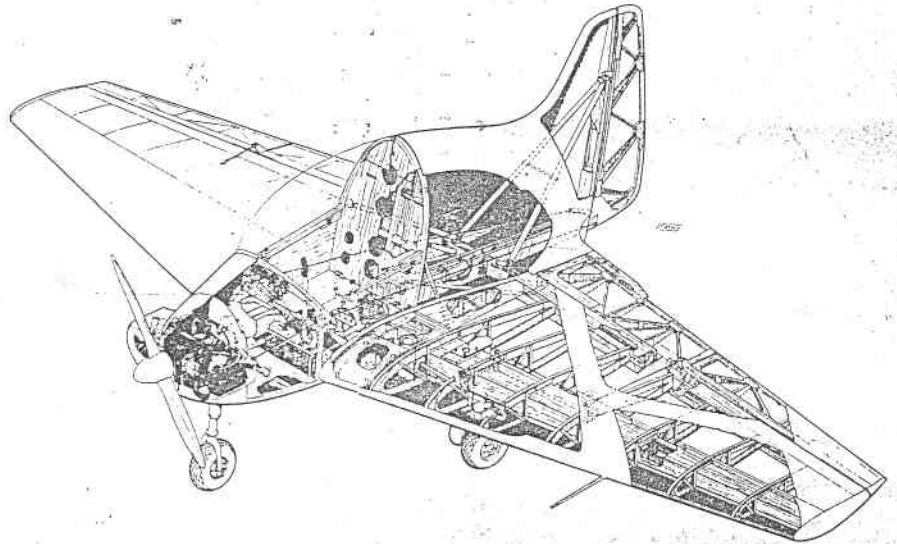


T.W.I.T.T. NEWSLETTER

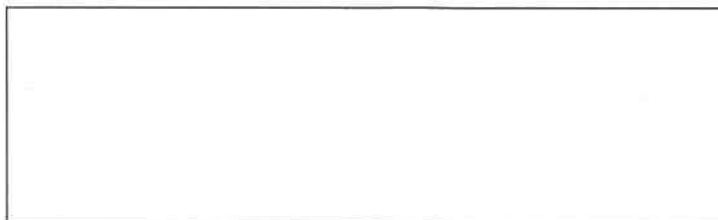
A cutaway rendition of Fauvel's AV-60 showing some of the construct details and general layout of the wing structure. For more on what the Australian's have proposed to do with this design see the Letters to the Editor column inside.



L'AV 60 garde les promesses de construction

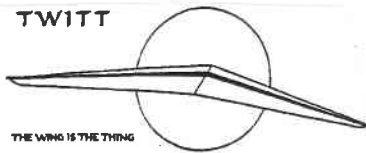
T.W.I.T.T.

The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021



The number to the right of your name indicates the last issue of your current subscription, e.g., **9609** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, September 21, 1996, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - East 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:

- President: Andy Kecskes (619) 589-1898
- Vice Pres: Bob Chase (818) 336-5485
- Secretary: Phillip Burgers (619) 563-5465
- Treasurer: Bob Fronius (619) 224-1497
- Editor: Andy Kecskes

The T.W.I.T.T. office is located at:
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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

First of all I need to make sure everyone realizes I made a big error on the cover and in the program announcement in the last newsletter. I got in a hurry to finish the thing on time and had a corresponding mental glitch that made me think we were already in September when in fact it was August. Oh well, I think I have a handle on it this month. Anyway please take note of the following:

**THE NEXT MEETING IS ON
SEPTEMBER 21, 1996**

(THAT IS THIS MONTH) not on October 21.

With that out of the way, I am pleased to announce that the letter for Dan Ford last month has received some responses from the membership including, I think, Russell Lee from the Smithsonian. He has a wealth of information available to him if he has the time, which he apparently did, and we appreciate his participation. I carried on some e-mail correspondence with him and was able to pass along some other information he could possibly use. It seems he was well on his way since he had already talked with Bob Cardenas and Max Stanley, and I will be sending him the flying wings video to supplement these conversations.

I was pleased to see that the pictures of the blended wing body aircraft came out as well as they did. The ones Kevin sent weren't of a high enough resolution to copy well so I went into the Net and printed them out on the laser printer. They give you an idea of the quality of graphics that is being presented on homepages on the Internet. I have also seen some with moving marquees and/or graphics, so it just depends on how much memory your computer has and the transmission rate you are using to retrieve the data.

E-mail was also an excellent tool this month to make sure that the video I was about ready to make for Olindo Zuanon in Italy would work on his VCR. A quick message to him with the question and an answer back the next day allowed me to make the proper tape without waiting weeks for regular mail to go back and forth. Obviously, I am sold on this, and hope more of you will be jumping into the world of cyberspace in the future.

Hope I saw you at Tehachapi over Labor Day.



SEPTEMBER 21, 1996
PROGRAM

This month's program will have dual speakers bringing you twice the bang for the buck. First we will have **Craig Roberts** give a presentation on his new 1/4 scale model flying wing. He is quite excited about what the glide tests of his 1/6 scale version has shown so far and has some new information about an Eppler airfoil he is using. He plans on showing a video tape of his 1/4 scale test flights and will conduct a question and answer session so everyone can learn as much as possible.

This is a rebirth of an earlier flying wing called the Aquila which was produced by Aerodynamics, Inc. in the mid-70s. The company was owned by his father. The full scale version will be a foot-launchable rigid wing and probably be built using composites. Floyd Fronius has been providing assistance from the vantage point of a hang glider pilot which will help with the final design parameters.

