No. 319 JANUARY 2013

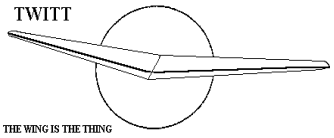
T.W.I.T.T. NEWSLETTER

This caught my eye as the future progression of the XB-35. Source was:
http://fc04.deviantart.net/fs71/f/2011/029/d/1/flying_wing_bomber_by_shelbs2-d38bdzb.jpg

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., **1301** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 19, 2013, 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.

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Editor: Andy Kecskes
Archivist: Gavin Slater

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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)

Single Issues of Newsletter: $1.50 each (US) PP
Multiple Back Issues of the newsletter:
$1.00 ea + bulk postage

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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

HAPPY NEW YEARS EVERYONE

I hope everyone had a joyous holiday with family and friends and that your New Years celebration didn't cause too many hangovers the next morning.

I am looking forward to 2013 since it will mean another level of retirement for me around mid-year. By that time the 1-26 should be in the air and I will actually have more time to fly it by just working on special projects rather than having a regular work schedule. I will be splitting my flying time between Warner Hot Springs here in the San Diego area and at Mountain Valley airport in Tehachapi. It will be good to get back in the air again.

While I was looking for material for this issue I found a number of flying wing designs in old issues of the Sailplane Homebuilders (at the time) newsletters. I am scanning them to create a permanent archive like I did for the TWITT newsletters that we have on-line. These, however, probably won't get put on-line but will be made available on a CD disk for a moderate price. The designs I have chosen for this issue have not been included in the past since I wasn't a subscriber to the SHA newsletter and wasn't fully aware of their design contest that was producing these designs. The eventually winner, as I understand it, was Burt Rutan's Solitare. There is now talk of having another type of design contest in the next couple of years so it will be interesting to see what comes out in terms of flying wings and electric launching systems.

LETTERS TO THE EDITOR

Hi Andy,

Re: TWITT Newsletter, March 1994
Al Backstrom's plan, "Could Be," published in Aero Modeler Magazine, Jan. 1994.

BITS AND PIECES

Bob Chase sent us a copy of the January 1994 Aero Modeler, a British model aircraft magazine. He noted an article on the "Could Be" flying wing model, along with full size plans in the center section. The Could Be was designed by A1 Backstrom, and was inspired by a Fauvel AV-10 NoCal he did some years ago. It has a span of 25", weighs in at 43 gms, and is powered by a Brown Campus Bee CO2 motor (although other types of power could also be used). For you modelers, if you can't find this magazine on your local bookstore's shelf, drop us a line, along with $1 for postage and handling, and we will send you a copy of the article and plans.

Is the plan of " Could Be" still available? Thought I should check before sending a dollar.

Thank You,

Stephen Sawyer
<s-sawyer@sbcglobal.net>

(ed. – My reply was: "I spent some time yesterday going through our archives trying to find the magazine with the article you are looking for. Unfortunately I could not find it. We consolidated two hangars into one some years back and it probably got consolidated into one of the stacks instead of remaining separate. We have probably close to 2000 magazines of various types on the shelves so it could be anywhere. I don't know when we will ever get the time to actually straighten out this mass of information so can't tell you when I could get the article to you. I am sorry we have lost track of it and can't provide it to you."

If Bob or anyone else out there happens to have a copy of this AM issue, could you please scan the article and illustrations and e-mail them to Stephen with a copy to TWITT. If you can't do a scan, please make a copy and send it to TWITT and I will see that Stephen gets a copy. Thanks.)

Andy,

Please be advised that you are welcome to reprint any and all material in RC Soaring Digest <http://www.b2streamlines.com/OTW.html>. Also, we have scanned the original documents regarding the wind tunnel testing, plan sheets and photos of the fabrication of the Akaflied Berlin B-11 - the swept forward tailless sailplane that was featured in an early issue of the newsletter (I think #4 without looking). I have digital files of everything the school loaned to me when I considered making a 1/3 scale RC model for aero towing. It's about 30MB in total and I can easily make the document and photo collection available to you via my Dropbox account. The language is, of course, German, but that could be an advantage to TWITT in the long run as perhaps there's someone out there who would translate the important things.

Hope that helps out a bit!

Bill & Bunny Kuhlman
<bsquared@centurytel.net>

(ed. – Thank you both for allowing TWITT to reprint items from RC Soaring Digest in response to my plea for more material for the newsletter. I haven't asked for the Akaflied material yet, but will probably do so in the near future.

RC Soaring Digest is available electronically through the following link: http://www.rcsoaringdigest.com/. There are also past issues available and all the information is on the web site. There is always an article "On the 'Wing" by Bill and Bunny that covers something related to a flying wing model so make sure to check it out each month.)

Hi There.

Thanks for your proposition, I'm interested to order of a DVD copy about the Facet Opal wing by Scott Winton.

Thank you for contacting me for a group order.

Richardin Gabriel
richardin78g@yahoo.fr

Do you recall if anyone in the US purchase a copy of the Facet Opal DVD? I am interested in the design and would like to contact them.

Best regards,

Jorj
jorj@charter.net

(ed. – I find both of these messages interesting in that I cannot find a reference to there being a DVD of the Facet Opal flying offered by TWITT. I looked back through the 2011/12 newsletters and only found one reference and that was related to a model version. Since I haven't heard anything back from either of these parties on where they came across the information, I am at a loss. So if anyone can recall where I posted this I would sure appreciate a note since others might be interested in the video.)

