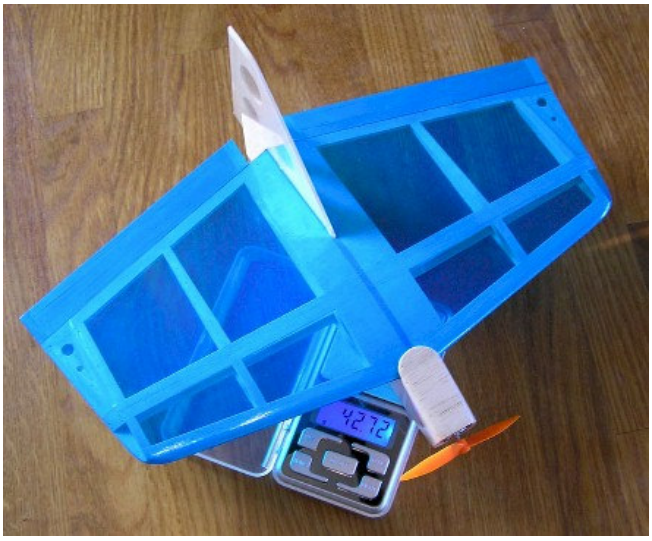
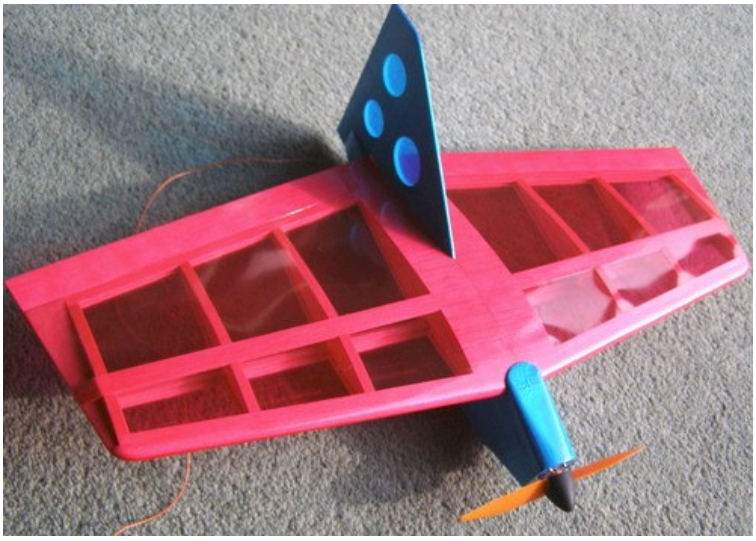
No. 273 MARCH 2009

T.W.I.T.T. NEWSLETTER



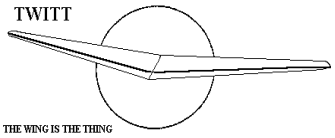


Left image is the Weezzle by Micron Radio Control in the UK. Right is their Frazzle. Flight Line Plans are a well-respected producer of electric R/C and free flight aeroplane plans. Flight Line Plans also intend to make some of their designs available as part or complete kits. Source: http://www.micronradiocontrol.co.uk/flp_plans_wing.print.html

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., **0903** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, March 21, 2009, 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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Treasurer:
Editor: Andy Kecskes
Archivist: Gavin Slater

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Password – **08member08**

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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

This was going to be a short issue due to the lack of relevant material. However, a non-member, Jason Wentworth, sent me a series of messages that I thought would be of interest and by including some pictures from some of the web sites he referenced I managed to get a full issue. I sent my thanks to Jason. He has also asked a question on hand launched flying wing gliders, so please provide him a response if you have any information.

We have a new member from the UK, so we are once again getting some strength in the European area. He does mention the lack of flying wing development in Europe, however, I have found that there seems to be more interest there than in the US, aside from the Mitchell U-2 group that seem to do a lot of talking and not much building/flying. It would be good to see the PUL-10 group in Germany find some funding to get that program started again.

THERE IS NO PROGRAM THIS MONTH, but if you would like to drop by the hanger we will be there. If you have an airplane that needs to be displayed in order to be exempt from property taxes, the TWITT meeting site is as designated display site thanks to the efforts of Bob Fronius a number of years ago.

I have been encouraged of late that the web site is continuing to be found and searched by flying wing enthusiasts. I have received several orders for past presentations, which means we can get the word out to more people and help them understand this side of aerodynamics.