Quite by chance (and a little planning) our second speaker for the day will be **Floyd Fronius**. He will be showing and telling us about his recent experiences at the US Hang Glider Nationals. He had some very long flights with his flex wing hang glider and he will be telling us about the competition scene from a national and international perspective and the level of competition that can be expected for the serious hang glider competitor.

Floyd will also be bring along his hang glider which has a slight different configuration than the last time it was on display. He will also be showing us the latest in electronic flight computers and how they can be interfaced with GPS to the same point as the big glass super ships being flown in competition.

Don't forget, Chris and Connie will be surprising us with some type of treat that will help beat the heat, and there will be a raffle with some very useful items to choose from.

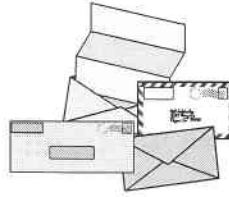
So mark your calendar right now for:

SEPTEMBER 21, 1996

(That's about a week from the time you receive this newsletter.) See ya there.

LETTERS TO THE
EDITOR

July 29, 1996



TWITT:

It is my guess that those of you who are fortunate enough to make the meetings do not have the problem that I face in reading TWITT, which I will try to explain, because you see the input as it arrives at the meeting. We outlanders do not have this advantage.

For example, in the July issue I spent some time trying to relate the Tacit Blue photos to Bruce's publication on drag, which I have, but did not recall any mention. Then, by the time I got to page 7 I had forgotten Tacit Blue's picture and tried to relate the text to the Fig 1 & 7 (which I still have no text for). And what justifies the spread of a full page on Les King's The Primer? (That sure is not a vintage.) Yes, there's a 3-view and a squib on it in June, but why?

And as for your President's Corner of June - we may not be able to absorb all the stuff that is printed, but please do not play down to below us. Rather, expose us to Phil Barnes and others, in hopes that we will grow mentally. (That, after all, is what TWITT is for.)

And now I drop the other shoe. I have Phil Barnes' Sept 16th presentation to TWITT but in the June issue are three pages ascribed to him (pp. 4, 6, 8, cover & minutes) seems to indicate that there may be a second Barnes address - end of third paragraph, right hand side of page 2 - and so I enclose a check for \$7 for the complete package.

Please forgive these criticisms. I can get a glimmering of the problems of editorship, since I have considerable difficulty keeping my notes coherent, and all I am doing is in a small shop.

Thank you,

Syd M. Hall

(ed. - First, don't worry about the criticism since that is how we make the newsletter better. I'm not a professional publisher so I am becoming educated about how to do this as I go along. All help is appreciated.

To help explain the confusion, I simply stuck the Tacit Blue pictures into the text as filler to try and break up the page a little bit with the information sent in by Chris Tuffli (your right, it didn't have anything to do with Bruce's book). I kept them together to reduce the need for two explanation paragraphs. The two figures on page 7 (also from Chris) didn't have any supporting information but included an interesting configuration we hadn't published before.

Although The Primer is not vintage, I was simply noting where and when it was photographed for everyone's information. I included it in both June because the 3-view was all I had at the time, then Bob got the film developed by the July issue. It is a flying wing (although it does have a vertical tail) and uses construction techniques that are available to most homebuilders and I thought would be of interest.

In my column, my intent was not to play down to the members, but acknowledge that we have had comments about some of the material being too technical and sort of apologizing for including so much in the newsletter.

As for Phil Bames' presentations, he has made two the first being in September 1995 which has material available and the May 1996 talk was in the minutes. It is the May talk that I offered the package since it is hard to put all the really good stuff he might have covered in the newsletter.

Hopefully you will have the package by the time you receive this newsletter. I apologize for the delay, but I missed your ordering it when I read through your letter the first time.

Again, don't worry about forwarding you criticisms. I'm sure there were others out there that had the same type of confusion, and hopefully this has cleared it up for everyone.)

July 22, 1996

TWITT:

Together with my subscription renewal is some more information about a true <<wing>>: our SURFAIR.

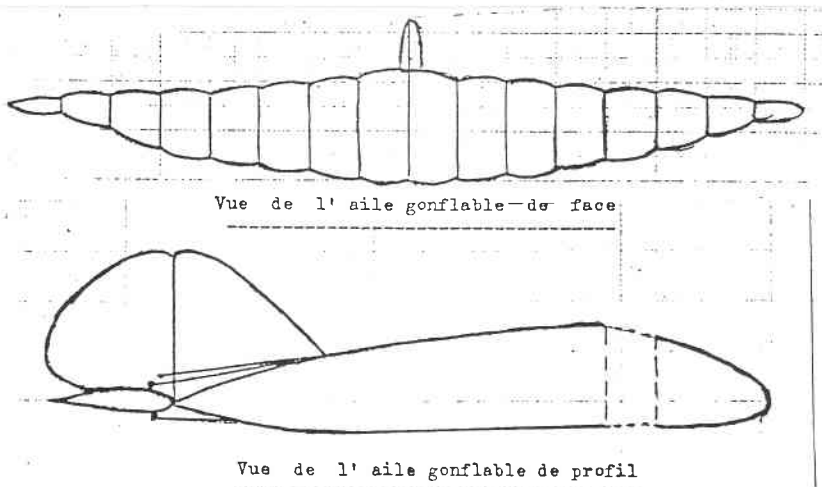
You already had some info about it, but it may be useful to add more. Some differences exist between plans and photos.

