No. 181 July 2001

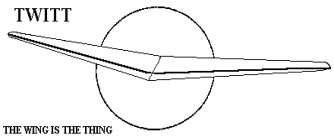
T.W.I.T.T. NEWSLETTER

These are pictures from Barry MacKerarcher's web site showing the 1915 Burgess-Dunne bi-plane seaplane he has built. The only thing lacking is an engine, either the original OX-5 or a suitable modern one. This aircraft is for sale. See inside, page 8 for more on this design and take a look at: http://www.adrageous.com/burgessdunne/index.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., **0107** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, July 21, 2001, 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.

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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, east side of Gillespie).

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PRESIDENT'S CORNER

The newsletter has a mixed subject matter this month. The mail has continued to be slow, but I would like to thank Terry Baxter for coming through with more ideas for economical flying wings. This one is almost a mini-construction article, with Terry going into detail about how he envisions the whole project coming together. He may not be an aeronautical engineer, but he sure keeps busy designing what, to me, look like feasible machines with a little tweaking from some of our more experienced members.

I think you will enjoy the program this month. Stefanie has some new information on the BKB-1 and we have all been amazed at the continuing interest in this design. I wonder what a modern airfoil and composite construction would do for the basic design. It wouldn't be a super high performance machine, but it might be something the average Sunday flier could enjoy for around the field and in regional contests.

I would like to thank R/C Soaring Digest and, Bill and Bunny Kuhlman (B^2 Streamlines) for giving us permission to reprint some of the material from the May issue. If you are a modeler and don't subscribe, you might want to look into it as an addition to your library. Every month B^2 does a column devoted to flying wings and this is just a sample of the type of material they present.

I would also Barry D. MacKeracher who gave permission to use information on the Burgess-Dunne bi-plane, flying wing seaplane. This month I will use some comments on the Nurflugel mailing list and a couple of pictures from Barry's site. Then next month I will wrap it all up with material from both sources.

Andy

JULY 21, 2001 PROGRAM

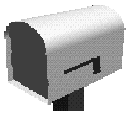
We have confirmed the program for July will feature **Stefanie Brochocki** who is going to be presenting information from **BKB-1** test flight reports and comments from its Canadian period 1959 to 1963, as well as some (by pilots other than Kasper himself) from the Seattle years 1963 to 1971. Her objective is to attempt to locate a thread of continuity in these reports leading to some clarification of the 'mythology' of its performance. She doesn't have all the answers; her research is not complete, but can provide, perhaps, a new perspective (thanks to Al Bowers, Jim Davis, and Norm Masters) and; she has new information on issues of tumbling and vortex lift as regards the BKB. Hopefully this will encourage others to seek some answers to these old and controversial issues.

Her father, Stefan Brochocki, who designed the BKB, has offered some thoughts towards the possible reconstruction of the BKB and, she will be passing those along at the meeting.

In addition, she will do a repeat presentation of the old film footage of the BKB in flight, this time with an enlargement of the section showing the alleged and fabled tumble. So come see for yourself and form your own opinion on whether it did or didn't. If you've never seen the BKB fly, you're in for a treat.

Depending on how much time we have at the end of Stefanie's program, we have two pieces of video that will be of interest to all. Dennis Karoleski has sent us some footage of the Greenland, New Hampshire fly-in that features a Mitchell B-10. We also have the recent PBS program featuring Paul MacCready and some of his many "interesting" projects, which include lots of flying wings.

Don't forget it's our **15th Anniversary Party,** which is a major milestone for an organization such as TWITT. So come and enjoy the celebration with cake and ice cream.



LETTERS TO THE EDITOR

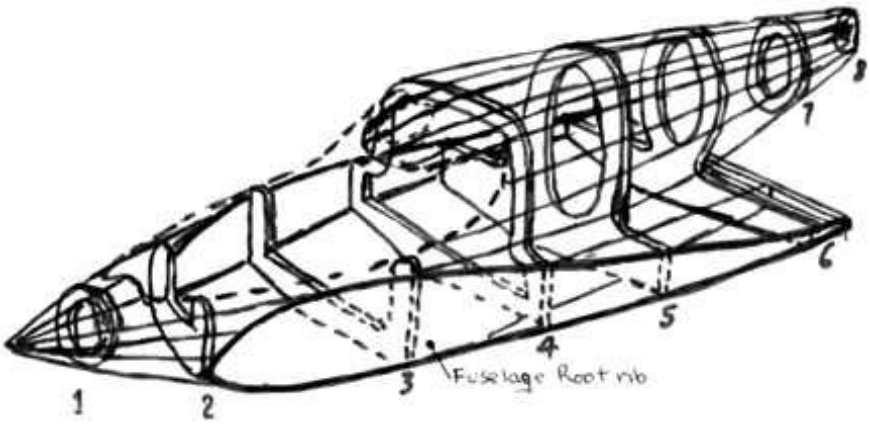
June 2001

TWITT:

I enclose $30 for my membership. Sorry about the small notes but that is all the bank had here in Darwin. It would be better if you had VISA card acceptance; it is so convenient.