LETTERS TO THE EDITOR

February 9, 2009

Strange world

I found out about a of year ago that Fred Bodek lived in Torrance (Los Angles) California where I also live. I got excited and went to meet him and talk about his work, and the Kasper wing team, and to ask if I could take him to an upcoming TWITT meeting. Fred was not feeling well enough to make the trip, so I said I would check in from time to time about other meetings

I was going to come to the underwater flying wing meeting but backed out when the facility became unavailable, so I didn't go see him. Last weekend my wife and I were cruising along to look at some properties in the area, and when we turned onto Fred's street I thought about him. We stopped across the street from the address my wife had and the realtor's sign was in front of a familiar house. I got a cold chill

Yes it was Fred's house. The realtor inside confirmed from information he had received via a neighbor, Mr. Bodek had indeed expired

Thank you again,

Larry Witherspoon
<ssspoon@aol.com>

(ed. – I had asked Larry, who works at Boeing, and Doug Fronius, who works at Northrop Grumman, to pass this information along to the companies for their internal newsletters. This was Larry's response on his experience in meeting Fred.)

February 13, 2009

Enclosed is my check for a two year renewal and several products from the library. If the DVDs costs are more, please advise so I can send additional funds.

Thanks for all the work you've done over the years. I know the effort you put out.

Takashi Hoshizaki
Los Angeles, CA

(ed. – I have completed and sent the order he ordered. I want to make sure everyone knows that whatever is advertised as VHS tapes in the newsletter and on the web site can also be delivered as DVDs. There is no additional cost for the alternate medium and I decided to offer it since more and more people now have DVD players or computers with this capability.

There has been a renewed interest in many of the items as I have received a large order for some of the older material. It is encouraging that people find this valuable and have an interest in flying wings.

I also very much appreciate the comments and the two year renewal.)

February 15, 2009

It is renewal time again. My thanks to all who keep this organization going. Please sign me up for another two years.

Thank you,

Charles Botzko
Elmore, OH

(ed. – Thanks for the two year renewal. I it nice to know we will have members around for the longer period. I often forget to mention that Gavin Slater is one of those people keeping the organization going through maintaining the archives and other duties. I also have to thank Doug Fronius (our founders son) for continuing to provide the hanger space to keep the archives and hold meetings on those occasions when we have a speaker.)

February 17, 2009

I received my first newsletter today and enjoyed reading comments by and about guys whose accomplishments I've followed for many years. (I'm 79.) Thanks again for listing my book in the T.W.I.T.T. library.

It's the result of 20 years of research and collection of government microfilms, FOIA and other reports, biographies of all the famous folks shown on the cover, and analysis of the data gleaned from other Northrop and Convair authors, like Gary Pape, Dr. Hallion, Mtrs. Woolldridge, Ted Coleman, Jackie Cochran, Pres. Truman, Charles Lindbergh, Gen. LeMay, W. Stuart Symington, speeches of Floyd B. Odlum (Convair CEO), many other AF generals, and a study of the annual reports of the corporations involved.

Hundreds of hours spend reading the actual correspondence and reports of the Convair and Northrop Corporations with the Air Force during 1941 through 1953 revealed a complex and fascinating story

that took a lot of work to interrelate and understand, and resulting in my book about what the Navy called "A Billion Dollar Blunder".

When I was about three-fourths of the way through the first draft I found Charles Tucker, the surviving Northrop test pilot who was the only one who would fly the great Wing through the AF's un-reasonably demanding stall tests and about 100 hours including autopilot installation in the YB-49, and Chuck -- still living in Hollister, CA and member of the Flying Wing Test Pilots association, (as well as Flying Tigers, Quiet Birdmen, Race Pilots (he flew in the Cleveland National Air Races 1946-49) verified everything I had found out, and clarified by suspicions about the cause of the fatal Wing crash ... all detailed with a dramatized scene in the book... when I went to California and visited with Chuck most of one afternoon. We became friends and still e-mail.

What I started as a simple investigation of the AF's puzzling claims about Wing performance and instability, prompted by my designing work for a new project (1985) of what 10 years later would be called a BWB... and my work getting a patent (5,078,338) on a device to maintain a desired relationship between roll and yaw stability for swept wing aircraft. This research soon turned into an epic tale that involved World War II bomber needs, the creation and use of the A-bomb with proven research by Germany and intended use by Japan, and the realities of the threats of the Cold War ... and the strategic need of the Northrop B-35 Wing and failure of the Convair B-36B that the AF generals and Secretary evidenced not understanding at all. The persistence and concurrent naivety of the genius founder of the Northrop Corporation is also revealed. I'm just very pleased that people like the members of this group will have a chance to read and talk about the tragedy, the incredible waste of a breakthrough in aerodynamics, serendipitous discovery of Stealth in 1948, that Jack Northrop produced for our society, only to have it destroyed by greed and ignorance.