This free hang gliding device has been marketed in inflatable form (as seen over primitive plans), but has been produced and flown (ed. - July 1995 & August 1994 newsletters) using building system already published in TWITT. (ed. - March 1996 newsletter)

The flying prototype has demonstrated good efficiency and general shape will be retained.

Prototype:

Span	6.5 meters
Length	5.8 meters
Weight	46 lbs (23Kg)
Take-off	15 mph (22 Km/h)
	(3 steps in a light breeze)



I shall send you later papers about:

-Rene COUZINET Flying saucer, far ahead of its time (and maybe explanation of some strange shapes seen in the sky).

-Low aspect ratio wings and some interesting features about them.

Felicitations for you super publication.

Alain MIROUZE
Vitrolles, France

(ed. - Alain also included some material in French that I though we had published in a prior issue, but I can't find it anywhere back through 1993. However, this time we have the English translation so I have included reduced sized copies of the diagrams and the explanation of what we are seeing.

I have also reduced the size of the SURFAIR 3-view and vitals.)

**FOR SOARING FLIGHT:
AN IDEA FLOATING IN THE AIR**

A communication from our colleague Alain MIROUZE (from Vitrolles). As you know our information bulletin is open to all the club members who have some interesting idea to present. Today our colleague Mr. Alain MIROUZE writes: Just a quick note, which might perhaps inspire some of you. I will never find the time to build everything I design so I prefer to release them to the community. Best regards A.M.

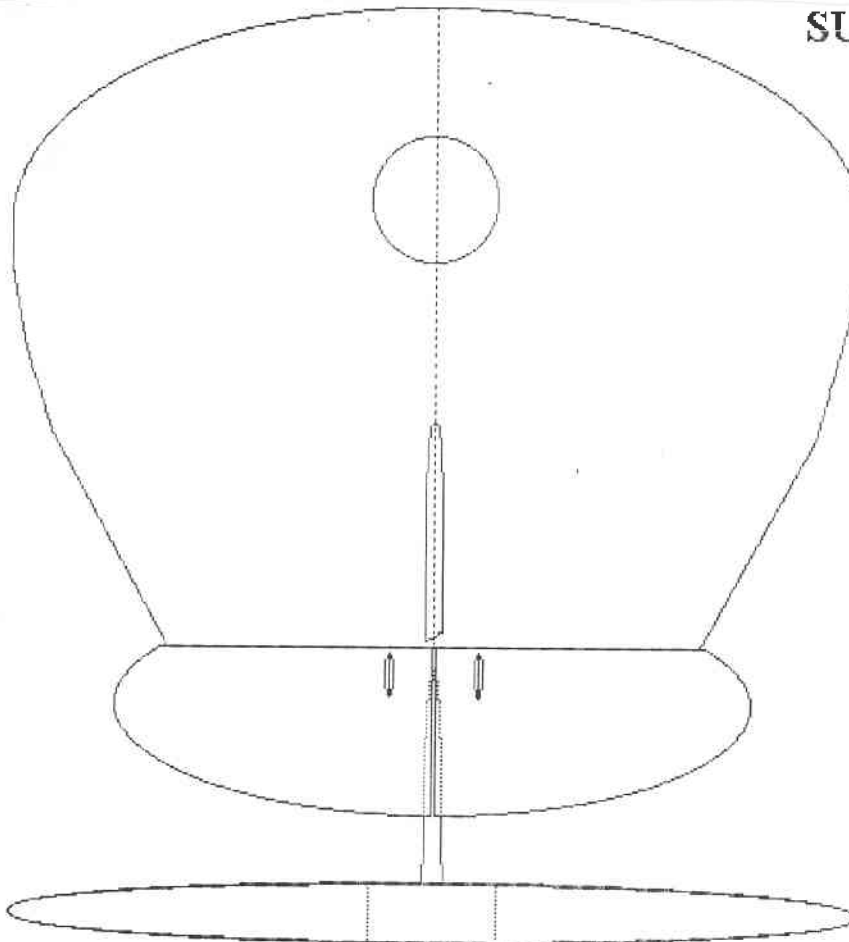
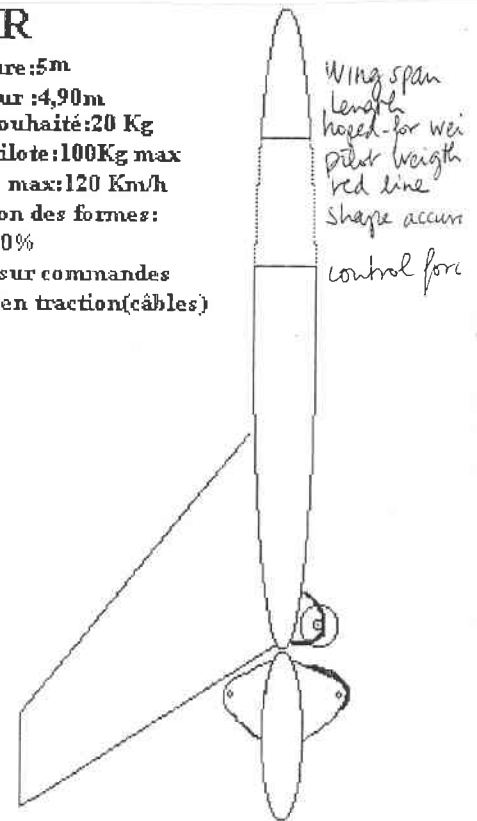
FLOATING IDEAS: We seem to be inching back, perhaps due to mental laziness, towards the Bleriot configuration. Other configurations and concepts are possible, for instance:

1. An inflatable flying wing (15' x 15') where the pilot occupies a centrally located opening. The Vmax-to-Vstall ratio can be large thanks to the wide alpha range. Good penetration, and good crash protection. However, a life-size prototype brought some difficulties into focus: PVC is hard to weld and can be heavy. On the other hand polyethylene is rather fragile. Lightening by hydrogen inflation is wishful thinking. On the other hand, even a bad hole does not result in rapid deflation. A parachute is still a necessity for high altitude flight since safety should not be sacrificed in the name of experimentation.

RIGHT: Front and side views of the inflatable wing.

SURFAIR

Envergure: 5m
 Longueur: 4,90m
 Poids souhaité: 20 Kg
 Poids pilote: 100Kg max
 Vitesse max: 120 Km/h
 Précision des formes:
 + ou - 10%
 Efforts sur commandes
 100 Kg en traction(câbles)

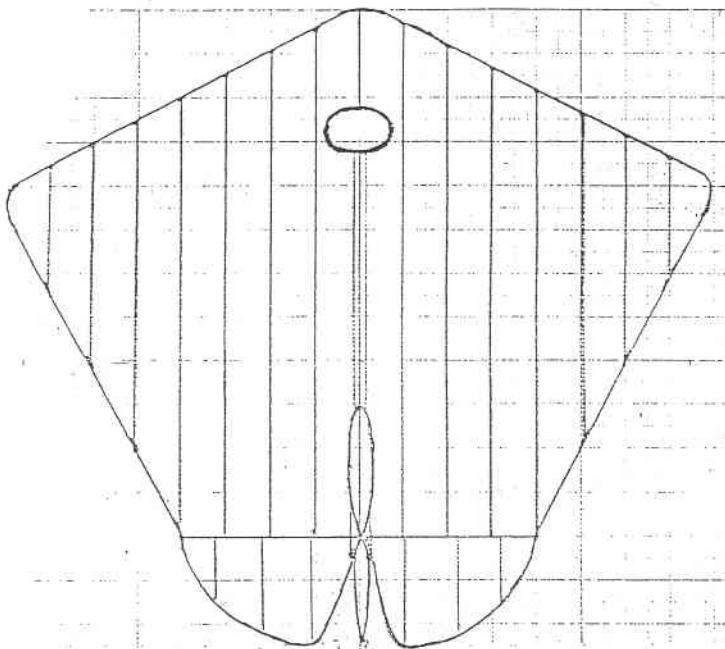


INFLATABLE CHARACTERISTICS

Length	4.8 meters
Span	5.0 meters
Weight	50 kg
Lifting Area	22 m ²
Take-off Speed	45 Km/h
Landing Speed	15 Km/h
Theoretical Speed	120 Km/h
Folded Volume	.50 x .50 x ? meters
Controls	Internal Cables
Independently Inflated Sections	
Very Low Pressure (like an air mattress)	

Vue de l'aile gonflable, en plan

Inflatable wing, plan view



FAUVEL AV 60

A Ian Lewis, of Paddington NSW Australia, sent us a package back in February on the AV-60, but somehow it got misplaced in the inevitable scuffle of paperwork at the hanger.

Included in the package are several drawings by Mike Burns, a well known Australian author and sailplane enthusiast. In one he changes the lines somewhat to give the viewer an idea about how to turn the AV-60 in self launch sailplane.

One page includes the coordinates for the FAUVEL F2 airfoil, including 23 for the upper surface and 27 for the lower surface.

There is a cutaway drawing done by a Mir. Wixy and then a number of drawings showing the various modifications proposed by the Australians.

The quality of the copies makes them difficult to get good reproductions for inclusion in the newsletter, however, we have tried to give you some idea of what the Australians are looking at for changes.

This package of material will be added to the TWITT library under Alan Lewis' name. If anyone is interested in looking at a copy of the complete package of drawings and accompanying text, please send a check or money order for \$3.50 to cover reproduction and postage within the US. Overseas airmail will be additional to cover about 4 oz of material.

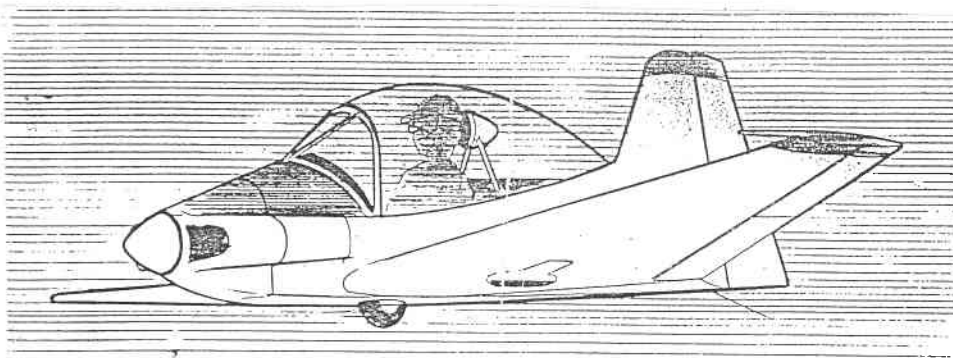
(Included in Thomas' mailing was an early release of an article that will be appearing in the ICAS Proceedings '96 (not sure just when that will be). It is titled "WING-GRID, a Novel Device for Reduction of Induced Drag on Wings", by U. La Roche, S. Palffy, Fluid Mechanics Laboratory HTL Brugg-Windisch, CH-5200 Switzerland.)