I have been trying to get the Australian Ultralight Federation to accept my concept of "Waterhen", a 3-seater amphibian which you once featured in your newsletter which had a ply/foam backbone and, which I believe I could put in the air with a M.T.O.W. of 614 kgs. They have replied stating that only 2 persons can fly in an ultralight, the stall can't exceed 45 kts and much be single engined. What are the rules for ultralights in the U.S.? The only way they said I could go would be to become a G.A. pilot and register under Experimental with Civil Aviation, an extremely costly operation in Australia.

I have waited anxiously for a two-seater flying wing which is on many people's minds. I am hoping to build my own under the Australian Ultralight Experimental banner and have started a concept called "SS" Catch 22, being 22' wing span and a two-seater side-by-side, hence the title. I have been informed that the WWI Albatross Scout Fighter was built by the women of Germany in 1916-17 and have since seen a video of the women stitching the ply to the frame of the fuselage of a drag free shape. Having built many fast sailing boats with ply, I believe with the 1/16 inch ply I could build a very light, strong ultralight 2-seater, side-by-side with the new 4-stroke 60 hp twin opposed air cooled engine for 300 lbs empty weight.

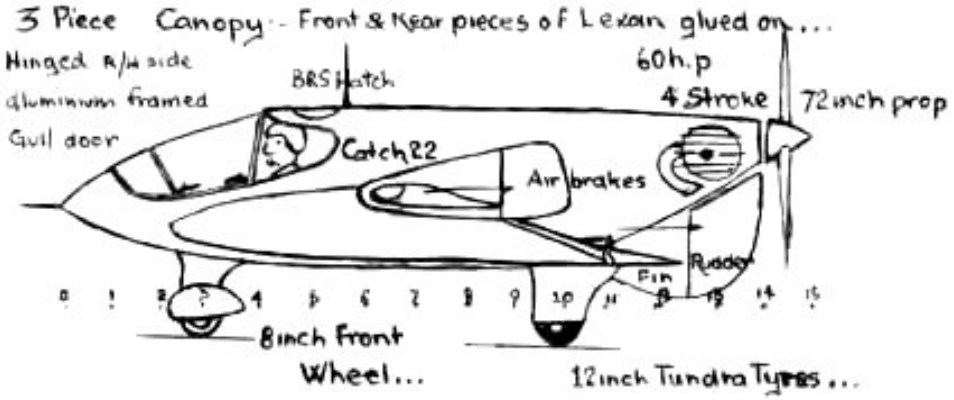


With a center fuselage and lifting body of 8' and two 7' detachable wings, it would fit on a 12' x 6' standard single wheel trailer and be legal on the roads in Australia. You are allowed 3' overhang and with the tri-landing gear it can be pushed up 3 planks for loading.

I have selected the 4-stroke engine as it has more guts in a climb and there is no mixing of the fuel, since it would use standard unleaded auto fuel. If I can cruise at 100 mph in a flying wing, which is all over the Drifters and Thrusters that I have flown and are the backbone of all Australian clubs, I would have the ultimate 2-seater ultralight as a general purpose utility and trainer. This monocoupe ply over a former framed shape fiberglassed must be economical as no molds have to be made, but would be time consuming in sanding before glassing, but all you would need is a flat floor to work off, even jigs are not required.

As you can see by the sketch below with the two root ribs of the fuselage identically made and, the 8' timber that takes the elevator at the rear and former No. 2 in position, the basic fuselage is formed and, formers 3, 4, 5 and 6 are added at 2' intervals. Level the frame on the floor and add

full-length stringers in the center areas checking that the elevator timber is level.



Place formers 7 and 8 between the stringers again at 2' intervals and brace to the floor. Place the No. 1 former in place pulling the stringers to a point and dock them off, tapering ends to join. The dart shape center lifting body is now shaped and must be checked that all is symetric to the center and the profile is correct.