Terrence O'Neill
<troneill@charter.net>

(ed. – I hope that you have success with your book.)

February 19, 2009

My name is Victor O'Boyle, I am a seventeen years old student and I am doing a research paper on the flying wing technology. Could you possibly recommend articles or sites where I could find information on the subject (technological aspects, advantages, problems...)

With many thanks in advance,

Victor
<veronique.oboyle@orange.fr>

(ed. – I provided Victor with the following: Thanks for writing and asking your question. All the references we have to technical publications and various books are included in various areas of our web site. Doing Internet searches using terms like flying wing, tailless aircraft, low aspect ratio aircraft, etc., will probably yield you a wealth of information on the questions you have. I think you will be overwhelmed with information and will have a hard time narrowing it down to the goals of your research paper.

Most books on the subject are very expensive so using a main library might be your best bet for finding copies. There are books by Reimar Horten, Karl Nickel, Peter Selinger, and Wolfhart.

You are welcome to use any of the diagrams, illustrations, etc. from our web site, but I just ask that you give proper credit to either the web site or the individual who was responsible for the items.

I hope this will help you get started.)

Thank you so much for your prompt reply. Those key words will definitely help!

With best regards,

Victor

(ed. – If anyone has more detailed information they would like to provide, please correspond with Victor directly. I would appreciate TWITT being a cc: addressee if you use e-mail so we can share the information with everyone.)

February 26, 2009

Anybody tried vortex generators, serrated edges, tubercles, etc. on flying wing aircraft and/or RC models?

There are reports of useful application of vortex generators and tubercles on leading edges of aircraft and windmill blades, as well as serrated trailing edges of some airfoils, as a means of improving L/D.

So, any insights or experiences of TWITT members would be most helpful.

Thanks!

Bart Brown
<bartbrown08@gmail.com>

(ed. – I responded with: Thanks for writing and asking your question.

While I don't have an answer I will put your question in the next newsletter and see what our members have to say. For some reason I have the feeling that they wouldn't work as well on a flying wing, but I am not an expert.

As with the letter from Victor, if anyone has something to offer on this subject, please include TWITT in your e-mail addressing so we can all learn.)

March 1, 2009

(ed. – This was in response to my message welcoming Hilal to TWITT where I also ask how they learned of our association and what their interests are about flying wings.)

I found TWITT years ago while browsing for unusual planes - I'm a particular fan of the Custer channel wing and the Facetmobile - and enjoyed the site but didn't join then. I found it again whilst tidying up my bookmarks on 'delicious' and noticed that the content had been very recently updated, and that's what prompted me to join.

I'm slowly learning to fly (the weather here in England is so poor!) and can't understand why the flying wings have never caught on (apart from the most recent military uses), when they seem to be so much more efficient.

No project to share at the moment - perhaps when I retire in a few years.

Regards,

Hilal Barwany
<hilalb@hotmail.co.uk>

(ed. – Although England may not have many flying wings, there is a definite interest in Europe as noted by completion of several Mitchell U-2s and prototypes like the PUL-10 that is only hampered by lack of funding.)

March 1, 2009

Hi Bob,

I am writing you from New Zealand and I am very interested in building a Vulture or an Eagle. How do I get a hold of your vulture plans? I look forward to hearing from you.

Cheers

Steve Mellis
<smellis@orcon.net.nz>
Christchurch Soaring Club
New Zealand

Hi Steve,
You can order the Vulture plans from;
Air Age Mail Order
P.O. Box 407
Mt. Morris, IL,61054-0407

The plan number is FSP0602 and the cost is $19.95. You might check their website first, www.RCstore.com The construction article was published in the June 2002 issue of Model Airplane News. You may want to see if they have a back-issue available.

I don't know how many Vultures have been built, but the feedback I have gotten from a few builders indicates that they are flying well.

Enjoy, and send me a photo when your finished.

Bob Hoey
<bobh@antelecom.net>

(ed. – As I have noted before, I find the continuing interest in building radio controlled bird models encouraging. Once the first one is successful, these modelers appear to have the desire to try new bird types as you saw in a past newsletter.)

