

No. 338

AUGUST 2014

T.W.I.T.T. NEWSLETTER



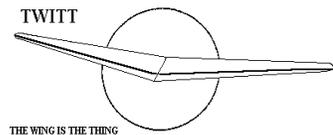
The ultimate flying wing with minimum structure. This is Jim Spurgeon clowning around with the horizontal tail surfaces from a Bowlus while waiting for the soaring conditions to improve at Torrey Pines circa 1950s.

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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 Members only section: ID – **20issues10**
 Password – **twittmbr**

Subscription Rates: \$20 per year (US)
 \$30 per year (Foreign)
 \$23 per year US electronic
 \$33 per year foreign electronic

Information Packages: \$3.00 (\$4 foreign)
(includes one newsletter)

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Multiple Back Issues of the newsletter:
\$1.00 ea + bulk postage

Foreign mailings: \$0.75 each plus postage

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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

In case you live on the west coast I want to remind you of the upcoming Experimental Soaring Association's (ESA) Western Workshop over Labor Day weekend at Mountain Valley glider port in Tehachapi, CA. This is a great annual event featuring many outstanding speakers covering a lot of interesting topics related to aviation and soaring. You can see more about it on page 4. If you want more information before deciding to attend for one or both days, please contact me and I will try to answer your question.

My thanks to Jim Marske for a quick note on the progress he is making with improving the performance of the Pioneer 3 and a little teaser on a Pioneer 4. The P3 is a great looking ship and he thinks he is getting at least 40 to 1 out of it now. Something to consider if you are interested in doing a home built.

The day is rapidly approaching when I will actually be fully retired from having a regular job. Right now I am planning on keeping busy flying my 1-26, working on restoration projects at the San Diego Aerospace Museum and USS Midway facility and, getting back into radio control airplanes but this time using electric power to be environmentally friendly. I am really looking forward to mid September when it will all happen.



LETTERS TO THE EDITOR

(ed. – This came in from Murry Rozansky when he inquired about a rumor of there being a Marske Pioneer 4 in development. This resulted in a series of messages from Jim Marske that are presented below. PLEASE do not make a direct inquiry to Jim for more information. We are sure he will keep us informed when there is more to tell about the new design and progress on the P-3. Thanks for your cooperation.)

News travels fast. We are building a P-4 for a fellow in Australia. So far the wing spars are completed. I'm trying to keep up with the engineering work. The P-4 is almost the same planform as the P-3a except with a slightly higher aspect ratio (17.5 Vs 16.8) and a new low drag laminar airfoil. There is no fabric on this wing and it carries water ballast. My P-3 has a fixed wing loading of 4 psf. The P-4's WL will range from 5 to 7 psf which will give it excellent high speed capabilities. The fuselage is the same as my P-3 except with retractable landing gear.

My P-3 calculated at 40 to 1 which I have achieved.

The P-4 calculates at 46 to 1 and may do better with the wheel retracted.

The prototype P-4 will be a quick build solid foam core wing without provision for water ballast. We will take this wing and make female molds off of it for the production units. Matt Kollman has taken charge of building my gliders in his shop on the south side of Columbus. Matt and Willis were active in building the prototype Genesis glider back in the late 90's.

Mike Hostage paid me a visit on June 7th and since the weather was good Mike took two flights in the P-3, (1.7 and .8 hrs). Mike was very pleased with its handling and performance.

The week before I was out on a cross country in my P-3 and on the last leg coming home the air went completely dead. I covered the last 23 miles and lost 3,000 ft against a light 5 kt headwind. That comes out at better than 40 to 1.

Jim M

(ed. – I got the following directly from Jim Marske after he saw the above post in Sailplane Builder. I have written to Mike Hostage and he has agreed to write an article on his experience in the improved Pioneer 3

and perhaps fill us in on his P3 building project. I will publish it as soon as it arrives, but he is very busy so it could take a while. There is a link at the bottom of this report that will lead you to a video of Mike's flight.)