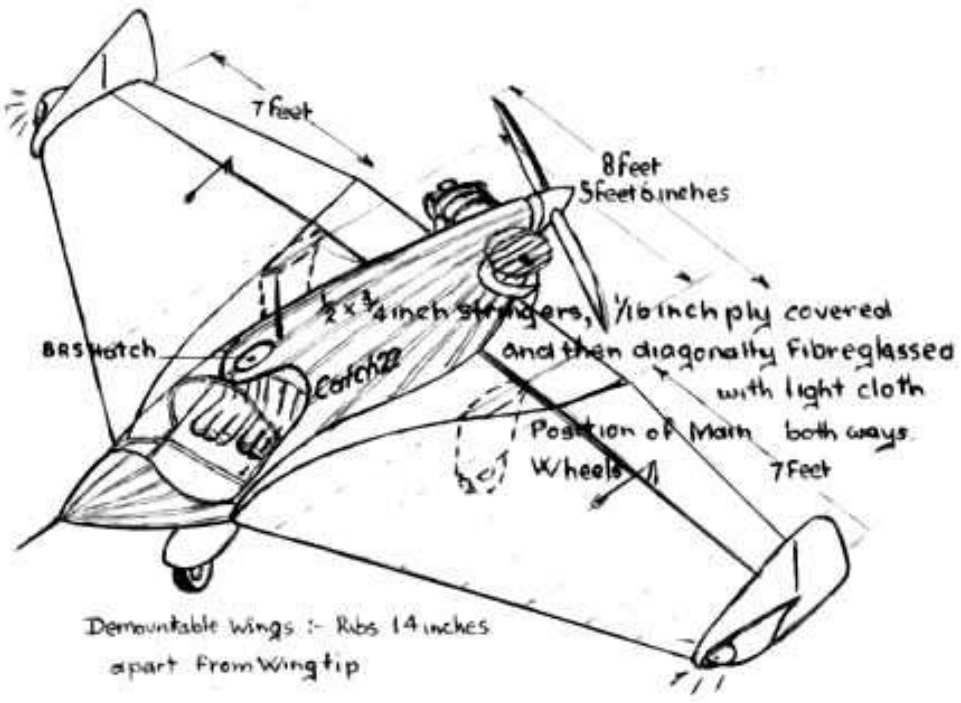
Satisfied the framing is true and, as all the formers have pre notched equal distance add all the stringers allowing overlap for the proposed canopy top and body sides of the cockpit. Plane down all stringers to the formers shape ("do not sandpaper") and nail on scrap ply to top and sides to hold shape in long thin lengths. Now turn the whole frame over on its back and add all the stringers to the bottom in the pre notched formers and the heavy keel piece from former No. 2 to the elevator timber. All stringers should be flush as it is level crossways. Only the stringers from former No. 2 to the point at the front need fitting and planning. When all the epoxy gap filling glue has dried in all the stringer joints, turn the fuselage upright again and level.

Check that the frame is symmetrical all over and braced level. Place ply full length on top of fuselage and mark area that requires little bending to put it in place keeping the line on the same stringer the full length. Remove and cut 3/8 inch inside line as stringer are ¾ inch and the joining sheet must butt against it. When the joining sheet is marked it must be cut 3/8 inch outside the line to butt up. As the ply is only 1/16 inch and epoxy glued, all those areas without tension can be fired on with a staple gun and stainless staples. Areas under tension are to be clamped until the epoxy is cured. When the main part of the top is covered, apply ply to both sides, doing the same to each side alternatively so no stress is applied to the fuselage. All difficult areas use steam heated ply using a spanish windless to held in place until dry. Then remove the windless and flush fit as the shape should be and retain with glue and staple into position.

When the sides and top are covered with ply, turn the fuselage upside down, clean out with compressed air and then spray with two coats of thin spraying epoxy that is compatible with that used for the gluing. Leave the bottom sheeting off until all internal work is completed. When dry turn fuselage right side up. Now the whole of the upper sides can be sanded and the profile of the cabin area finished off with wood inserts where required.

The canopy can be made professionally if money is available so it is in one piece. The other option is to form it in three separate pieces using small aluminum tubing for the frames and hinging the center section as a gull wing door closing with latches on the left hand side making it the pilots responsibility. The front and back piece can be epoxied to the fuselage. Use the new elastic type epoxy and use sloppy holes for any screws, bolts, etc.

It is suggested that the demountable wings could be ply/foam ribs, all timber/foam spars, ply covered, fiberglassed with aluminum tubular extensions fitting into tubes located at formers at 2 feet, 6 feet and 10 feet positions, or alternatively could be all metal. All security for wings within the fuselage easily accessible. Front wheel is braced off formers at the 2 foot and 4 foot positions and the rear wheel is braced at the rear spar and trailing elevator



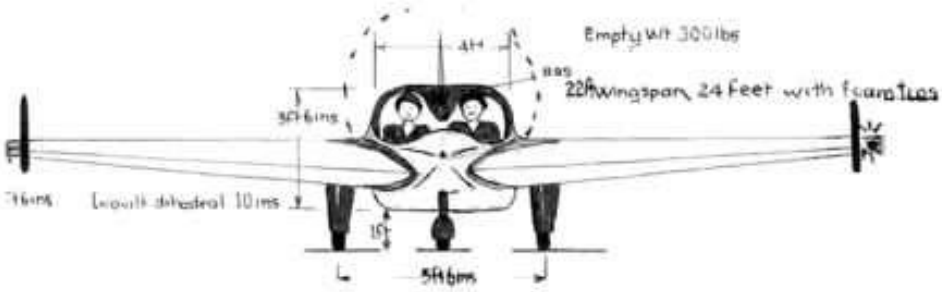
support at the center lifting body.