March 5, 2009

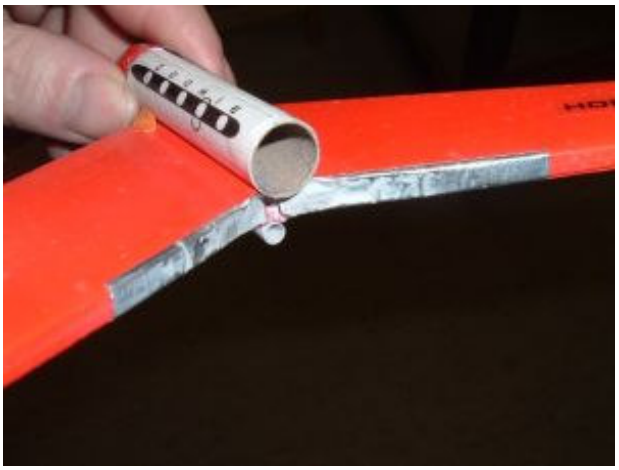
Here is information on three flying wing model rocket boost-glider kits. Starlight Model Rockets www.starlightrocketry.com produces a flying wing boost-glider kit called the Sparrow, which uses 18 mm diameter standard model rocket motors. It has swept wings with downward-turned tips. Detailed kit reviews are on Essence's Model Rocketry Reviews web site at: www.rocketreviews.com/reviews/all/sl_sparrow.shtml .

Sparrow: (top of next page)
A Great flying easy to build Rocket Glider kit.
Length: 6.00", Body Diameter: 0.75",
Wingspan: 11.00", Balsa Wings, Glider Recovery, & Decals.
Recommended Engines:
1/2A6-2, A8-3.
Price: $6.95.
Product Number: MR7824

Also, Starlight Model Rockets has acquired the production rights for the Zoomie flying wing boost glider (below), which was originally designed and produced by Holverson Designs (see: www.rocketreviews.com/reviews/all/oop_hov_zoomie.shtml) and later by Fun Rockets (see: www.rocketreviews.com/reviews/all/oop_fr_zoomie.shtml). Very similar in design to the Sparrow, the smaller Zoomie uses 13 mm diameter mini motors. The original Holverson Designs Zoomie kit used solid balsa wings and "tip rudders," while the Fun Rockets version was a pre-built Ready-To-Fly (RTF) model with foam wings and "tip rudders."

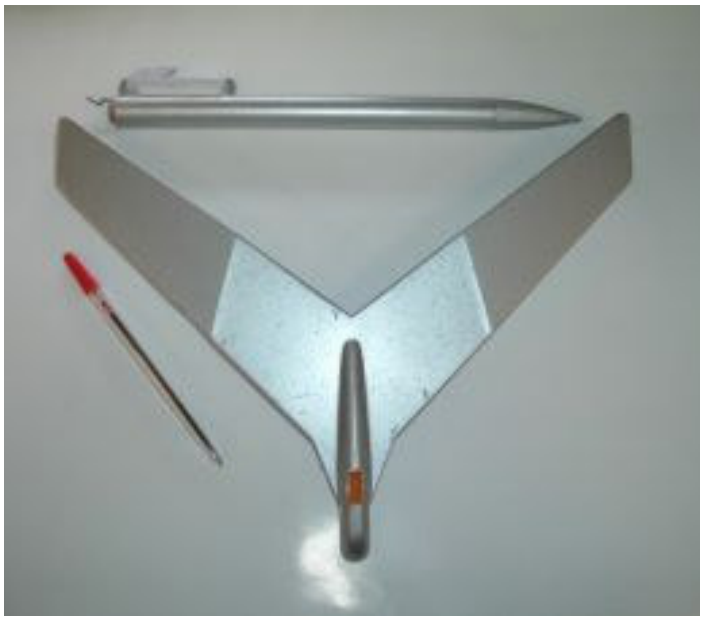
Starlight Model Rockets' Zoomie will also be a kit with balsa wings and "tip rudders," and the company has announced that their Zoomie kit production will begin this summer. (In the meantime, out-of-production original Zoomie kits and Zoomie RTF models made by Holverson Designs and Fun Rockets, respectively are still available from numerous vendors.)

Here are online scans of the instructions sheets and the balsa wing & "tip rudder" patterns from the original Holverson Designs "Zoomie" flying wing boost-glider kit: www.oldrocketplans.com/hdi/hdi2000/hdi2000.htm .



Above: Zoomie rocket motor tube.

This summer Starlight Model Rockets will also begin producing the Holverson Designs Silver Hawk (below) (which was also later manufactured by Fun Rockets as a RTF model, see: www.rocketreviews.com/reviews/all/oop_fr_silver_hawk.shtml). It is a "pop pod" type of flying wing glider.



I hope this information will be helpful.

Sincerely Yours,

James Jason Wentworth
<blackshire@acsalaska.net>

(ed. – Jason is not a member of TWITT, but I have written back thanking him for passing these links and information along to our members. I will also create a page on the web site for this information since it puts a lot of information in one place.)