The following is the abstract from the article along with several of the illustrations that will give everyone an idea of what Wing-Grid might look like in a practical application.

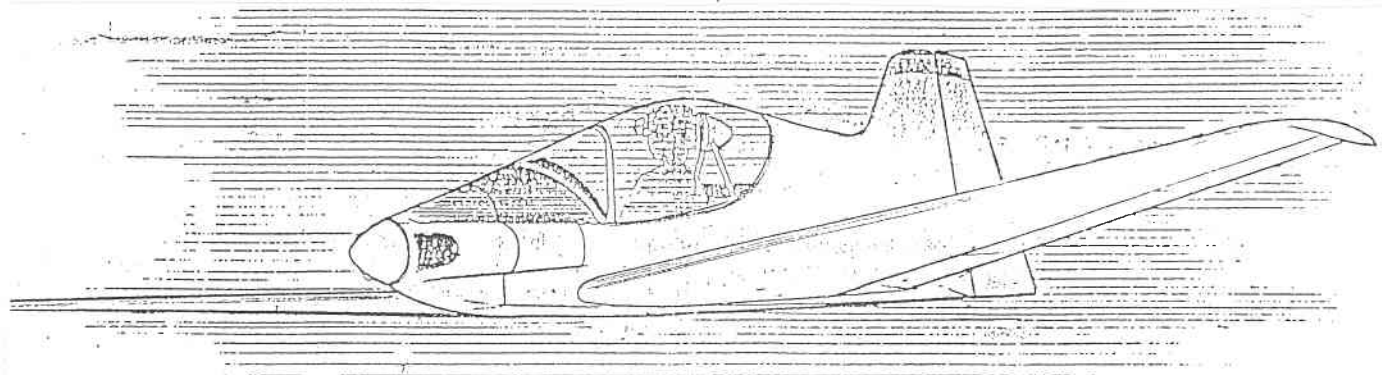
ABSTRACT

A new wingtip-device for reduction of induced drag on wings is reported. Relative reductions of induced drag compared to elliptical planar wing up to 50% have been verified. The well known equation of Spreiter & Sacks for rolled-up vortex geometry has two parameters that define the relative induced drag of any wing and wingtip configuration. In the so-called Trefftz-plane behind a wing the trailing vortices have spacing and vortex-core radius.

The contribution of a wingtip to increase the vortex-spacing and/or the vortex-core-radius for reduction of



Mike Burns artiest concept of the AV-60.



Mike Burns concept drawing of a modified AV-60 that could be a simple, self-launch sailplane.

induced drag is used for the classification of wingtips.

Simultaneous exploitation of increasing vortex-spacing and increasing vortex-radius leads to configurations exceeding the potential of the known classic configurations by a wide margin.

Known is the Spiroid: published in Aviation Week of 6th December 1993 by Dr. Louis Gratzler.

Another is the WING-GRID treated in this paper. Both have been included in our windtunnel verifications and are identified to belong to the same class.

The paper reports the tests made and a preliminary description of the working principles of the wingtips belonging to this class as well as a description of the design information arrived at for the WING-GRID.

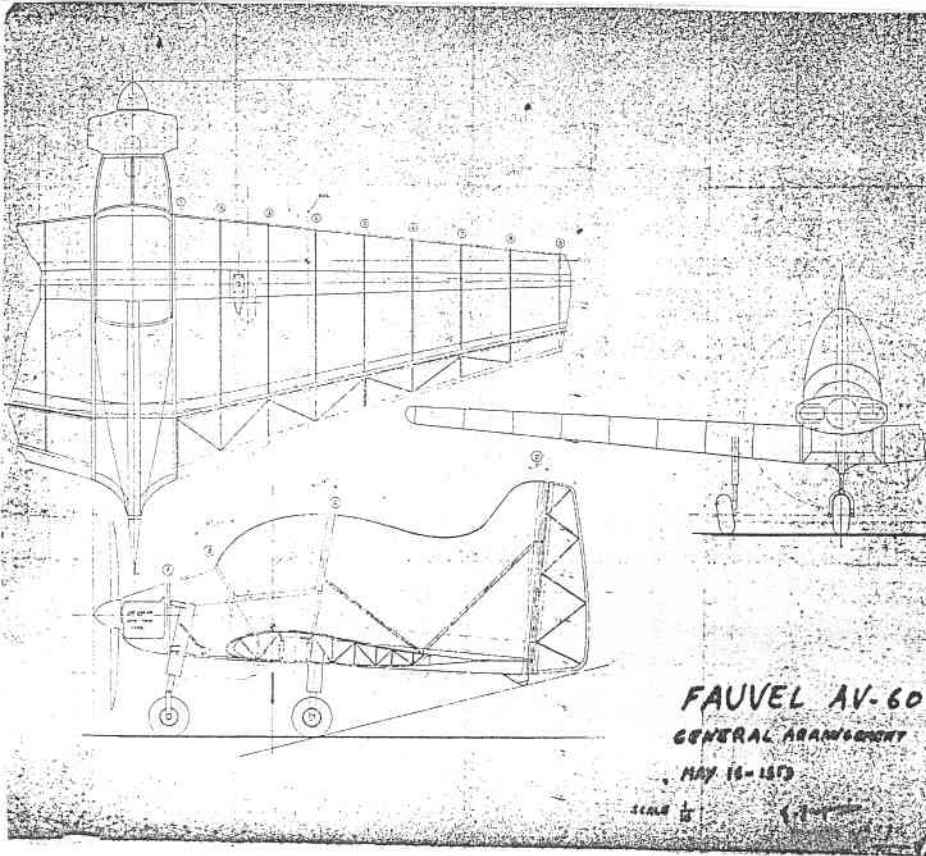
(continued on page 7)