Summary – This concept is to produce a two seater ultralight as a common utility, cross-country, economically built and operated aircraft as a flying wing concept for the

homebuilder from scratch plans which can survive Tiger Country of Australia outback and still be used to train people for the conventional 3-axis aircraft.

I am no aeronautical engineer, but have drawn what my gut instincts tell me might work. Having little knowledge of flying wings, but having had experience of the Thruster and Drifter 3-axis drag bags of cruising at 60 kts, feel that less drag flying wing would be the ultimate in a general utility all around aircraft. Remembering "Pernauds" flying wing concept of 1800's amphibian with the reflexed after wing shape that never was built, I am sure he had the right idea prior to the Wright Brothers.

I feel that the large elevator is an extension of the reflex of the center lifting body and would eliminate porposing



making stable flight. The ailerons of the reflex wing can counter roll and, the under body rudder would control yaw in conjunction with the winglets that have been kept reasonably small for less drag, but big enough to mount airbrakes for short landings in Tiger Country. It would include a BRS to perch you on forests, mangroves and rocky areas fired through an overhead canopy which should shade occupants from the blazing hot sun of tropical Australia. If this concept is capable of cruising at 90 kts, about 100 mph, have short takeoff and landing ability, capable of being a trainer, then it must be the ultimate in ultralights. Please print the drawings in the newsletter for criticism and help with my address as I have no computer, e-mail, etc.

Terry (the Tiger) Baxter
79 Mueller Road; MALAK
DARWIN, Northern Territory
AUSTRALIA 0812

(ed. – You have to admit Terry never gives up thinking of new designs and ways to do the construction economically. I would appreciate our members offering the requested criticisms Terry has asked for, especially since he is not an aeronautical engineer and might be overlooking something really important.

I will also add this latest to the Baxter section of the website so it will get wider exposure.

I am continuing to look into methods for accepting credit card payments to make it easier for our overseas members to submit their yearly subscriptions. I will keep you informed when I find the best solution.)

June 19, 2001

TWITT:

Here's my dues for next year. I am enjoying the newsletters, but haven't been able to make any meetings. The bird-model testing continues, but no big breakthroughs. I now have a Pelican model that flies pretty well, considering the long destabilizing beak. Will be presenting a paper to the Society of Flight Test Engineers in Seattle in September. It is a shortened version of the material that I presented to TWITT in the fall of 1999 (with some new photos).

Keep up the good work.

Bob Hoey

(ed. – Thanks for the renewal. Always glad to see people coming back for more each year.

We were hoping the Bob would have some new revelations to share with us this fall for a program, but obviously that hasn't happened yet. Reinventing bird flight looks like it will take almost as long this time around as it originally did.

If you are in the Seattle area and can get to Bob's presentation, be sure to make the extra effort and do so. It is well worth it.)

May 25, 2001

TWITT:

Please find enclosed the annual subscription for my membership. I apologize for it being a little late.

Thanks for the effort you and TWITT are doing for the flying wing idea.

I had to reduce my hobby a little bit due to growing workload on my job and my family life. I still try to make progress with learning the Horten design principles. Going through all the things I collected over the years brings up some new findings from time to time, but also new questions. Fortunately there are some knowledgeable people living around that help will all this. So it still makes for fun.

Greetings,

Reinhold Stadler

(ed. – It was good to hear from you and have you onboard for another year. We have always appreciated your sharing of information from your on-going research about the Horten designs and, look forward to more in the future.)

July 2, 2001

TWITT:

What a great web site! I was very impressed. Richard Avalon pointed me in your direction.

I am currently building a Mitchell U2. I set up a small web site with pictures of my progress. I would really appreciate it if you would take a look at my web site and maybe mention it to your members if you think they would be interested. I'm sending the money today for membership and Don Mitchell's tapes.

http://www.geocities.com/quick503/

Cheers,

Michael Peer

(ed. – I guess I need to thank Richard for the referral that resulted in another new member. Word of mouth is our best advertising method. And welcome to TWITT, Michael.

I have added a link to Michael's site on our website so others can take a look at his progress so far. He has been working on the main spars and has some interesting shots. Take a look when you have a few minutes.)

July 7, 2001

TWITT:

Yes you may use anything from the website. It might help
in acquiring an engine or with the sale of the plane.

I do have the theories of performance from 1915, both of Burgess and, of Dunne in England.

July 16 had a visit from Burgess' grandson from Los Angeles, California. He builds & flies tail less wings.