Hi Andy:

Below is a copy of Mike Hostage's flight in my P-3. You might ask him about his evaluation of the glider. He wrote a few notes to me about it.

I found two items that make a big difference in improving performance. One is the finish, particularly from the leading edge back to the main spar. It cannot have any blemishes. I had half sanded it to a smooth



some irregularities in the finish itself. There were no surface waves - just what I would call blemishes.

Performance wise I figured I was getting between 30 and 35 to 1. I knew it would do better than that so I sanded the top surface down till it was perfectly smooth and then finished with a treatment of 400 grit wet sanding. I then followed up with two coats of paste wax and polished it well between coats. It has a semi gloss finish but it was, and is, extremely slick to the touch. This made a fantastic difference. Both Mike and I feel the L/D is now well over 40 to 1.

Unfortunately, during Mike's flight the airspeed was reading low due to a leak in the pitot hose connection, thanks to me messing with it a few days earlier. I calculate the error was 11% low when comparing tow speeds.

The second improvement is sealing the air leaks. A big improvement came in sealing the canopy rail, especially in the area of the wing leading edge. This improved the handling and the performance. I had installed airtight socks on the control pushrods within the wings I had overlooked the air leakage from the fuselage into the elevator hinge line through the elevator torque tube thus spilling air down the length of the elevators lower surface. Now I know why I constantly had to carry more up elevator than was needed.

I am extremely happy with my Pioneer 3. It is very forgiving to fly at very slow speed. Stall is almost non-existent. I work thermals at 35 kts and the glide is

very flat up to 80 kts. I expect it to improve as the cleanup work continues. I still have the bottom of the wing to smooth out.

All this sounds good, but I wonder if this is a good thing for the average flyer. It is very slippery to fly - especially on air tow. Keeping slack out of the line is a constant effort. I found it best to fly a fast tow, over the max L/D speed. Mike found yawing and 60 kts to work for him. At any rate, the time on tow is minimal.

In free flight it is still slippery but you don't have to follow a tow plane. During landing approach, when you are distracted, it is easy for the airspeed to vary. I never had this problem when flying the clubs 35 to 1 ships.

I've always been interested in building a wing that would be suitable for club flying. The 13-meter Pioneer 2d came close to it but it needed updating.

Now I think of going back to the 12 meter Pioneer 1, only updating it with all I have learned over the years.

Using the P-3 airfoil, plug type spoilers, narrow ailerons, carbon spars and more cockpit comforts it would be a classic design having a resemblance to the old and venerable 1-26 - only with 35 to 1 performance.

Anyway, that's what I'm thinking for what it is worth.

Jim M.

<https://www.dropbox.com/sh/i0vzbbgsd6du6j6/AACBiZdEkVGwjxbVPZWw7HUfa>

(ed. – I have included this material at the suggestion of Phil Barnes who let me know about the award. I am sure some of you know Mark or have heard of his work. I searched the AiAA web site (source of Mark's photo) and eventually the Penn State site to see what this was all about.)

Mark Maughmer, a prominent ESA member, won the AiAA Piper General Aviation Award. He is professor of Aero Engineering at Penn State. I suggest that you get Mark to provide a photo to get this into the newsletter. Perhaps Mark can provide further details of his work which prompted the award.



From the AiAA web site:

Formerly the General Aviation Award, the Piper General Aviation Award is presented for outstanding contributions leading to the advancement of general aviation; honoring William T. Piper, Sr., who made the name Piper synonymous with general aviation. Beginning in 2010, the award is presented biennially (even numbered years) at the AIAA Aviation and Aeronautics Forum (AVIATION).

2014 Awarded to:

Dr Mark D Maughmer

Professor of Aerospace Engineering, Pennsylvania State University

“For contributions to winglet designs on racing sailplanes, an advance that promoted the broader acceptance and diffusion of winglet technology in the general aviation community.”