(ed. – The following material was all submitted by Jason Wentworth right after I responded to his initial message. I was about the cut this issue off on this next page since I had run out of letters and the Nurflugel group has been exceptionally quiet of the past month or so. I hope you enjoy reading about the concepts and take advantage of the links. Since there are so many of them I would suggest you go to the electronic copy in the Members Only section where you can just click on them versus having to type them in from the printed copy.)

I am helping a local model rocketry educational group (in Fairbanks, Alaska) that is being organized by a university professor. For developing expertise with boost-gliders, I have suggested that they first learn about building, trimming, and flying balsa F/F (Free Flight) HLGs (Hand-Launched Gliders), which are very similar to front-motor pop pod boost-gliders.

I have found several excellent balsa HLG kits made by Campbell's Custom Kits, Guillow's, and Sting Aero Products. Between them, these companies also produce several CLG (Catapult-Launched Glider) and DLG (Discus-Launched Glider) kits. Unfortunately, none of them produce tailless or flying wing gliders (they don't even make any canard gliders).

Could you recommend any manufacturers of flying wing or tailless balsa HLG, CLG, or DLG kits?

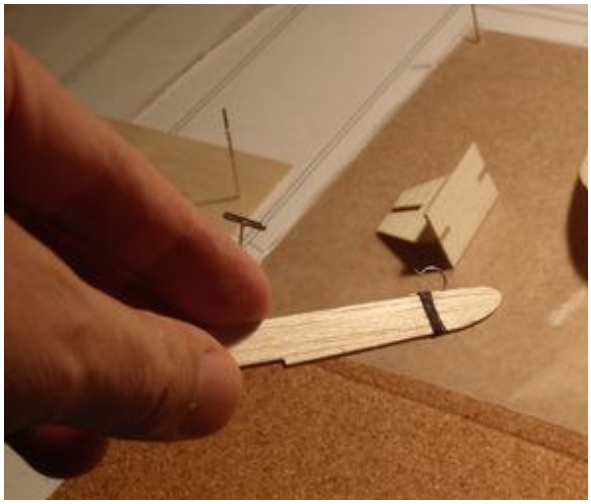
Jason

(ed. – I didn't know of any but perhaps one of our modelers might be of help. Please include TWITT in any e-mail to Jason so we will have the information to pass along in the next newsletter.)

I have an idea for something that would be beneficial--in terms of income and publicity--for both Starlight Model Rockets www.starlightrocketry.com and for the TWITT ("The Wing Is The Thing") www.twitt.org flying wing enthusiasts/historical society. Starlight Model Rockets' Sparrow flying wing boost-glider kit www.rocketreviews.com/reviews/all/sl_sparrow.shtml would, with only minor additions, also be a fine HLG (Hand-Launched Glider) *and* CLG (Catapult-Launched Glider) that could also be flown as a rocket powered boost-glider, just like the existing Sparrow kit. This could be a special, official TWITT flying wing glider kit that would come with TWITT logo decals, and TWITT could sell it to TWITT members and to non-members.

The only necessary addition to the existing Sparrow kit would be a small "keel" (made of spruce or model aircraft plywood) that would be glued to the bottom of the Sparrow model along the centerline wing joint. This "keel" would have three functions: [1] It would provide an underside finger grip for hand-launching the glider; [2] It would include a forward hook to engage the catapult rubber, and; [3] It would also extend 0.5" to 1" behind the rear end of the motor mount tube, to provide a rear finger grip for holding the glider when stretching the catapult rubber for catapult launches.

The "keel" could be laser-cut or die-cut to include either a protruding hook or a recessed "hook slot" that would engage the catapult's rubber band (or engage a stiff wire "hook ring" tied to the free end of the rubber band catapult). As an alternative, the glider's hook could also be a curved piece of stiff wire that would be pressed into the front of the "keel" and wrapped with thread (which would be coated with glue for reinforcement), as shown in the instructions for this CLG kit (see: www.aerosente.com/sting-008-construction-guide.html).



Also (as an option), a longer ogive nose cone could be temporarily friction-fitted (using tape on the nose cone shoulder) into the rear end of the motor mount tube to act as a streamlined tail cone, to further reduce the glider's drag. ("Wicking" thin CA [cyanoacrylate] glue into the inside rearmost 0.5" or so of the motor mount tube would prevent it from becoming frayed from repeatedly friction-fitting and then removing the tail cone, while also allowing 18 mm

model rocket motors to be installed for rocket powered boost-glider flights.)