Thank you for the interest in my project.

Barry MacKeracher
barry30@netcom.ca

(ed. – I would like to thank Barry for permission to use some of the material from his site. If you haven't seen it yet you might want to check it out at:

http://www.adrageous.com/burgessdunne/index.html

The replica he has so carefully built is now for sale without an engine. He comments, "It seems unlikely that an original OX-5 engine will be found for this plane. If someone has such an engine and also is interested in buying this plane then it would be an exciting end to a very long project.

"The owner is presently looking at the possibility of getting a Volkswagen engine or Wankel that can deliver about 100 prop HP. This would do the job but spoil the authenticity that has been so carefully preserved thus far."

If you can be of any help in coming up with an engine or would be interested in possibly in buying it, he can be contacted at the e-mail address above.)

(ed. – The following was extracted from the Nurflugel mailing list. For those of you with computers but not connected to this highly informative group of flying wing enthusiasts, I have included this so you can begin searching the patent archives for your favorites.)

May 21, 2001

Hi, List-

Today I found that the U.S. Patent and Trademark site now furnishes a link to a free plug-in that brings up their patent images. Images do not take forever to appear, either. They say they have images of all patents back to 1790, and I was able to pull up some old ones via reference links and specific patent number requests. HOWEVER, the search engine is unable to get the really old ones via key words, full author's names, etc. I suppose that this is because they are not stored as text documents. So that part is not extremely helpful, if you are "browsing". The last 30 years, though, is easy to explore at

http://www.uspto.gov/patft/index.html

So, if you've a desire to explore "tailless aircraft", "hang gliders", etc., but haven't been able to access the images under their new system, look up a patent and try for an image. If you don't get one, access their help and download the plug-in they suggest.

Serge Krauss

(ed. – Wait, there's more.)

June 28, 2001

From the "Get a Life" department...

In a previous message, I outlined how to find patents on the USPTO site:

http://www.uspto.gov/patft/index.html

It was about that time that I got the grandiose idea that I should find all the tailless aircraft patents that were not in my Bibliography...hmm. Anyway, as I remarked at that time, patents before about 1974 cannot be found by text search (inventor name, key words, etc.), because there are only links to images through patent numbers, UNLESS you want to search by USPTO classes. So I tried that, but inadvertently doing it the hard way, I overlooked a tremendous resource.

I had clicked on "index" and then "class definitions", from which I listed all the class numbers likely to include tailless aircraft patents (you must have some familiarity with the genre to realize the implications of each class). Having exhausted several classes (and finding some 'empty'), I

realized that quite a few important patents were not showing up. I thought that with some classes not responsive and their subclasses not accurately assigned (my opinion), there would just be no way to "discover" all relevant patents. Finally while going through 244/46 (variable wings), I saw that a patent that I "knew" belonged there was missing. Finally I got smart enough to search out that patent to see what classification the USPTO gave it. It was in a class (among several) that I could not even find in the class definitions list. So after quite a time, I looked further and found the "Classification Index" for Aeronautics:

http://www.uspto.gov/web/offices/ac/ido/oeip/taf/moc/244.htm

Now this URL is probably too long to fit on one e-mail line, so it may not be "clickable" in this message, but anyone interested in searching can follow the same trail to it from the first URL. What you get there are more sub-categories than are defined in the definitions. You can then get the full class/subclass definitions by just clicking the class titles/subclass numbers. Clicking a "P" icon at each listing initiates any search automatically.

So, if you want to look up pre-1974 patents, this is the way to go. I hope the USPTO sometime will also identify these patents by author and then perhaps by title. Things will then become MUCH easier in searching this area.

Well, anyway, I found some neat stuff. Patents by people like R.T. Jones are like reading a well-written textbook in some subjects. However, a little searching can go a L-O-N-G way. I'll let you know when I've "finished".

