

T.W.I.T.T. NEWSLETTER

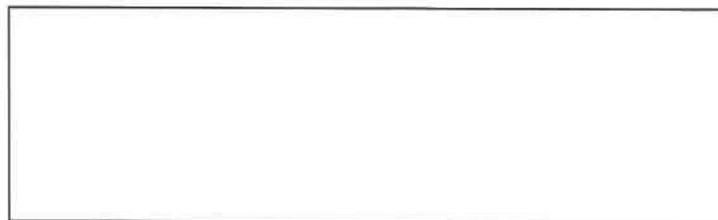


A side view of Alain Mirouze's low aspect ratio hangglider. Note that there are no tips in this view, but the in-flight shot on tow clearly shows the addition of tips.



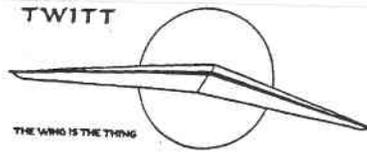
T.W.I.T.T.

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., **9611** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, November 16, 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.

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- Secretary: **Phillip Burgers** (619) 563-5465
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- Editor: **Andy Kecskes**

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Mailing address: P.O. Box 20430
El Cajon, CA 92021

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Subscription Rates: \$18 per year (US)
\$22 per year (Foreign)

Information Packages: \$2.50 (\$3 foreign)
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Multiple Back Issues of the newsletter:
\$0.75 ea + bulk postage

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Meetings are held on the third Saturday of every other month (beginning with January), at 1:30 PM, at Hanger A-4, Gillespie Field, El Cajon, California (first row of hangers on the south end of Joe Crosson Drive, east side of Gillespie).

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PRESIDENT'S CORNER

I would like all of us to thank Bob Chase, TWITT Vice President, for his contribution toward sending a complete set of TWITT Newsletters to the EAA library in Oshkosh. This will give us even greater exposure to the world of the homebuilder since the newsletters will be available to everyone who passes through there and is looking for information on flying wings or tailless projects. Thank you Bob for making this opportunity open up for us.

It is also time for us to send another year's worth of newsletters to the Library of Congress through our representative William Foshag. We understand the complete set we sent last year is readily available to the public which we hope over the years will result in sparking the interest of young want-to-be aerodynamicists in flying wings.

I don't remember if I told you we have a small advertisement on the internet through one of the hang-glider organizations, so people who are getting into the sport will see there are other options available to them.

Oh, by the way, did someone order two copies of the flying wing video and not get them. I made the copies but then the letter got misplaced at the hanger and we forgot who was supposed to get them. If you are missing these as presents for your friends, which was my impression of how they were to be used, please drop us a note and we will get them to you as soon as possible.

One of our members is trying to get a hold of the German or Italian manufacturer of the PUL 10, but has been having difficulty in getting through to the telephone numbers we had obtained and is not getting any answers to mail he sent to the addresses. If anyone out there has a good contact point for the PUL 10 in terms of getting more information about the purchase of a kit, please give us a call so we can forward the information along.

Well, from the temperature in my house it appears winter is about upon us and all of you will be going back to your drawing boards to make your dream wings come to life on paper. Please make an extra copy of your special design and send it along for sharing in the newsletter. I know we have modelers who are always looking for new ideas on how to convert balsa wood into exotic flying machines and make them out perform those conventional tailed things.



NOVEMBER 16, 1996
PROGRAM

Our speaker this month will be **Gene Larrabee**, an aeronautical engineer, who will be talking to us primarily about propellers and how they can be more efficient. The plan is to have a large number of different types of propellers on display to show the various right and wrong things to do when designing/building one. If you have one that you would like analyzed or get Gene's opinion on a proposed design, bring it along and share it with the group. Besides talking on propellers, Gene may also be available to discuss other aerodynamic issues related to obtaining better efficiencies from your designs.

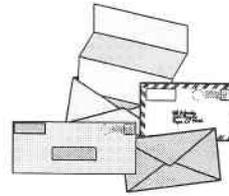
Among the propellers we have already brought together are:

- 30" Four bladed ducted fan
- Five bladed ducted fan
- Manpower
- Ultralight
- Historical - vintage type
- Powered sailplane - pusher type
- Formula 1 racing propeller
- Ground adjustable light aircraft
- Three position Hoffman experimental
- Museum propeller exhibit
- Mystery propeller

Last month we left Gene's bio at the point where he had gotten involved with man powered aircraft. He served as the catalyst that brought together a group of especially bright but practical minded students who created a series of man powered aircraft. The first was a bi-plane called the Burd which demonstrated the forward chord force at high angle of attack with a spectacular wing failure on take off. The following ones were much more successful especially after Gene worked out a propeller design theory which produced a loading of minimum induced drag. Many of this group were snapped up by aircraft firms making long endurance and high altitude drone aircraft.

After retirement from MIT, Gene moved to California where he worked for the late Dr. Julian Wolkovitch on joined wing aircraft and also taught aeronautics at the Northrop Institute. He also developed some very efficient windmills. He has just completed a book on stability and control in partnership with Malcomb Abzug.