The hand-held catapult itself could be just a short length of 3/8" or 1/2" maple dowel, with one or more strands of contest rubber band tied to the dowel near one end. (Nearly all Catapult-Launched Glider kits use a catapult of this type.) For more "thrust" at launch, the TWITT Sparrow kit builder could use a simple ground-mounted "bungee" glider catapult that is built as follows: A stake (at least 12" long) is driven into the ground, and one or more long (36" or more) strand(s) of contest rubber is/are tied to the stake near its top. A monofilament "leader" line a few feet long is tied to the free end of the rubber, and a "hook ring" made of stiff wire is tied to the free end of the monofilament "leader line." Although it imparts more velocity to a glider than a typical hand-held catapult, this "bungee" catapult actually provides a gentler launch because its much longer rubber strand(s) isn't/aren't stretched as much in relation to the "relaxed" length of the rubber.

Glidersonde (A Tailless Glider Application)

I recently came across a NOAA Glidersonde project web site (see: http://www.nssl.noaa.gov/projects/glidersonde/). The concept has great merit from the standpoints of cost saving and the opportunity to collect air data during the glider's descent as well as during its balloon-borne ascent.

I have a suggestion for a glidersonde plan form that would reduce the per-unit production cost, reduce the required RAOB (RAdiosonde OBservation) station storage space for storing glidersondes, and reduce the shipping container size for shipping glidersondes to RAOB stations.

As you know, both full-size (pilot-carrying) and R/C (Radio Controlled) model tailless gliders of the "flying plank" type have been flying for decades. The plank has a straight (often constant-chord) wing mounted on a very short fuselage that is not much longer than the wing chord. Planks can have either a single vertical stabilizer with rudder on the rear of the fuselage or twin rudders mounted on the wingtips.

For the glidersonde, I would recommend a simple, stable, and robust design such as Al Backstrom's EPB-1A flying plank. This glider (please see below for relevant web site links) can be built with either vertical stabilizer configuration. With its simple constant-chord and constant-airfoil section wing, a glidersonde of this design would be ideal for low-cost mass production. The wings, the vertical stabilizer(s), and the simply-shaped fuselage would be easy to manufacture in large quantities using ordinary R/C model glider production methods, particularly those methods that are used for producing ARF ("Almost Ready to Fly") R/C gliders.

This design would lend itself to both low altitude (up to 25,000 feet) and high altitude (above 25,000 feet) sonde work. For high altitude flights, the glidersonde could carry ballast (as full-size competition sailplanes do) to enable it to quickly penetrate the upper level high-velocity wind flow fields. Its relatively stout proportions would enable it to withstand the wind-induced structural stresses.

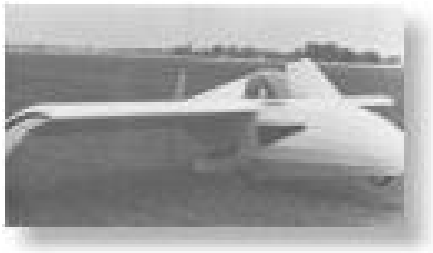
After descending below the high-velocity wind zones, the glidersonde would jettison the ballast to improve its L/D (Lift/Drag) ratio so that it could glide back to the RAOB station or (depending on the low level winds) land at a pre-arranged down-range landing site. The ballast could be a pour able powder such as sand or fine steel shot, or it could be a liquid that would not freeze or evaporate at the very low temperatures and pressures encountered at maximum altitude.

The flying plank glidersonde would be compact even when assembled, and the unassembled glidersonde would take up only minimal storage space. It would break down into the very short fuselage, the vertical stabilizer(s), and a total of either 4 or 6 wing sections (depending on whether each wing would be divided into 2 or 3 sections). Since the wings have a constant chord and a constant airfoil section, the left and right wing sections could be made interchangeable if desired.

Also, this glider configuration would allow the glidersonde to be suspended from the balloon either by the rear fuselage or by a wingtip. (The latter suspension method would minimize the glidersonde's

swinging under the balloon during ascent on a windy day, and it would allow the balloon's flight train length to be shortened somewhat since the glidersonde's wings would essentially *be* part of the flight train.) Below are links to several websites that contain information on the Backstrom EPB-1A and on tailless gliders in general. Here they are:

Al Backstrom's and Charles Fauvel's plank tailless gliders (plus other plank designs)
http://www.nurflugel.com/Nurflugel/Fauvel/e_backstrom.htm



Backstrom Plank

The preceding web site has a few pages (including the tailless flying plank aerodynamics page) only in French. However, you can easily translate the French text into English using www.freetranslation.com . Just select "French to English," copy-and-paste the web page text onto the freetranslation.com space, and then click "translate."

Here is another web page with material on the Backstrom EPB-1A flying plank: http://www.sailplanedirectory.com/zwfoud.htm . The Vintage Sailplane Association (see: http://www.vintagesailplane.org/index.shtml) has the plans for the Backstrom EPB-1A.

