add to anything Mitchell Wing, we welcome all!



Many Thanks!

Leland Gordon - Home Built Aircraft, Mitchell Wing Ultralight, Light Sport Aircraft

<http://www.mitchellwings.com/>
<http://www.mitchellwing.info/>
<http://www.mitchellwing.org/>

Nurflugel Thread

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

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

(ed. - There haven't been any replies to this message yet so I don't know if there is any interest. I have included an image of the Tadpole so you can see what he is talking about.)



PHIL's BREAK DOWN OF HOW TO SOLVE THE PROBLEM PRESENTED EARLIER.

*Here's the solution to the thermodynamics problem I had posted. The basic problem is that of a **scuba tank** with its **header suddenly broken**. The result is of course a high-speed, dangerous **rocket** (such a trajectory was actually taken through the roof at the TRW corporation in an incident many decades ago). The problem statement had intended to "throw us off track" by specifying two orifices, one at each end but one larger than the other. The solution is more readily reached by first thinking in terms of a single aperture, as a "divide and conquer" approach.*

Engineers use a "control volume" to analyze systems like this. Here, we have many options, but the simplest control volume is a dashed line surrounding all internal and external surfaces, "wrapping around" the edges of the orifices. This leads quickly to realization that the thrust on the cylinder is given by the product of internal pressure and net aperture area. The tank will accelerate away from the larger aperture when the apertures suddenly rupture.

The physics, aerodynamics, and thermodynamic processes of the problem add many additional interesting aspects to the problem. These include the initial "vena contracta" or reduced "throat" area of the expanding air jets, their subsequent expansion to plumes of large area and supersonic Mach number, the "polytropic" or nearly "isentropic" blow down relating the air temperature to the air pressure as the