This is your opportunity to get those nagging questions about your favorite propeller answered, so don't miss this meeting. It's our last one for 1996, and we would like to close out the year with a super meeting.



LETTERS TO THE
EDITOR

Sept. 22, 1996

TWITT:

We'll have to amend my Tailless Aircraft Bibliography advertisement. I sold my last salable copy of the fourth edition, and despite working hard on it last summer, have not yet finished the fifth. Specifically, I am trying to cross-reference it, while adding all the "new" old material I've found, editing down (while adding!) related-interest material, and fielding the new literature that appears while the rest of this continues. My computer has interrupted by demanding more RAM to do the job. It never ends!

For what it's worth, the bibliography now spans over 4300 entries - many of them multiple - with extensive support information. Currently passing 250 pages, even before cross-referencing, length may be contained somewhat by diminished line spacing, but the cost will escalate. Meanwhile, anyone needing help in specific searches may still contact me for bibliographical info or photocopies from my file at cost. I appreciated all the help TWITT has afforded me in publicizing this work!

OSHKOSH STUFF

I got to Oshkosh for the first time in several years. The Rutan and Roncz forums were noteworthy. Rutan has become quite visionary (in the good sense of that word) - seemed particularly inspired. Certainly his "Boomerang" was the most inspired new design (asymmetry to achieve flight symmetry), especially in a year lacking the adventurous design spirit of, say, 20 years back.

Burt asserted that it was time for homebuilders to wrest certain research, development and safety functions from NASA and FAA, because personal initiative far exceeds any bureaucracy's ability to handle certain challenges that should have been surmounted by now. He said that he "thinks" he knows how to win the \$10,000,000 "X-Prize" for private flight into space, within three years, using materials off the shelf at Aircraft Spruce and Specialty. He especially decried the change in weather "hieroglyphics" when anyone can transmit superior graphics via the internet. He sees heads-up, 3-D pictorial display providing VFR separation, regardless of weather. He uses a lap-top and custom software for his "Boomerang" instrument display, remarking also that it is really sad when all he has to do to exceed the quality of ATC navaid service is to go down and unplug the GPS unit from his boat. The angry refrain: "They just don't care!"

John Roncz made one remarkable statement: "I'm a flying wing man; that horizontal stabilizer on my homebuilt

9/28/96

does nothing (at cruise) . . ." He continued by noting a relationship between wing and fuselage drag, showing that on mid- and low-wing designs, computer modeling shows the best total drag package to be a pressure recovery aft fuselage shape coupled with his newer "flying wing" (reflexed) sections, rather than with his most efficient new wing sections. He uses these Genesis I type sections on his other designs. I have misplaced my notes, but I believe he showed that, compared to the old 23000 sections, wing-alone drag can be cut by more than half (by 75%?), and that his best reflexed sections were not far behind his overall best sections - and ahead in his best wing-fuselage combinations, modeled on Peter Garrison's Melmouth II design. These are strong comments, coming from the guy Jim Marske had to talk into looking into tailless types at all.

Incidentally, John also justified statements concerning span vs. aspect ratio by deriving information contained in formulae printed in TWITT No. 93 (3/94).

While John was denying the need of his horizontal stabilizer for *stability*, one of the Genesis Group people was telling me that their "trimmer" was providing some stability. He also said that the first complete Genesis kits from Lithuania were due at the end of Summer. Apparently the nationals did not go well for their prototype this year, but he reiterated that it out-performed the Discus in comparison trials, after the root was reconfigured last Fall.

I also spoke with Lowell Farrand, test flier with Milt Hatfield on Milt's ultra-light, low-A/R Arup derivatives. He remarked that the first two Hatfield "Little Birds" had an annoying high-speed pitch-up (presumably due to the long-chord reflexed sections), but that the third one was "OK". Apparently Milt took an ax on the spot to a preliminary design after its first test flight, for the same reason. He was a DOER!

Well, enough for now. Keep up the good work, and let me know what you'd like - that I might have - for the newsletter.

My best,

Serge Krauss

(ed. - Thanks for the interesting comments on what you saw and heard at Oshkosh. We will have to wait and see what Roncz finally does with the Genesis project in terms of turning it or some other derivative into a pure flying wing.)

I have changed the ad in our classified section to reflect the sell out of your 4th edition. I am glad to know that we played at least a small part in getting the word out on it and helped you sell some of those copies. We all look forward the bigger and better 5th edition.

Right now I can't think of anything we need out of your stock, but if I get into a really tight pinch I certainly will call.)

TWITT:

Many thanks for the Sept. TWITT. I was very upset at the loss of those drawings. I hope the readers like them. *(ed. - We have made at least 4 copies of the AV-60 material so far and sent it out to our members so I believe Alan struck the curiosity of at least them.)*

I will include some photos which are described as:

1.) Is a 2 seat flying wing about 1938 and burnt by the Germans about 1944. Flew well. Noted the pointed wings (George Jacquemin was adding pointed wings to the AV-60 when he passed away).