Hello Andy,

A copy of "Halfway to Anywhere: Achieving America's Destiny in Space" by G. Harry Stine is enroute to you. The book is about SSTO (Single-Stage-To-Orbit) spacecraft and similar suborbital spacecraft ("Single-Stage-To-Overseas," as Stine called them) for rapid delivery of time-sensitive cargoes (and passengers who prefer to reach their destinations quickly) to any point on Earth in less than an hour. Quite a few of these designs are tailless winged spacecraft, and Stine included illustrations and descriptions of them in the book.

Jason Wentworth

(ed. – Thanks for the book. I will share some of the illustrations with the group once I have received it.)

(ed. – I have been working on a project to digitize all the issues of the Experimental Soaring Association's (ESA) S.H.A.p Talk and Sailplane Builder issues. While scanning some of the issues I ran across several flying wing and tailless designs that had been submitted for a design contest. I don't believe any of these has been shown in previous issues of this newsletter although I did run into some that I am sure I included since they were done by TWITT members.)

From: Sailplane Builder, Issue #8-97, August 1997.

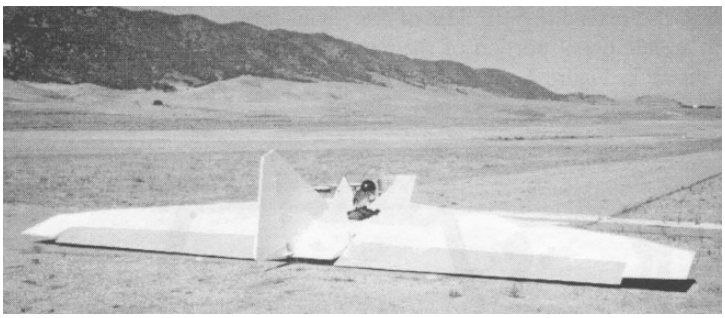
What's Going on with Les King's Primer?

Editors note again: Last year at the SHA Western Workshop Les King presented a very interesting and unique new glider design. He calls this glider The Primer. He sent in some pictures, a 3-view, and a letter explaining away his lack of progress. Here they are.

I haven't touched the glider in almost 6 months. I'm trying to make my large fortune making hats so that I can turn it into a small fortune in aviation.

Les King standing next to the Primer. All primer photos by Marilyn King.

The drawing is of the proposed second iteration. The changes are from what I learned with the prototype. All the changes are to make the design easier to build or lighter. I almost got sucked into making changes to the design to improve performance, but I caught myself by remembering the basic design goals and mission of the airplane; Easy to fly and build - and Cheap!



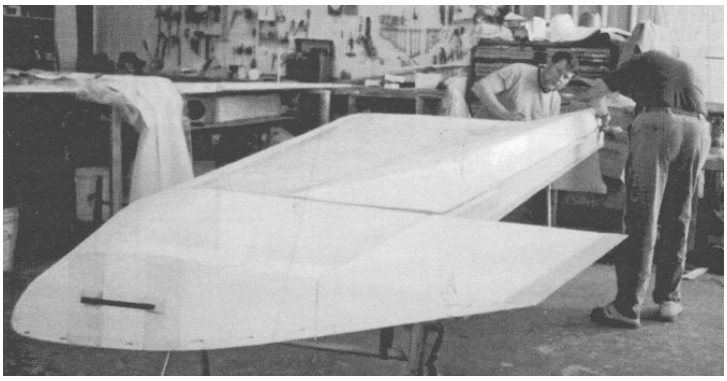
Waiting for tow at Tehachapi. Note the helmet. Les plans to make much smaller elevons on the second Primer.

When I get this Hat business to settle down to a loud roar, I plan on getting some ultralight air tows on a calm morning and do timed descents at various air speeds to develop a polar.

The photo of the glider on the truck *(next page)* is not a launcher. It is Mark West's hang glider test platform. We tested the glider for pitch stability, performance

and strength. Those tests showed marginal stability stick free and good stability stick fixed. (flight testing seems to show good stick free stability). The test rig indicates about a 14 to 1 L/D. We "cleaned and jerked" (weight lifting term) over 900 lbs., which would be more than 4 Gs. The design loads are 7 Gs ultimate and 4.6 Gs limit loads.

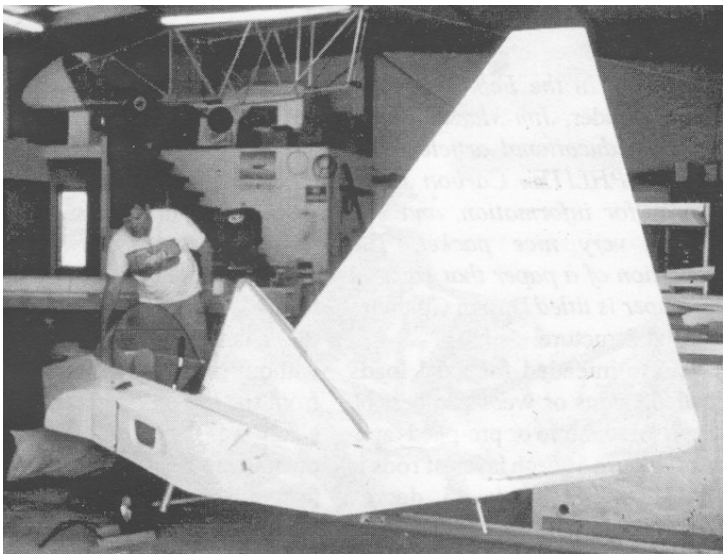
I'm estimating cost of materials right about $1000 without instruments. Build time should be about 120 hours. I plan on wringing out the second iteration and if it meets expectations, make up a building manual and a set of plans. Later on I would like to offer kits.