[\(https://www.aiaa-aviation.org/Recognition/\)](https://www.aiaa-aviation.org/Recognition/)

From Pennsylvania State University:

Aerospace engineering's Maughmer wins AIAA Piper General Aviation Award

Curtis Chan
March 4, 2014

UNIVERSITY PARK, Pa. -- Mark Maughmer, professor of aerospace engineering at Penn State, has been named the winner of the 2014 American Institute of Aeronautics and Astronautics (AIAA) Piper General Aviation Award.

The Piper award honors outstanding contributions leading to the advancement of general aviation. Maughmer is being recognized for his contributions to winglet designs on racing sailplanes. Developed to increase efficiency of fixed-wing aircraft, winglets help to lessen the amount of drag on an airplane.

Maughmer's winglets research has led to the broader acceptance and diffusion of winglet technology in the general aviation community. His research encompasses aerodynamics, aircraft design and aircraft stability and control.

A member of the Penn State faculty since 1984, Maughmer has won numerous accolades for his research and teaching, including the AIAA/American Society of Engineering Educators (ASEE) John Leland Atwood Award; the ASEE Fred Merryfield Engineering Educator Design Award; a NASA Group Achievement Award; ASEE's Aerospace Engineering Division Distinguished Service Award; the Soaring Society of America's Exceptional Service Award; the Penn State Alumni Association's Alumni Faculty Teaching Award; and the Penn State Engineering Alumni Society's Outstanding Teaching and Premier Teaching awards. He is an associate fellow of the AIAA.

Maughmer received his bachelor's in aeronautical and astronautical engineering from the University of Illinois, his master's in aerospace and mechanical sciences from Princeton University and his doctorate in aeronautical and astronautical engineering from the University of Illinois.

He will receive his award at the AIAA Aviation and Aeronautics Forum and Exposition in June in Atlanta.

<http://news.psu.edu/story/306490/2014/03/04/academics/aerospace-engineerings-maughmer-wins-aaa-piper-general-aviation>

**Experimental Soaring Association 2014
Western Workshop**

Friday evening August 29 – Monday Sept. 1, 2014
(Labor Day Weekend)
Mountain Valley Airport (L94), Tehachapi, California

RSVP and Pre-registration not required –just come and register at the door

Registration will be \$18 for the whole workshop, or \$10 per day

NOTES:

- For Potluck BBQs – bring meat and drink for yourself, and something to share. Utensils, plates, cups, etc provided

For Saturday night auction – donations of items gratefully accepted – clean out your workshop and bring that white elephant, which might be someone else's treasure...

Below is a listing of the speakers and topics that have been lined up for Saturday and Sunday.

Dan Rihn: History of Schleicher
Jeff Byard: Weihe ("Vaya")
Andy Kecskes: SGS 1-26 Restoration
Ben Harvey: Scaled Composites
Tom Weil: Soaring at California City
Dan Armstrong: WinDancer ULS
Murray Rozanski: Oratex Covering

Phil Barnes: Regen Electric Flight (Sunday 1st slot)
Dean Sigler: Electric flight
Bob Hoey: Flight of Birds (Radio Controlled)
Mark (Thunder Gull): Electric Flight?
ESA Business Meeting – time permitting
Floyd Fronius: GOAT Update
Mark Forger Stucky: A Personal Soaring History (evening keynote)

(ed. – The following item came in through the Nurflugel link but as I played the first video I saw links to others that looked just as interesting. I am not a big YouTube user so am not quite sure how it sorts and displays associated videos based on the subject you started with, but rummaging through what initially shows up produces new directions that can be fun to watch although I limit myself to the 2-3 minute items.)

Anyone seen this video before? I have just come across it and was intrigued by the Horten style model shown near the start, anyone know anything about it?

<http://www.youtube.com/watch?v=M0-QZzJPGcl&feature=youtu.be>

This is the oldest film I have found showing model airplanes. One or two interesting rubber powered models here like the blended wing model.

John

Large Paper wing – This is fun to watch as these guys try to get this extremely large folded paper wing airborne. It does fly, but.....

<http://www.youtube.com/watch?v=MmcJCKvkrq8>

Successful smaller paper wing and there were several more links to other examples of paper wings.