THIS JUST IN

As promised, here is information about a TWITT TIP!

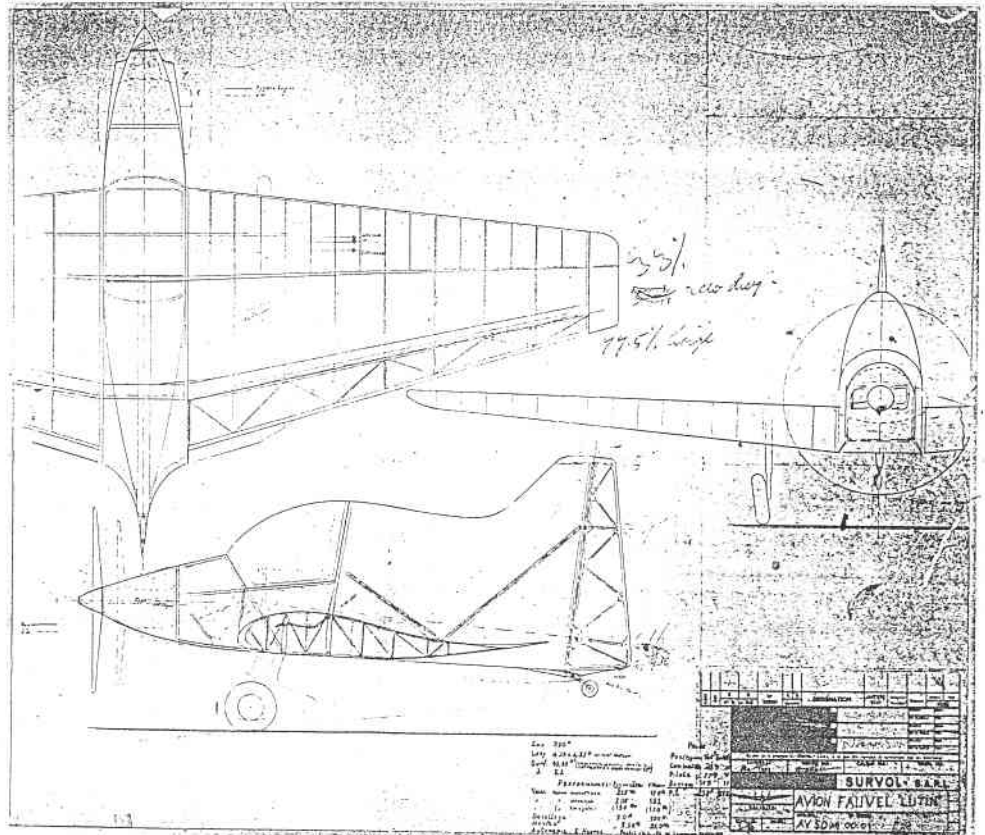
Not all of the involved people think it will work. With Prometheus we are going to prove it! We will use the short wing version, using the old grind and fly and compare technique. The goal: proof of concept.

Thomas Bircher
Switzerland



ABOVE: Partial 3-view of the original AV-60

BELOW: Three-view of Australian modifications.



(continued from page 5)

Wingtip Classifications

1. Contour - method to reduce induced drag is contouring a flat wing, e.g. by backswept wingtips increasing mainly vortex-spacing b' (e.g. Dornier 228 wing).
(b' = Spanwise spacing of vortex-pair)

2. Endplate - adding endplates of various design at wingtip distributes circulation more at wingtip, again increasing vortex-spacing b' (e.g. various retrofits of transport aircraft). Adding propellers has the same effects as endplates, such a configuration tentatively being a member of the endplate class (Airbus study).

3. Open fanlike - this configuration was up to 1993 the general class proposed to represent e.g. the working principle of soaring land birds wings having fanlike extensions of several winglets with open ends and at different orientations. Some successful and simplified wingtips (e.g. Whitcomb-type) in use belong to this class which works on increasing vortex-spacing and increasing vortex-radius, although with limited potential, e.g. U. Kuppers [5].

4. Closed multiple - this class is a fundamentally new configuration type opening the way to induced drag reductions exceeding the potential of the classes 1 to 3 by a wide margin, because both possible parameters for induced drag reduction are exploited together at the same time with the same purpose: increasing vortex-spacing b' by circulation dispersal at wingtip; and increasing vortex-radius r_k by distributing lift on several winglets individually.
(r_k - radius of vortex-core, e.g. Rankine vortex-core)



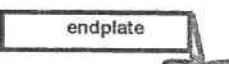

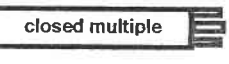

Class	method of reducing induced drag	Self-influenced variable	configuration
1	 contour	b'	planar swept-back
2	 endplate	b'	endplates
2	 endplate	b'	propeller
3	 open fanlike	b', r_k	fanlike expanded multiple
4	 closed multiple	b', r_k	wing-grid
4	 closed multiple	b', r_k	spiroid

Fig 4 Wingtip classification

As illustrated in figure 5 we have a special kind of double-decker-effect at work. The winglets positioned along the main wings edge take over its circulation segmentwise at the end of the main wing and by adding up their individual lift contributions they will produce essentially the same lift per unit of span as the main wing section.