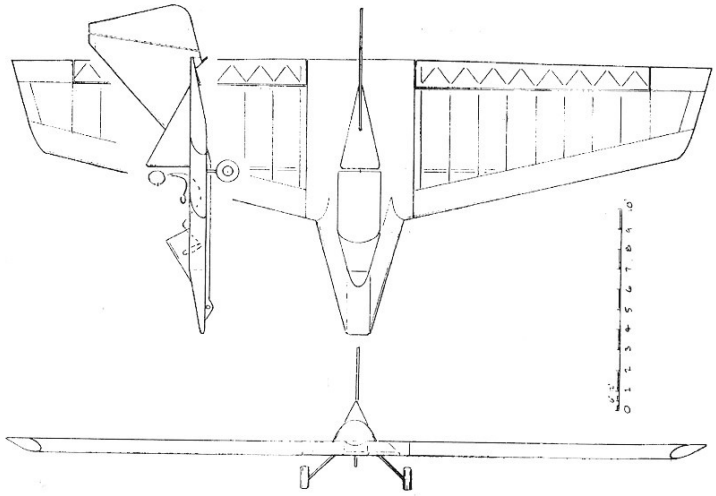
Les King and Gary Sundberg covering the left wing. The top of the wing is covered with white Tedlar and the bottom with clear.

So many people have asked about a powered version, that I have done some preliminary design of a powered ultralight. This powered ultralight will not be a motorglider. Physics and F.A.R. part 103 kind of gang up on us and tell us that we can't eat our cake and have it too.

Gary Sundberg has a couple of flights in the Primer and reports that it is easier to fly than a 1-26.



A nice look at the Primer's vertical tail.



From: S.H.A.p Talk Newsletter, Vol X, No. 6&7, June & July 1991.

THE MONARCH ULTRALIGHT SAILPLANE

Jim Marske

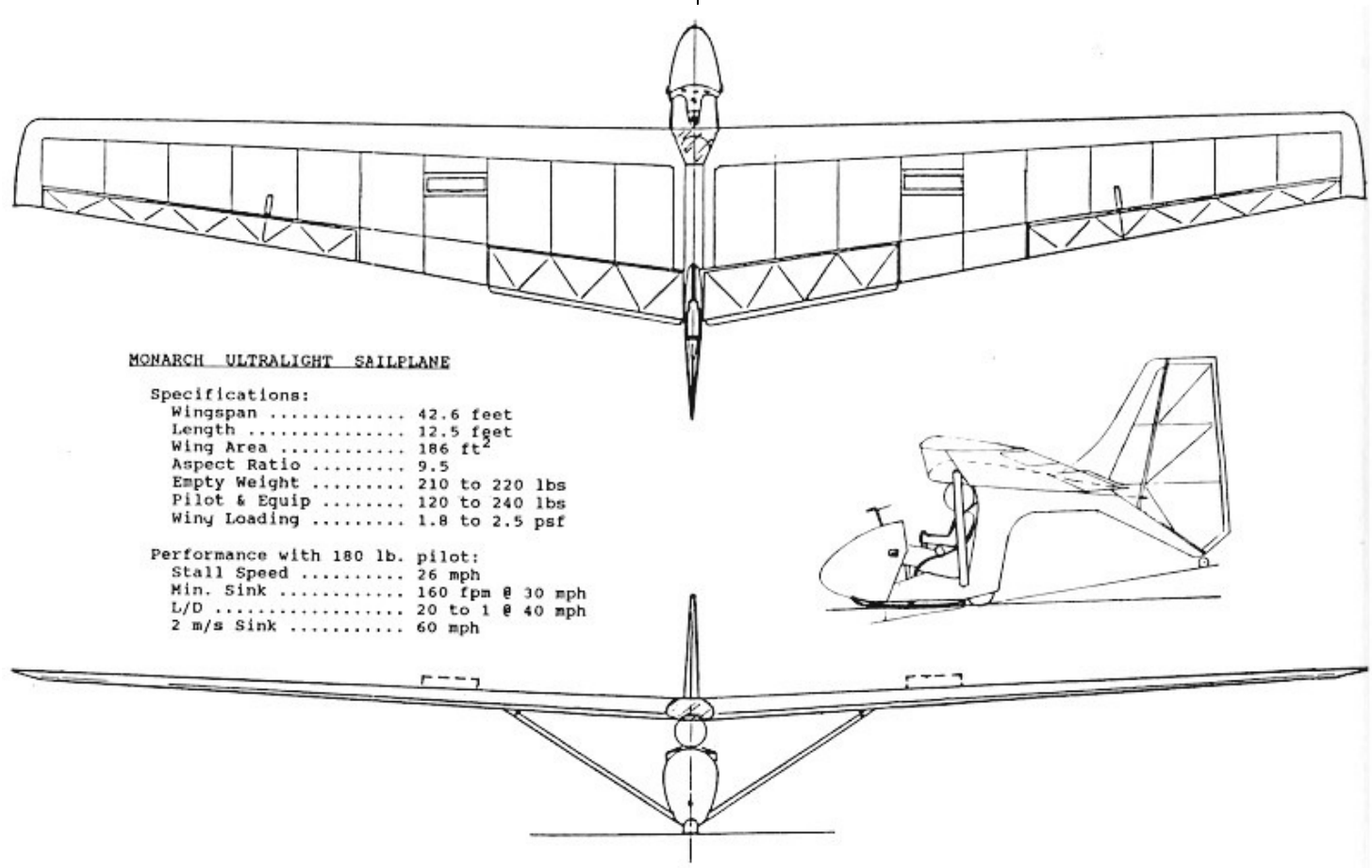
The MONARCH is a time proven sailplane that was first flown in 1974. The craft has seen six major changes since it's conception, each improving esthetics, construction methods, handling, and performance. This type of sailplane was probably 15 years ahead of it's time since it didn't seem to fit into the sailplane or the hang gliding community. Today it appears that a new segment of soaring is developing. Hang glider pilots who are into towing are beginning to recognize the ultralight sailplane's increased