<http://www.youtube.com/watch?v=KUuTvERSpWA>

MITCHELL WING GROUP THREADS

Thought I would see if anyone who frequently posts on the forum is currently building a U2. The U2 I am currently building is probably about 4 - 6 months away from completion, I have invested around 600-700 hours so far in the build, it has 2 x 5 gallon fuel tanks (each in the wing on the spar to not affect C of G), got a shock absorber on the main gear to lessen damage to the spar on hard landings. Spar area has also been strengthened in the area of the landing gear to add protection. The cage has a few extra points not shown on the blueprints that it has been secured to main wings, lower fuselage has been custom fabricated out of foam and fiberglass, lower fuselage has 4 doors installed giving access to parts that are not accessible when the seat and covering on for maintenance and inspection, cockpit canopy is on the way and then the top fuselage will be fabricated the same way as the lower section making aircraft extremely aerodynamic. It will also have an air vent by the nose area bring air into the cabin and hooked up to a small heater that will allow me to heat cabin for winter flight. Aircraft has spoilers in the wings, custom sports seat, 4 point harness and will also have an electric starter with a rotax 377 engine, 3 blade carbon fiber propeller. Would love to hear about your planes you are building or flying :-)

I am going to be installing my pitot tube and wanted to double check what angle it should be set at. It will be in the nose, someone said 7 degrees. Does this sound right and is the angle pointing to the ground or sky? Have a great day

Ryan Derot
Vancouver BC Canada

Guy, use a two inch diameter pipe and don't worry about the angle.

Austin

I suspect Austin's answer involves a touch of tongue-in-cheek even though he probably is correct in theory. The issues with a two inch pitot tube are

many fold – from the collection of insects while flying along (plugging the orifices of the instrument) to providing a nesting area for birds and mice etc., while hangered.

While the wing of a Mitchell U-2 has an AOA of 7 degrees sitting on the ground, the pod normally has a zero AOA while sitting on the ground. These conditions are set so the AC will fly off the ground at 30+ MPH without rotation. If you want an accurate airspeed indication at takeoff (and landing) the pitot tube should be aligned with the pod (or 7 degrees negative to the chord of the wing).

In level flight at max airspeed the AOA of the wing will flatten somewhat to less than 7 degrees, which will cause a negative AOA for the pitot tube and create a small understated error in airspeed indication. But all that having been said, in general airspeed indicators are very inaccurate instruments and at best only achieve a close approximation to the actual airspeed at one AOA – so you need to select an alignment of the pitot tube which creates the best accuracy for the AOA that is most critical to you. I'll align mine with the pod.

Roger Olander

Yes I will do 7 degrees, especially with engine 7 degrees.

I bought a pitot tube from aircraft spruce, not afraid to spend a little, my plane going to be incredible. An article in our local recreational aircraft association magazine is coming out shortly on my plane.

Ryan

So I got some Lord engine mounts for my engine, when I got them I was told the engine bolts through the lord mounts to the frame - however the hole is only 1/4" which obviously will not allow the engine to bolt through them. My question is this, do I bolt the engine to the engine mount, then bolt the engine mount to the frame with the lord mounts between the 2 for vibration or how do you recommend. I tried searching online with no luck so I wanted to see if anyone can recommend or send me a link on how to do it. Thanks

Ryan

I think the answer to your question is "yes" but....

Sheet 5 of the drawings clearly shows the Lord Mount location and installation. The motor is bolted to a "Mounting Plate" and the "Mounting Plate" is connected to the Engine Mount Framework via Lord engine mounts. And finally the Engine Mount Framework is bolted directly to the top spar cap and the rear, No. 1 ribs.

But page 21 of the Manuel clearly indicates this design is for a maximum engine weight of 55#. Your Rotax 377 is listed as having a weight of 84.5# (re-drive and exhaust included but not sure about electric start and prop.???) so you should re-evaluate the entire engine weight and mounting scheme - not to mention the effect of that engine weight on the CG location.