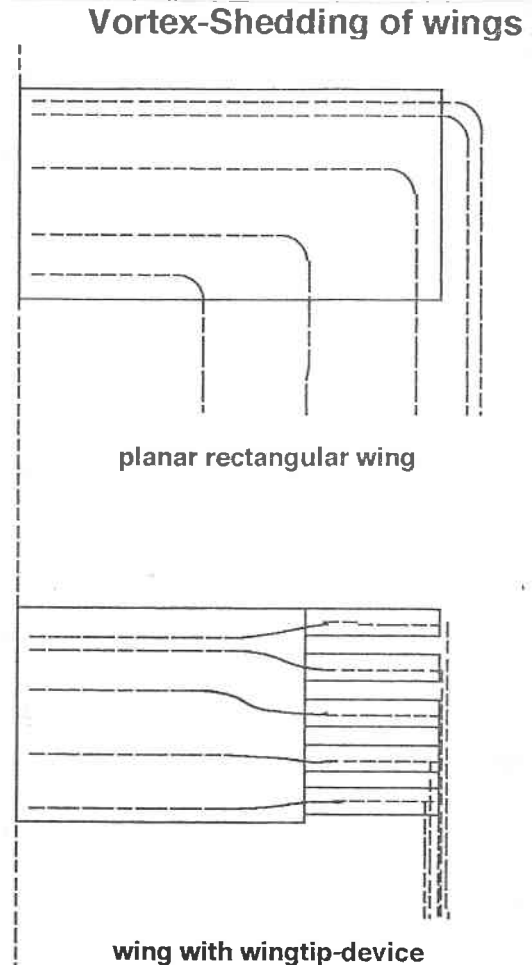
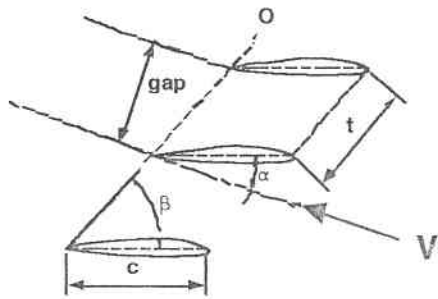


Fig. 5 Vortex shedding of wings

In order to do so a minimum stagger angle is necessary as shown in Figure 6. The minimum stagger angle is found to be dependent on the design angle of attack of the main wing and roughly of the same value. A further condition to assure the proposed circulation transfer is that the winglets overlap (ratio of winglets chord to grid-spacing) should be smaller than 1 (e.g. $c/t < 1$). (c = chord winglets; t = grid-interval) In addition the winglets will be essentially parallel to each other in order to create the condition of a WING-GRID, where by grid-interference the transfer of the circulation to the end of the device is assured. The same effect without grid-interference is created in the Spiroid by the semi-spiral connection pieces of winglets with different dihedral orientation.

some wingtip-device definitions



notations:

- c chord winglets
- t grid interval
- gap projection of grid interval on free-stream direction
- alpha angle of attack of winglets
- beta orientation of grid = stagger-angle
- v free stream direction

Fig. 6 WING-GRID geometric definitions

wings with identical glide-number and specific load

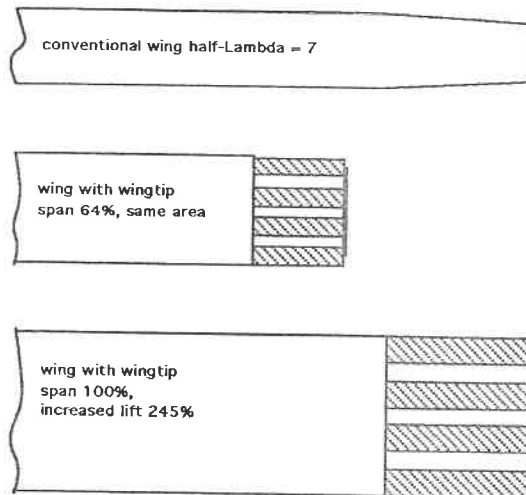


Fig. 14 Wings comparison

HISTORIC LANDMARK

On April 20, 1996, Jeff Byard, National Soaring Museum President, dedicated a new commemorative marker at the site on Point Loma (San Diego, CA) where many early historic glider flights were made. Jeff noted this is the seventh National Soaring Landmark in the NSM's ongoing historic Program. This

marker is a companion to one placed on a stone monument about two years ago by The San Diego Sailplane Association and The Environmental Trust. The new marker is part of their continuing efforts to recognize the pioneering efforts of Hawley Bowlus, Ralph Barnaby, Jack Barstow, and Charles and Anne Lindbergh for flights in late 1929 and early 1930.

The ceremony was attended by many notable figures in local and national activities. Jeff commented about the rugged terrain and the distinct lack of launching and landing areas and that many of the flights were made at night, including Barstow's record breaking 15 hour 13 minute flight landing at 3:57am. This says a lot about the pioneering spirit of the men who flew there.