performance and safety potential. Sailplane pilots are discovering that the ultralight sailplane offers less work and more fun at a reduced cost.

The most unusual feature of the MONARCH is that it is a flying wing with forward sweep. Although the concept is fairly new to man, mother nature has been using the principal for eons. Notable examples are hawks, eagles, and even Monarch butterflies.

to do airplane towing the use of an ultralight airplane of 48 hp or greater will provide excellent tows. A tow release altitude of 1,000 ft is more than sufficient to climb away in a thermal.

Wing construction is rather unique and deserves some comment. The wing D-tube is molded in a female mold so the exterior surface is smooth and ready for finish sanding and painting. The spar caps, which are an



One of the primary advantages of the straight flying wing is that it is highly stall resistant. A stall can only be accomplished by diving first and pulling back into a steep climb in excess of 30 degrees. Even then the nose will only fall down to the horizon. A quick glance at the airspeed will show you are at normal flying speed. To date we have not been able to spin the Monarch. This again is a characteristic of the straight unswept flying wing. I often fly a tight thermal with the stick pulled full back against the stop. There has never been any sign of an oncoming stall, even in turbulent air.

If you plan to do auto towing, expect 1,000 foot release altitude on relatively short (3,000 ft) runway thanks to the center of gravity tow hook. If you decide

integral part of the D-tube, are stiff, high strength pulltruded fiberglass rods. The D-tube ribs are 1/2" foam covered with a thin layer of fiberglass fabric and epoxy. The tail ribs consist of a thin corrugated fiberglass sheet which acts as a shear web and vertical stiffener. The rib cap strips are spruce strips resembling a channel which are epoxied to the vertical web corrugations. Rear spar and trailing edges are cut from spruce.

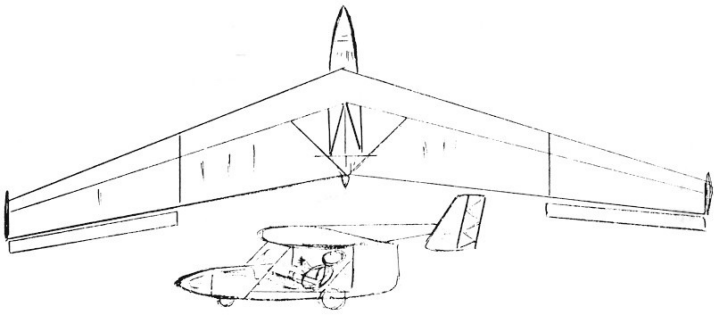
From: S.H.A.p Talk Newsletter, Vol X, No. 6&7, June & July 1991.

STEALTH II
by Don Mitchell

This is a multiple use aircraft. The wing may be used as a hang glider or by changing the cage (pod) can be a single place sailplane and by removing the fairing at the aft end of the pod an engine - 10 to 36 HP may be installed making it into a self launch sailplane. The wing is the same in all cases and can be used for all three. The pods attach to the wing with 6 pins. The conventional control stick is part of the wing and not part of the pods - glide control is either by spoilers or dive brakes in the fairing aft of the pilot. The rudders may be used together for additional drag. The structure is single spar, 3-piece wing. Spruce caps and 45-degree plywood web - 2 lb foam leading edge ribs are hot wired to contour when they are on the spar - rib spacing in L.E. is 3 inches. Trailing edge ribs are spruce truss of foam with glass caps - wing has plywood skin back to the 30% chord point - fabric aft to T.E. Carbon is used in many areas to great advantage. Push pull tubes are used for stabilator control and cable for rudders. The landing gear's part of the pod and the option would be up to the pilot. I like tri-gear for glider and self launch. I do not believe you give up very much with the tri gear and it sure makes it nice landing and taking off as well as when you taxi. A word about safety. The ship is low in total weight so the inertia loads are low. The pilot sits under the wing and the pod extends 30 inches in front of his feet. By making this area out of Kevlar, carbon, glass with shock absorbing foam inside I think the pilot may be ok. If it were possible to include an air bag aft of the spar at the centerline that would inflate down and back. I believe it would be pretty safe in a crash. By going to a lower load factor a two-piece pod could be installed for training.