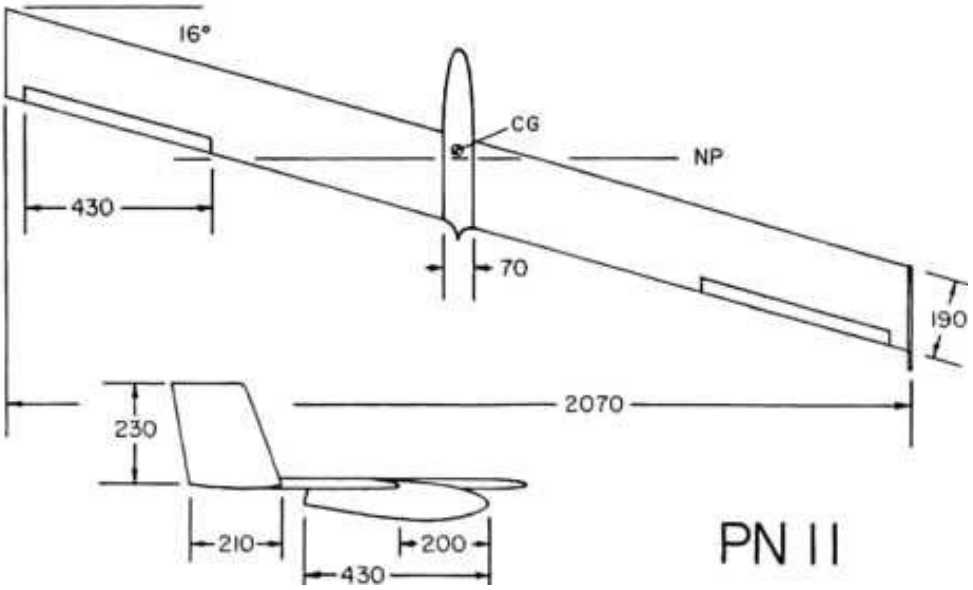
Serge Krauss

(ed. – The following is reprinted with the permission of R/C Soaring Digest and, Bill and Bunny Kuhlman of B² Streamlines. I would also like to thank them for providing electronic copies of the pictures and figures which made my job a lot easier. This was in the May 2001 issue, Vol. 18, No. 5, pp. 6-9.)

The Oblique Wings of David Freund

The last time an oblique wing appeared in this column was back in November of 1992 and was Dieter Pfaff's PN 11. As can be seen from the included diagram, the PN11 was essentially a constant chord wing with 16 degrees of sweep and a fin mounted on the tip of the trailing wing. Despite it unorthodox planform, it flew very much like a conventional plank design. The only flight control idiosyncrasies of note were a slight tendency to climb during right turns and an associated tendency to dive during left turns.

About five years ago David Freund decided to build a three channel oblique wing for RC slope flying, roughly based on Steve Morris' 20 foot span powered NASA testbed *(ed. – see more on this later)*. The results are in two "free form" models, which fly exceptionally well, despite their unorthodox planform and variable sweep.



Modern radio equipment, with multiple mixing capabilities and adjustable rates, makes it all possible.

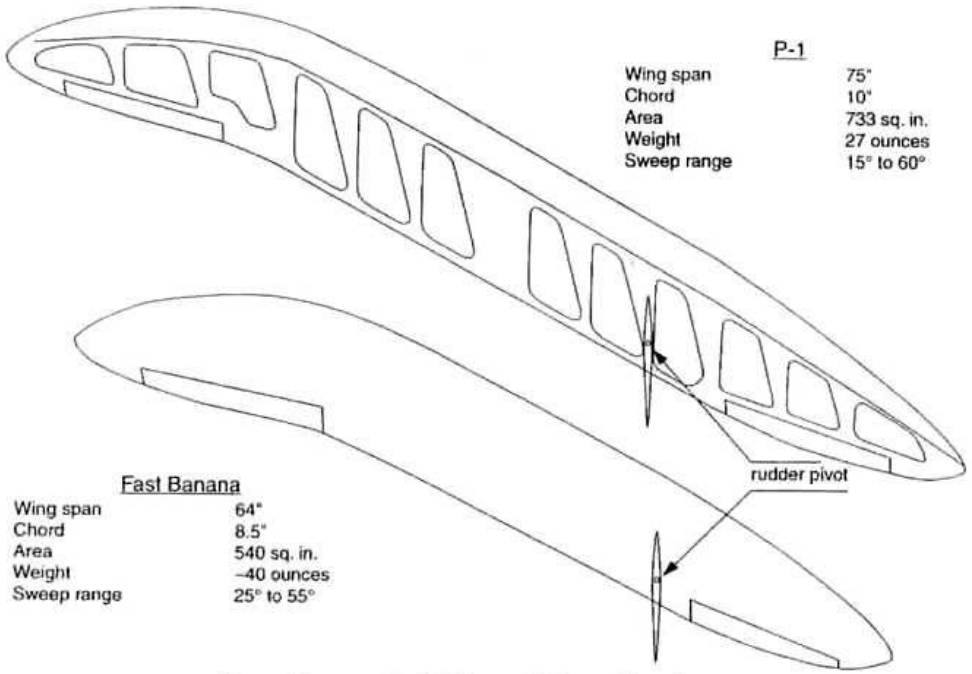
The fin is not used for steering, only for adjusting the sweep angle. Huge amounts of mixing are required to maintain hands-off control, but you can shift the sweep from 25 to 55 degrees. The rudder input is used to directly trim the elevons.

The first of Dave's variable sweep oblique wings, the P-1 uses a relatively open structure using ribs and a single spar. Because the fin/rudder controls the angle of sweep, a very sturdy servo is needed for that function. Add the skeg, which tends to grab on landing, and you get the idea for what's needed. Dave reduced some of those loads by making the lower part of the fin automatically fold on landing.