Roger

Yes I talked to Rotax and they said we are to use 2 aluminum engine mounts, on the first one the engine bolts to it, then the lord mount is positioned between both aluminum plates with the lord mount bolting through the second mount into the frame. We got a slightly thicker steel tube for the engine mounting frame as the engine we using is heavier - I also plan on pushing the engine closer in to the fuselage to keep it within c of g limits. I just have to figure out if it is not going to structurally weaken the cage by having to drill a 1/4" hole in 1/2" tubing for the lord mount to bolt to. I feel like it will be a point of weakness if I drill 1/4" hole in 1/2" tubing - your thoughts.

Ryan

Drill the hole 3/8. Make a bushing with a 1/4 hole thru it, (4130 3/8 tubing with 1/4 ID) and TIG weld this bushing in the 1/2 dia tubing, (TIG WELD NOT TORCH) and just put the bolt thru the bushing a nut on the backside. It will be much stronger than just the 1/2 steel tube without a hole in it. TIG WELD NOT TORCH

One more thing, Guy, If you still have concerns about the 1/2 dia. tube strength, put a sleeve about 1 inch long of 5/8 OD X 1/2 ID over the 1/2 dia tube before you drill it (drill both at the same time) and weld this sleeve on the 1/2 dia tube at the same time you weld in the bushing. Strong like bull. Your next-door neighbors will be jealous

Austin

Awesome thank you, I have a TIG welder.

It will be a while before I do this as I need to use my engine for c of g and once positioned properly can permanently secure.

Ryan

Is there any current B-10 builder out there?

Thanks,

Rigidwings

I have one that is built, but I didn't build it

Skiwriter

Thanks for the reply, but as of now, I am looking for current builders to try to find answers for simple B-10 questions like this:

1. Is the last rib #1 diagonal location on the bottom side correct? (Because in my opinion it is an error in the plan.)
2. How is it ensured that the top clear cover of the center section will not delaminate during flight from the ribs? (because in a MW the consequences could be deadly -- literally)

...and complex questions like this:

1. How do I check the accuracy of the rib template against the theoretical NACA 23015 airfoil? (Because most of the ribs are about 15 degrees off relative to rib #0, but on the rib template paper all ribs seems to be drawn identically)
2. What airfoil does the B-10 has anyway? (since the US Pacific website call out "Modified 23015)
3. Is it better to use the Riblett modified 23015 airfoil instead of the modified(?) NACA 23015 to soften the sharp stall characteristic of the wing? (Safety concern)
4. Is there a better way to distribute the loads on the center section of the wing than directing all loads to the point of the trailing end of rib #0? (Safety concern)

Since you already have a ready to fly wing, these decision were already made for you, but I still have to figure out which way to go, before I cut and glue too much wood. So that is why I am looking for current builders.

Rigidwing

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

Books by Bruce Carmichael:

Personal Aircraft Drag Reduction: \$30 pp + \$17 postage outside USA: Low drag R&D history, laminar aircraft design, 300 mph on 100 hp.

Ultralight & Light Self Launching Sailplanes: \$20 pp: 23 ultralights, 16 lights, 18 sustainer engines, 56 self launch engines, history, safety, prop drag reduction, performance.

Collected Sailplane Articles & Soaring Mishaps: \$30 pp: 72 articles incl. 6 misadventures, future predictions, ULSP, dynamic soaring, 20 years SHA workshop.

Collected Aircraft Performance Improvements: \$30 pp: 14 articles, 7 lectures, Oshkosh Appraisal, AR-5 and VMAX Probe Drag Analysis, fuselage drag & propeller location studies.

Bruce Carmichael
 34795 Camino Capistrano
 Capistrano Beach, CA 92624 (949) 496-5191



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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COMPANION AVIATION PUBLICATIONS



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The purpose of ESA is to foster progress in sailplane design and construction, which will produce the highest return in performance and safety for a given investment by the builder. They encourage innovation and builder cooperation as a means of achieving their goal. Membership Dues: (payable in U.S. currency)

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