I want a ship that can satisfy the hang glider pilots and allow them (when their legs get tired) to move up to an affordable sailplane and then to a self-launch sailplane. It can be done with "Stealth II". Being a wing it is cheap, simple, efficient and easy to fly. - "Stealth II" has everything.

Single place sailplane, hang glider, self-launch sailplane.
Span 38 ft.
Length 10 ft.
Area 140 sq. ft.
A.R. 10.3
Weight empty 115 lbs.
Landing gear -- Legs or feet
2 wheel tandem, single wheel and skid or tri-gear - depends on the use. Airfoil - modified NACA 0015. Computer developed wing twist for maximum lift and minimum drag



From: S.H.A.p Talk Newsletter, Vol IX No. 7, July 1990.

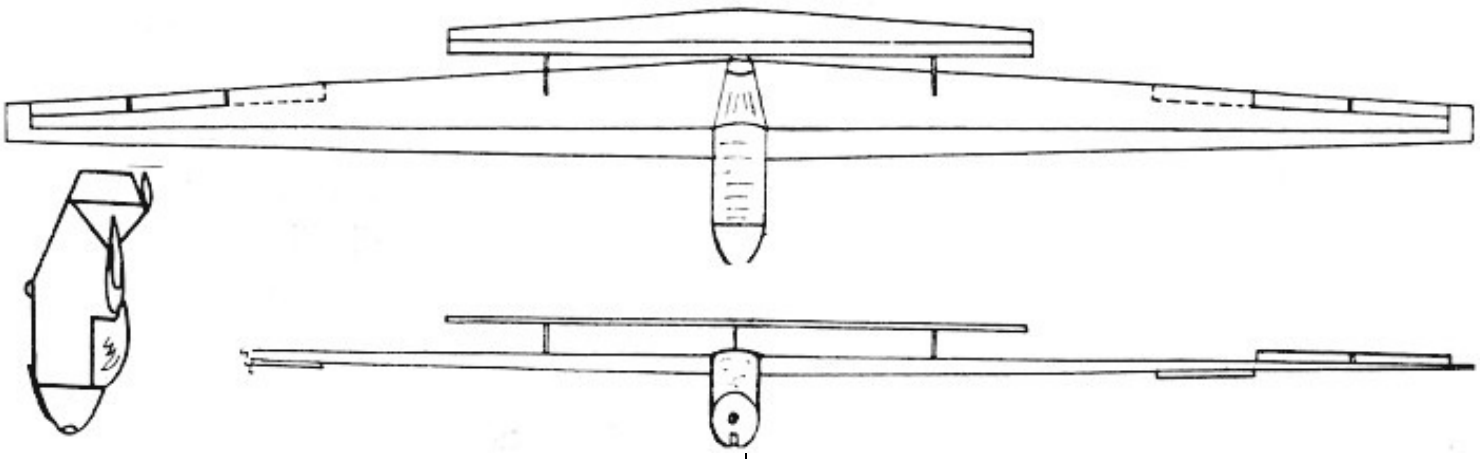
DOPPEL-SCHWANZ TEUFEL (D-91)
(Fork-Tail Devil?)

Kollection: Baron Max Halb-Darmstadt
Konstruckteur: Unbekannt
Aus Darmstadt, Deutschland

This design is from the old country sent. The sender enters the contest because he to the SHAp Talk yearly subscribes. The sender gained this design by honorable means while he at Darmstadt was a student. There he learned that Sailcraft which had no tail had lightness. There would be less skin friction because this design has less soaking space. The problem of more Drag caused by the reflexed trailing edge was not discussed. More so, the negative angle of incidence of horizontal tail. An explanation will later come.

Beste Gleitzahl: 34.99 : 1
Spannweite 15 meter
Flacheninhalt 10 meter^2
Flugelstreckung 22.5
Gewichte
Hochst 250kg
Leer 150kg
Kenn Motor---Zum Hoelle Mit. Engine not necessary.

See the three view on the next page.