The Fast Banana has a wing loading twice that of the P-1, and the planform is compressed into a smaller airframe. It used the Selig 5010 and 5020 airfoils and is fully sheeted. The primary goal with the Fast Banana was to better balance the roll stability and trim changes with sweep changes. This includes not only the fore-aft CG, but the lateral CG as well.

These models are quite easy to fly after the trims are set up properly. Before trimming is complete, a lot of distracting manual tuning is required to change the sweep angle by an appreciable amount. After proper trimming, involving mixing both elevons to the fin function, the wing can be swung back and forth with the fin knob, hands off the stick.

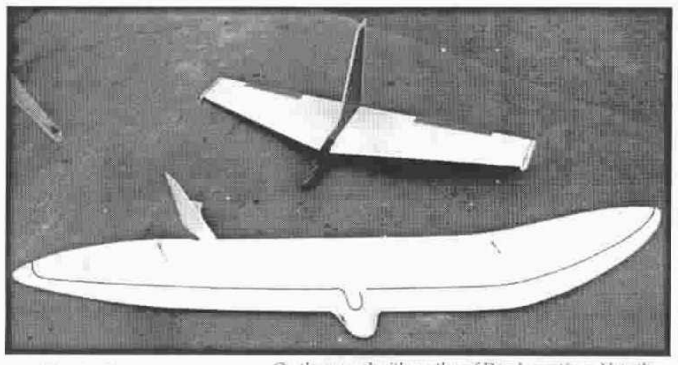
Dave place the fin somewhat inboard. Placing it further outboard would give it a better moment arm.



Dave Freund's Oblique Wings Planforms

Because of the totally enclosed structure, access to the fin end of the control system is quite limited, and the whole control system is a maintenance headache. The fin shape doesn't seem to matter too much, but the outline should be of a low aspect ratio and the surface area should be larger rather than smaller. Make sure the fin rotates on the quarter chord point on the mean aerodynamic chord.

Everything behind the spars should be as light as



possible. Dave says, "Don't add anything unless it removes weight!" All gear is as far forward as possible for the same reason.

(ed. – The following is more about Steve Morris' oblique wing demonstrator.)

Steve Morris spent two years designing, building and configuring the NASA variable sweep oblique wing demonstrator. The purpose of the model was to study handling qualities, investigate various computer control algorithms for stability augmentation, and to demonstrate the feasibility of an inherently unstable asymmetric all wing design. The model has a span of 20 feet and weighs 80 pounds. Power is two Viojett ducted fan units, each putting out 12 pounds of thrust. There are ten trailing edge control surfaces and two moveable fins. Eighteen servos are used to actuate the control surfaces, swing the engine units so they are parallel to the flight path, and steer the landing gear. The cost of materials was $25,000.

During flight, the aircraft on-board computer reads the radio signals "uplinked" from the pilot and combines this incoming information with information gathered from six on-board sensors to produce control deflections that will both stabilize and maneuver the aircraft.

The first flight of this variable sweep oblique wing demonstrator took place at Moffett Field on May 10, 1994, and was without incident and picture perfect.

BURGESS-DUNNE FLYING WING SEAPLANE

June 27, 2001

Dear List:

I am a new member and, between the other flying wings, I have been interested for a while in the British Dunne n.8 flying wing biplane, 1913-1920 circa. I am wondering if anyone knows where to find information and possibly plans for this very interesting and apparently very stable aircraft, that was using a Gnome 50 hp rotary engine in his more usual version, and was capable of carrying 3
people from London to Paris.

I would really appreciate some input, if possible. Thank you in advance.

Bruno

June 28, 2001

Bruno. Years ago I put up some Dunne stuff at:
http://home.att.net/~dannysoar/Dunn.htm

David Dodge

Thank you, David, much obliged. Do you know which kind of angle of attack and reflex were the wings built with?

June 27, 2001

Years ago I built a Burgess Dunne No 3. The center rib on the top wing has a large incidence and is curved to do this. The incidence angle is 25 degrees. It then warps up rapidly to the index of zero d. at the third rib and twist from there out to the tip where it is -8 d. The lower wing has a angle of +2 d. at the root and -2 d. at the tip. Both wings have the twist as a straight line from root to tip. Balance point is at 20% of the length of the wings in the side view LE to TE. The airfoil is very much just a curved plate, no reflex in it at all just twist. See my model of her at:

<http://www.gj.net/~regiaero/photo4.html>

She has a tendency to wander about first turning right and then turning left in pretty large arcs. Apparently it cannot be made to turn in one direction only. Both myself and Otto Kuhni have had the same problems with it. It is a very majestic vehicle in the air.