R/C Model Flying Wing glider design links web page
http://www.b2streamlines.com/winglinks.html

Basic Design of Flying Wing Models (including plank type)
http://www.mh-aerotools.de/airfoils/flywing1.htm

Australian Model Flying Wings page
http://www.ctie.monash.edu.au/hargrave/wings_fun.html

Australian B2422 "Twin Plank" sailplane
http://www.powerhousemuseum.com/collection/database/?irn=212051

I have never flown an R/C fixed-wing model aircraft (just an indoor R/C helicopter), but I have always followed developments in the R/C field and I have a brother-in-law who was once quite active with R/C model airplanes. I have always been interested in R/C model and full-size sailplanes (gliders), and have flown in them twice. I also collect radiosondes, pibals (pilot balloons), and pibal lights, and I was glad to come across this "intersection" of the model sailplane and the radiosonde--the glidersonde.

I have looked at the GPS Boomerang (see: www.gpsboomerang.com/component/option,com_frontpage/Itemid,1/) glidersonde web site. Their "Databird" glidersonde is an intriguing system, and I think its ability to carry "stock" Vaisala radiosondes is quite clever. For routine sonde work, however, its glide ratio (Lift/Drag ratio) leaves a lot to be desired. The specifications page lists the Databird's L/D as "approximately 5:1," but an answer on the Frequently-Asked Questions page says that the L/D is "about 4:1." This answer also said that this L/D ratio "only works to an altitude of about 10 km, beyond this the atmosphere gets too thin."

Assuming a 5:1 L/D, the Databird's maximum gliding range is 50 km. Since a radiosonde can drift up to 200 km from the RAOB (RAdiosonde OBservation) station that launched it, a glidersonde would need to have a L/D of at least 20:1 to glide back to the station from an altitude of 10 km under optimal conditions.

The Backstrom EPB-1A "flying plank" has a maximum L/D of 20. Charles Fauvel's various plank-type tail-less gliders (see: http://www.nurflugel.com/Nurflugel/Fauvel/e_machines.htm) have maximum L/D ratios of 26:1 to 30:1.

Jim Marske's plank-type Pioneer II glider (see: http://www.sailplanedirectory.com/marske.htm#Pioneer and Http://www.marskeaircraft.com/flyingwings.html) does even better, having a maximum L/D of 35. Fauvel also built several low-power motorgliders (see the photos and data listed in the "gliders" column on http://www.nurflugel.com/Nurflugel/Fauvel/e_machines.htm). These designs could be adapted for a glidersonde that would be able to further extend its range using a low-power, air-startable gas engine or electric motor to drive the propeller.

Pioneer II

Here's how a hypothetical operational glidersonde could look and operate:

A high performance plank-type glidersonde based on, say, the Fauvel AV-22 would have a vertical pass-through airflow sampling duct (for the sonde sensors) in the fuselage, located just forward of the glidersonde's CG (Center of Gravity, or balance point). The duct would have spring-loaded doors (centerline split like bomb bay doors) at the top and bottom of the fuselage. The duct doors would be held open during the balloon-borne ascent by either an open wire frame or an open cardboard frame that would remain with the balloon after separation. When the glidersonde separated from the balloon and fell away leaving the frame hanging from the balloon, the duct doors would spring shut and lock using spring-loaded latches (similar in operation to the snap locks used on cabinet doors). The closed duct doors would improve the glidersonde's aerodynamics and protect the sonde equipment from dirt and debris at landing.

To ensure a stable ascent and smooth airflow through the sampling duct, the glidersonde would be suspended from the balloon by a bridle. A lightweight suspension bar (attached at the glidersonde's Center of Gravity) would span both wings (not necessarily from wingtip to wingtip) and would fit snugly against the tops of the wings. A suspension line would run from each end of the bar up to the balloon. One or more quick-release latches would connect the suspension bar to the glidersonde, and there are several ways that these could be arranged.

Before launch, the glidersonde's ailerons and rudder(s) would be set for a full left or full right bank. This would ensure that it would not glide very far if its control system failed and it separated either at low altitude (due to premature balloon rupture) or at the normal separation altitude. (If desired, the release mechanism could be arranged so that the control surface servos would not have electrical power until a switch was closed at balloon/glidersonde separation.)