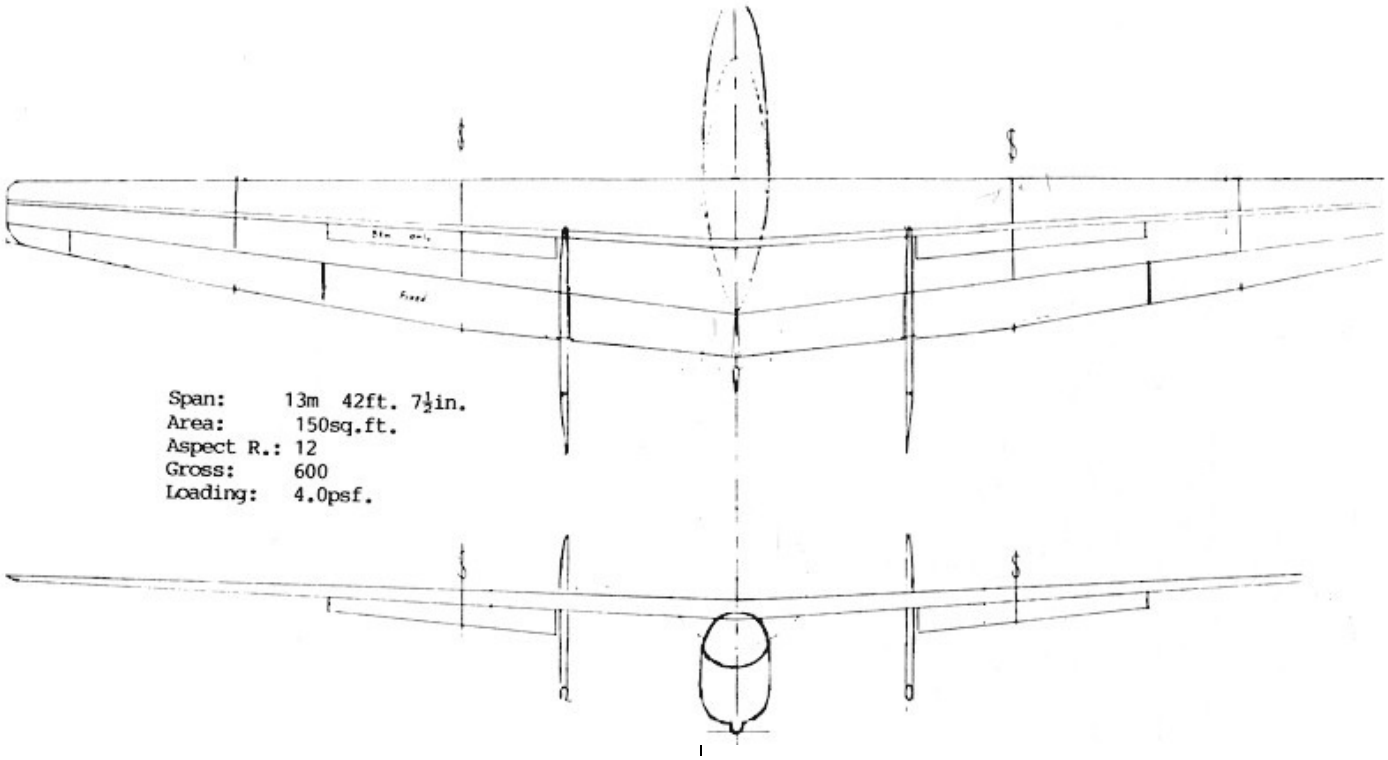


TEACHER

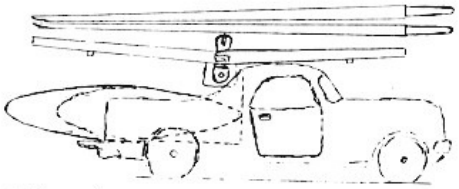
Simply stated, the object is to produce as much, for as little as possible. This is a simple to build, safe, single-place, self-launched, moderate performance, "store it in a garage" sailplane. Herewith, a beginner through expert aircraft with self-teach parameters, car-topable (no trailer) on a pickup, van, or station wagon, motor retrieve, and electric start (no heroic pull start in this tight cockpit – thank you). Because it does not carry ballast, and has only moderate penetration, it will not likely win contests.

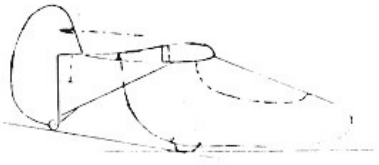
All one-man assembled with an electric screwdriver-torqued Phillips Csk ¼ -20nc stainless flat head metal screws to imbedded nuts in graphite-epoxy. The assembly time should be 15 minutes or less, since control linkage is mostly automatic hookup. No tow plane, towrope, tow pilot, wing-runner, no retrieve car, not tie-dawn fee, etc. This is truly a poor man's plane, with a ballistic chute as an insurance policy.

Construction is wood, a box spar in the root, an I-beam in the tip, which enters the box at the joint. Four ribs of wood and foam hot-wire cut ribs 6" oc fwd the spar and 12" oc aft. Leading edge of Kevlar-Epoxy over tension Kevlar ravings, since the LE radius is tight for ply. Ply skin, except that all surfaces aft of the drag spar are foam, FRP epoxy covered, and the pod is also foam, tubing and FRP epoxy. The joints in the wing area bit tedious, in that they involve a lot of labor and thought, but since they enable the wing to store, it is felt that this effort is well-rewarded. This elaborate



joint is required because the skin is stressed, and its contribution to the structure must carry through this joint. Forward-sliding wrap canopy of polycarb. The tricycle gear allows the beginner to self-instruct, up to almost take-off, but it would be foolhardy to completely avoid instruction at this point, and damage to the bird might demonstrate that this is extremely poor economy. The tailless configuration will preclude difficulty with stalls and spins, both of which are not possible in this type. Here again, before going to a higher performance type, one should get dual instruction.





Pod on it's side - Fins, Rudders removed - Motor behind cab.

To set up, from the pickup transport, you first unload the pod and deploy the padding used to secure it to receive the tips. These pivot at the root, so the sole operator places the tip on pillow #1. He then. places the root on pillow #2. Repeat for other tip. Slide the center section aft to rest on pillow #5 and tailgate, and attach pod and fins & rudders. Hook up controls in the cockpit. Insert tip roots in socket, and from the tip, slide them home (automatically hooking up controls). Alignment of the tip may be assisted through the flap pocket, but this is unlikely to be needed. Screw with an electric screwdriver. Torque all screws. This is important, since if they do not all work alike they might as well be left out, and then, one can use the ballistic chute... (It might work. It is guaranteed, so your wife can take it back). Lock the pickup. Walk-around check. Start the motor and climb to altitude and start soaring. When lift quits, if needed, start the motor and return. After landing, repeat all the above in reverse order, and motor home. Store the works in the garage, and then admit that the garage is too full for the car. Life is a trap, and we'll never get out alive, so complain elsewhere.