Carlo Godel

June 28, 2001

Bruno asked about the Dunne N8:

I believe the Royal Aeronautical Society here in London has original documentation and photographs of the Dunne aeroplanes. They recently released a CD of photos of early aeroplanes that you can buy over the internet which, I think, includes Dunnes. Try:

http://library.raes.org.uk/

I also remember that someone is building a full-size replica of one of the Dunnes.

Chris Bryant

June 28, 2001

A few more facts concerning the Dunne D.8: It was built from the D.5 by Fairey and flew from 6/12 through 1913; a later War Office order was dated 3/19/13.

Dunne was indeed a relatively early pioneer in aviation, model experiments having been described in his correspondence with H.G. Wells as early as 1901. His D-1 glider flew in 1907. Like so many early designers (notable exceptions being the Wrights), Dunne was more interested in the geometry of his wings than in wing sections. I have to agree that from pictures and the perspective of his design philosophy, there would have been no reflex in his wings. The washout of his swept wings is described in several of his British and U.S. patents from about 1907-1911 and consists in various schemes of wrapping them diagonally along the surfaces of cones and cylinders. This produced a marked positive camber to all sections, which he (most vehemently) contrasted to the Zanonia types of Etrich and Weiss, for instance. His wings deviated from the conical only in lifting the inner trailing edge from the cone and always including a sharply downturned root area trailing edge, which he called the "bustle", a geometrical feature he felt essential (perhaps from early paper airplane experiments) but which was dispensed with by W.S. Burgess in his lightly later Burgess-Dunne aircraft, built in the U.S. under Dunne patents.

The flight characteristics would surely favor excess stability (again in contrast to the 'control- configured' Wright designs), because stability was his main goal. In his talk to the Royal Aeronautical Society ('The Theory of the Dunne Aeroplane', 1/29/13), he explained how his wing geometry ensured yaw and roll stability as well as the expected pitch stability. He also showed a remarkable awareness of current information from German and British aeronautical labs, including knowledge of the behavior of ultra-low-aspect-ratio wings (later redis-covered by Snyder, Johnson, Hoffman, Zimmerman, et.al.), which he cited in explanation of the Dunne type's response to side gusts and/or yaw. In a letter to Flight magazine (6/25/10) he asserts that his positively cambered and washed out wing obviates adverse yaw, as does the necessary use of controls on the "rising wing" to correct for pitch effects in roll.

Dunne demonstrated the stability of his design in 1910 before Orville Wright and members of the Royal Aeronautical Society at Eastchurch, Isle of Sheppey (England) on 12/20/10 (probably flying the D-5 pre-decessor of the D-8). Mr. Griffith Brewer handed a blank sheet of paper to Dunne just before a flight, during which Dunne took both hands off the controls to hold and write on it (with no backing), recording his actions and observations during the flight. He returned with the following written on it in pencil:

"Engine revs. 1400
Levers normal
Strong wind in face
Turning now
Straight again"

Returning from the circuit during which he had written these notes, he cut the engine without adjusting pitch, threw up his hands, and descended with arms raised until just before touchdown, when he resumed hold of the control handles. The plane had adjusted and maintained its pitch automatically.

In his account, Dunne states that his purposes were "to show that the machine could fly as well and as strongly as the ordinary T shape, to exhibit the power of control and maneuvers given by the two little steering flaps, and above all to show that with this type of machine good turns, with the correct amount of banking, and no side slipping, could be effected without resource to the complicated 'three rudder' system...The next point was to prove the safety of the machine."

By all accounts, the Dunne aircraft WERE extremely stable. Unfortunately, their high drag left performance well behind the accelerated aircraft developments brought about by the "Great War".

In addition to biplanes, Dunne built four monoplanes: a glider, the D-6, D-7, and D-7 bis. These featured what many would now call "diffuser tips" (down-turned, with an inboard cant). By all accounts they flew well, but biplanes were what the various governments thought they needed. Hence, Dunne proceeded with development of the D-8 and D-10.

Although the Dunne and Burgess-Dunne aircraft were well documented in contemporary periodicals, sometimes with elaborate, full-page scale drawings, these are the only Dunne D-8 scale drawings I've found:

Lewis, Peter; British Aircraft 1809-1914; Putnam; London, 1962; p. 230. (shown on David's site)
Munson, Kenneth; Pioneer Aircraft 1903-1914 (Pocket Encyclopedia of World Aircraft in Color);Macmillan, NY; 1969; p.45. (also shown on David's site)

Gould, Bartlett; "Burgess, Part VII"; WWI Aero; 5/91; p.33.

Fortunately, these are of good enough quality to make model plans. I would guess that any reasonably sized model built to Dunne's geometry should behave much like the full-sized plane, since very thin wing sections were the rule.

Dunne was surely one of the most important and successful creators of tailless aircraft ever. His writings are lucid and revealing.

Serge Krauss

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