After the ceremony, there was a reception held at the Gillespie hanger of Bob and Doug Fronius, and hosted by Bob, Doug, and June Wiberg.

TWITT has been on the fringes of this project over the years, most due to the efforts of Bob Fronius. The Local Landmark Committee will be receiving a \$50 donation from TWITT to help offset the tremendous cost of this project. If any of our members who have an interest in the historic recognition of our early aviators, your contribution would be greatly appreciated by the Committee and The Environmental Trust. Please mail them to the TWITT post office box and Bob will make sure they get to the Committee and Trust.

AVAILABLE PLANS & REFERENCE MATERIAL

Tailless Aircraft Bibliography

by Serge Krauss

4th Edition: An extensive collection of about 2600 tailless and over 750 related-interest listings. Over 15 pages of tailless design dates, listing works of over 250 creators of tailless aircraft, and the location of thousands of works and technical drawings for the Ho 229 (IX), Me 163, & Me 262.

- Cost: \$23 (Domestic)
- \$32 (European destinations)
- \$35 (Asia/Australia destinations)

Order from: Serge Krauss
3114 Edgehill Road
Cleveland Hts., OH 44118

Tailless Tale, by Dr. Ing. Ferdinando Gale'

Consists of 268 pages filled with line drawings, tables and a corresponding English text. It is directed towards modelers, but contains information suitable for amateur full

size builders. Price is \$38, postage and handling included (also applies to Canada and Mexico).

You might also want to purchase his new book **Structural Dimensioning of Radioguided Aeromodels**, priced at \$18.00.

On The Wing...the book, by Bill and Bunny Kuhlman (B²)

- is a compilation of their monthly column that appears in RCSD. Many of the areas have been expanded and it includes coding for several computer programs to determine twist and stability. Priced at US\$28.00.

All these are available from B² Streamlines, P.O. Box 976, Olalla, WA 98359-0976, or (206) 857-7249 after 4pm Pacific Time. Orders shipped elsewhere will be sent surface mail unless an additional \$10 is included to cover air mail postage. Washington residents must add 7.5% sales tax.



ABOVE: A natural occurring example of the vortex-shedding wingtip. Photo taken by Bob Fronius of a cloud structure over San Diego one day.

Personal Aircraft Drag Reduction, by Bruce Carmichael. This 207 page, soft cover, 8½ x 11" book starts with a chronological history of experimental verification of large theoretically predicted drag reductions on aircraft components having extensive laminar boundary layers. Practical problems which could limit attainment of these large drag reductions are discussed and methods to minimize the problems are suggested. The book is limited to aerodynamic considerations, principally on drag

reduction. 195 illus., 239 ref. Priced at \$25.00 postage paid from:

Bruce Carmichael
34795 Camino Capistrano
Capistrano Beach, CA 92624

VHS VIDEOS AND AUDIO TAPES

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)

VHS tape of Phil Barnes September 16, 1995 presentation on the "Math Characterization and Visualization of Aircraft Geometry. This can be packaged with a 35 page booklet of all the charts and graphs covered by Phil. There is also a set (2) of audio cassettes of the talk if you don't want or need the video.

Cost: VHS Tape \$5.00 postage paid
Booklet \$5.00 postage paid
Audio Tapes \$4.00 postage paid

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 tape of Alex's presentation explaining the material.

Cost: \$5.00 (postage paid)
\$6.50 foreign (postage paid)

Audio tapes of presentations by Don Mitchell at the September 1991 SHA Western Workshop, Tehachapi, CA (1 cassette), and his March 1992 presentation at a regular TWITT meeting (2 cassettes).

Cost: \$3.50 (1 cass.)
\$4.00 (2 cass.)
Add: \$1.00 for foreign postage

Audio tapes of the presentation by Barnaby Wainfan at the September 1994 TWITT meeting where he discussed his prototype FMX-4 Facetmobile, low aspect ratio ultralight airplane.

Cost: \$4.00 postage paid
Add: \$1.00 for foreign postage

Audio tape of the presentation by Bruce Carmichael at the May 1995 TWITT meeting where he discussed the past, present and future of aircraft using laminar flow boundary

making possible the growth of this sector of soaring, and to serve members in their common ultralight soaring needs.

Donations are being accepted to cover the cost of sending the newsletter: suggested amount is \$15 for one year (may be later credited towards first year's membership dues), or you can send \$25 for your "Founding Membership".

Please make checks payable to:

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VINTAGE SAILPLANE ASSOCIATION

The purpose of the Vintage Sailplane Association (VSA) is to promote the acquisition, restoration and flying of vintage sailplanes by its members, and to assist the National Soaring Museum in the preservation of soaring history and the promotion of vintage sailplane activity.

A vintage sailplane is any glider out of production since 1958, or a more recently built glider with appearance, performance and construction characteristics similar or comparable to gliders manufactured before 1958.

A classic sailplane is a glider that is at least 25 years old, but is not categorized as a vintage sailplane.

For more information on VSA you can contact them at:

The Vintage Sailplane Association
4310 River Bottom Drive
Norcross, GA 30092

or the internet: <http://www.iac.net/~feguy/VSA/>

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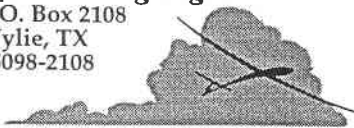
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