I'm 74 years old, and can do all this alone in 15 minutes, since I am in rather good shape (I ski and row a lot). Some of you kids will need help.

From: S.H.A.p Talk Newsletter, Vol. IX No.5, May 1990.

WILD THING

(Note from the contestant):

A friend of mine and SHAp Talk subscriber, Mr. Will Connelly, introduced me to your fine publication, and I am impressed. I am an aeronautical engineer, and I have long been interested in designing and building my own sailplane, but it has been difficult for me to find information and people to share my ideas with.

This is my entry in your sailplane design contest. I have been very impressed with the entries that you have already published, and I look forward to more. Enclosed are my initial membership dues. I am anxious to begin receiving your newsletter on a regular basis. (anonymous for now) (Editor's note: Welcome aboard new member!)

WILD THING was designed as a flying wing for two reasons: cost and style. It costs money to build tail feathers, and why pay to build something you don't need? Besides which, this thing will look really neat if I ever get around to building it.

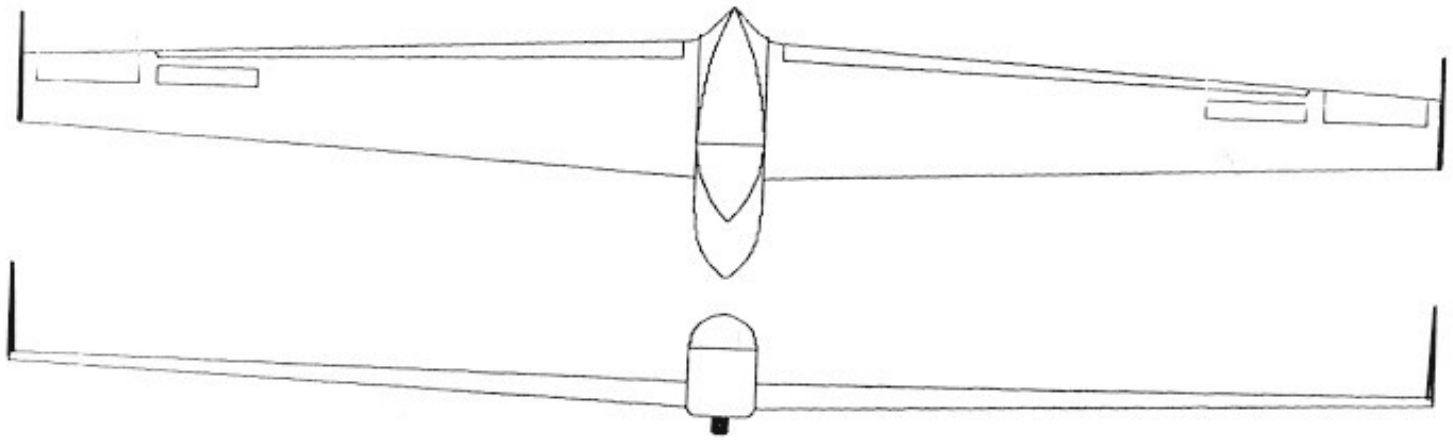
Cutting off the tail also saves a lot of weight, making it easier to achieve a light wing loading and low sink rate. As any 1-26 enthusiast will tell you, glide ratio doesn't mean a thing if you can't stay up. The lack of a tail also means low moments of inertia, which should make for a more responsive ship.

Enough on why a flying wing. What makes this wing different?...

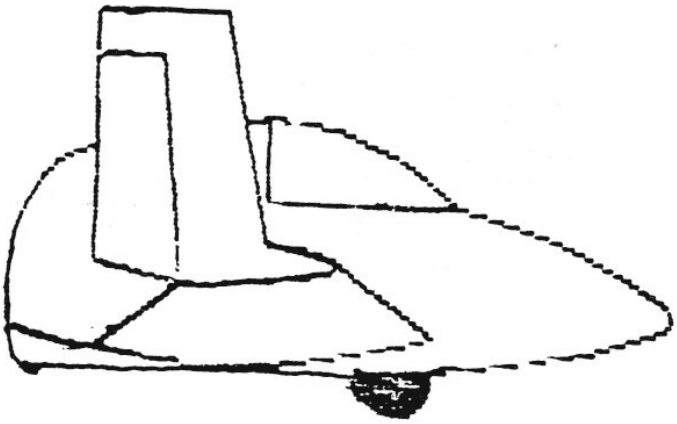
Narrow Chord Elevators - Small influence on lift, resulting in slower stall speed and better induced drag characteristics.

Ailerons and Spoilers for lateral control - Marske has the right idea -spoilers to keep adverse yaw under control despite the small rudders - but with a combination of controls, one should be able to have a decent roll rate without having the spoilers waving in the breeze when thermalling.

Drag Chute - Because of their role in lateral control, the spoilers are rather small. The drag chute compensates for this in the landing phase.



Winglets - Their induced drag compensate for the low vertical surface volume as well as improving performance. I believe that past experimenters' problems were a result of inadequate understanding of how winglets interact with the tip vortex. Also, coupling the elevator and rudders will allow induced drag to be minimized over a wide speed range, not just at the winglet design point.