During ascent, the glidersonde would transmit its data in real time just as radiosondes do. After release, it would free-fall without lift until it descended into denser air. If high-altitude winds were known to be blowing at high velocities, the glidersonde could be programmed to "mush" (that is, command maximum "up-elevon" deflection and open its wing spoilers to give it the lowest, worst possible Lift/Drag ratio without stalling) to cause a rapid descent to below the high-velocity wind zone. (While commanding a steep dive would be a faster way to descend below a high-velocity wind zone, it would be potentially dangerous--imagine if the control system died at that moment and the glidersonde did a "kamikaze" dive right into a house?) If the control system died during the "mushing" the glidersonde would descend relatively slowly with a nose-up attitude and wings level, and just "pancake" into the ground. The final descent would be slow enough in the dense air at ground level that the glidersonde might not even be damaged if it landed in grass or on soft soil.

To make the radiosonde manufacturers happy and to relieve RAOB station personnel from the burden and expense of re-calibrating the sonde sensors, the sensor elements could be replaced for each glidersonde flight. Perhaps Vaisala, Sippican, InterMet, and Space Data Corporation (these are radiosonde manufacturers) could offer cash deposits (or discounts on subsequent orders) to RAOB stations or meteorological agencies for every 10 kilograms of returned used sensor elements that they sent back to the sonde manufacturers?

Below are links to web sites about available tailless R/C glider kits and plans. One or more of them might be suitable for use as instrumented glidersondes.

The smaller gliders on this list might be good for use as reusable un-instrumented (GPS only) wind-finders to augment or replace the small pibals (pilot balloons) that are used for wind tracking. Here are the links:

http://www.northcountyflyingmachines.com/index.htm

http://www.offtheedge.com.au/page.asp?id=1

http://www.flycs.co.nz/

http://www.rc-aero.com/

http://www.dream-flight.com/

http://tuffplanes.com/

http://www.californiasailplanes.com/planes/epp/Electron60%20Super.htm

http://www.rcgroups.com/forums/showthread.php?t=745870

http://www.demonwing.i12.com

http://www.glide.net.au/flyingwing/wfreak.htm

Mitchell U-2 Chat Room Threads

A question for the engineer types here.

In an attempt to reduce weight AND swing a larger prop for efficiency, I'm considering using a tall belt drive in place of the Rotax gearbox.

The gearbox has a 2 1/2" offset between the crankshaft and prop hub. The belt drive has a 10" offset. (It's a Challenger Tall Redrive)

Is this going to drastically change the thrust line of the engine, or have little effect? At the moment, consider both to be mounted upright.

Both drives and props are available to me, and will be mated to a DCDI 503. I just don't want to end up with the tall drive trying to keep the nose plowed into the ground.

Thanks.

Dave B.
<crusader6c@comcast.net>

Recommendation from Guy were that the thrust line pass through a point 14" ahead of the front face of the spar, and 3.5" down from the top of the ribs at that point. The thrust line would rotate about that point, so the higher you raise it aft of the spar, the more it points down. In my opinion, 12.5" offset will be too much to accommodate without raising the thrust line and generating nose-down moment.

This is based on a scale drawing. Make yourself one, and you will be able to see what is possible.

Dave Gingerich
<dgingerich@cox.net>

Thanks guys, for the several responses I got on this, post and direct.

Did some measuring, and it appears the thrust line is at the center of the crankshaft output(across the top of the spar, 14" out and 3.5" down). I guess the question here is where the thrust line actually taken from? The prop hub, the engine base, or somewhere in between? A torque applied (prop hub), over an offset (engine mount), would seem to have a different (lower) effective thrust line. I'm just trying to figure if the tall redrive would still be within an 'acceptable' range, in trying to get some additional prop clearance plus efficiency.

The plans call for a smaller inverted engine, which I don't have an option for. Looking at Tabor's pics, it appears to have the thrust line much higher. Not much else to compare with.

Thanks again.

Dave B.

The thrust line passes through the center of the prop disk. Here are a couple of bulletin board posts that you might find relevant. Unfortunately the technique for locating a good starting point for the thrust line on a model isn't very practical, or safe, for a full scale airplane

<http://www.rcgroups.com/forums/showthread.php?t=656724>
<http://www.homebuiltairplanes.com/forums/design-structures-cutting-edge-technology/4942-propeller-thrust-line-moment.html#post35858>

Norm Masters

It is very important to recognize that the thrust acts on the axis of the propeller, and the position of the engine crankshaft is irrelevant. Of course, the centerline of the crankshaft is parallel to the axis of the propeller. What you really need to know is where the engine mounts are, relative to the centerline of the propeller.

If I understand the Rotax correctly, you could turn the gear drive 180 degrees, and reduce the offset to 7.5 inches.

On the other hand, Wolfgang (the inaccessible) apparently ignored the thrust line recommendations, without any reported adverse effects. He hasn't flown the U2 as much as Guy, however.

Dave Gingerich

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

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 brucehcarmichael@aol.com
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

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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 $140, postage paid. Add $15 for foreign shipping.

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