Right now, this design consists of a few rough numbers and a couple of my pet prejudices. I am actively working on the airfoil design and winglet geometry, and I hope to get around to refining my weight and cg estimates and beginning detailed design in about a year, with construction to begin in about two. Opinions, suggestions, derogatory comments, and snide remarks are always welcome. (Editor's note: Comments will obviously have to wait until after the contest is over, because of anonymity.)

Span: 40’
Area: 120 sq ft
Max Gross Weight: 500 lbs
Glider Ratio: mid 30’s @ 55 mph
Sink: 130 fpm @ 45 mph
Stall: <40 mph

Mitchell U-2 Bulletin Board Threads

I am in the process of building my rudders and have come up with a couple of questions.

The first has to do with hooking up the spring. I don't have the plans in front of me, so I can't quote directly, but they say something to the effect that there is a screw that needs to be routed through the spring, or something like that. Unfortunately, on the drawing, I can't see any indication of a screw. If I were to assemble the spring and cable going strictly by what I see on the drawing, I would simply hook one side of the spring on the eye hook, and the other side would be hooked to the cable. The cable would be secured with nicopress fittings on each side with a washer on the back end of the aft spar to ensure it doesn't slip through the hole.

This all makes sense to me, so what am I missing in regard to the screws??

The other question is a bit simpler...

What do I use for covering material on the rudder? Looking at the picture of Wolfgang's modified U-2, it appears that the forward section may be using plywood and the aft section is using fabric. It seems that the other parts of the U-2 are covered in a similar fashion (Wings and Stabilators), so this makes sense, but I've found nothing mentioning the covering material.

andyomigosh@juno.com

You should think about the springs to help return to center or what ever you are going to need to trim (Trim Tabs or Stops for travel limit) the aircraft after you start flying to get to hands off or as close to hands off as possible. Remember each rudder is an independent control on the flying wing. As far as covering material, you should use one covering system to keep it simple and make the covering maintenance universal also. Not many people use dope and pigmented dope much these days. Have a friend with a champ, the fabric and dope weighed less than polycoat measuring the same sq area, but weight is a chaseable ghost, you can save in some area's and loose in others. You might contact Norm Masters and see what he would do also. On the Springs, you could use springs on the rudders (0utside toward the wing tips) and use springs inside the cockpit on the rudder pedals to achieve centering also. Just make sure you do a safe design, the U-2 is still kind of a prototype aircraft since it has not been updated since the 70's/80's.

Regards,

Charlie Caldwell

Nurflugel Bulletin Board Thread

Hello Everyone;

I popped in to the Pegasus Bridge Memorial Museum recently and was casually looking through the Log Book of Flt Lt Tommy Grant DSO, who trained and led the Halifax Glider Tug Pilots who towed the Horsa Gliders to Pegasus Bridge.

I was admiring the wide variety of types flown.

I was surprised to see this included several handling flights in a Horten IV at Farnborough in 1945.

Rather interestingly he flew a Granau Glider just before the Horten and was towed by a Storch both times!

He also flew a dual control (powered?) 'G A Tail-Less' aircraft several times. (Handley Page HP75 perhaps?)

He was then attached to the Experimental section of the Royal Aircraft Establishment (RAE) Farnborough.

Thought that might interest the group and may fill in a small piece of history.

Before the visit to the museum I had not heard of this Officer before, but clearly he carried out important Flying Wing evaluation work just after WW2. He was clearly a figure of note in both Gliding and Flying Wing testing.

Obituary link;
http://www.telegraph.co.uk/news/obituaries/1354357/His-Honour-D-A-Tommy-Grant.html#

Is this was the same Horten IV that was flown later in the United States by Falvy?

Log book shots attached. Sorry for the poor quality, I just had a point & shoot.

Best wishes to all for the New Year;

Mike Gelpi (Portsmouth UK)

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.

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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.

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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.

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

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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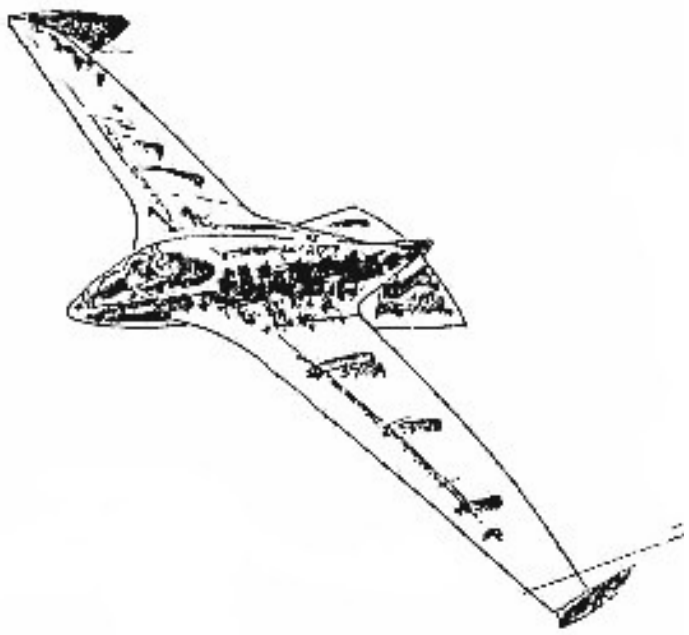

Above: Jerry Blumental's unnamed design. Below is Jerry's Rassberry concept.