2.) AV-60 flying in California (notice registration number). TWITT is in the same state as the AV-60 was built by Wolf & Davidson. Yes, it still exists. *(ed. - We have learned that it may be in Texas and are trying to get more information on its current status as this is being written.)*

3.) The AV-60 showing the rear fiberglass covering (vertical fin and rear cockpit bulkhead). The wing has no twist (even the 747 has twist along with hang gliders today) however, Fauvel used forward CG which made the wing stall before wing drop and spin. So builders keep the wing level with no twist and the CG where it should be.

4.) The R 40 hp VW engine mounted on the uncovered airframe. It would have been better when the 1600cc VW arrived. Note the nose wheel Yankee style. I fitted cable steering and another nose wheel. The short distance could cause hobby horsing so Fauvel did the drawing on lower page 6 (of drawings sent in previous letter). Also note the main spar on each drawing George Jacquemin (who did the top and all the drawings) used the Jodel spar and actually criticized Fauvel's spar as no strength in the aileron area. Fauvel used the leading edge as a torque tube and we may have put retract box in anyway. Note the rib strengthener. On my Playboy we used cloth chords to the next rib, but George did not believe it when I told him much as though he had never seen an uncovered wing.

5.) Note the steering brakes and the gas tank. I actually built the tanks inside the leading edge of the wing, but it was too time consuming.

6.) The aircraft uncovered.

Can TWITT get microfilm printed please. I can send you the actual drawings cheaply then people can build the machine. I also have the AV-222 drawings of a motorized AV-22 sailplane. The AV-60 is only an aircraft similar to the French Jodel 9 and Turbulent, and it even has the same cruise speed as the Turbulent.

Mike Burns is a draughtsman by profession and running a glider repair shop at Tocumwal today. He was a draughtsman for the Gliding Federations of Australia when he did the sketches you printed.

I belonged to the GFA then, but the \$150 membership finished me. Also, 63 years old me send the drawings and offer the rest. Yes I would like to see the flying wing fly

the owner of this AV-60 will not let it fly in California (the ones the photos came from).

If the AV-60 had been popular they (George Jacquemin) would have used elevons rather than the aileron and elevator, however, Fauvel always used aileron and elevator.

Mrs. J. Jacquemin, RR5 2098 ANNA MARLE RD, Sooke BC VOX INO is George's widow and maybe she would appreciate a copy of her husbands work in the newsletter (she would remember me). I would appreciate a few copies for Mike and the boys. I certainly appreciate your use of my old Department of Aviation Australia approval data.

All the very best with TWITT.

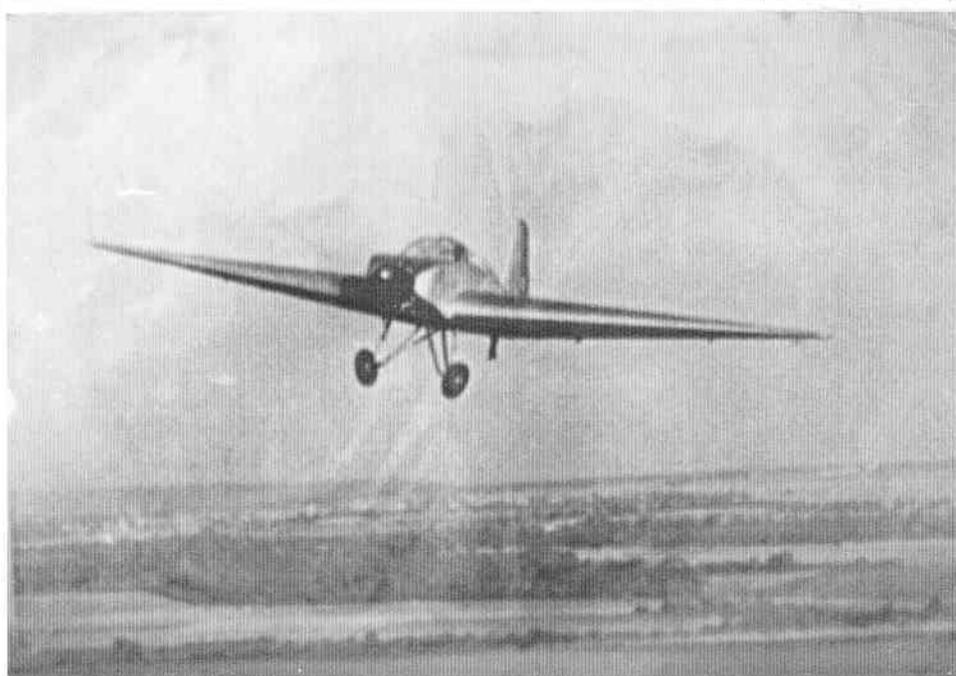
Alan Lewis

(ed. - I will try to see if any of the photos described above will come out good enough to put in the newsletter so the words will have more meaning. Since they are black and white already, it may be possible to get enough out of them to at least show the members what you are talking about.

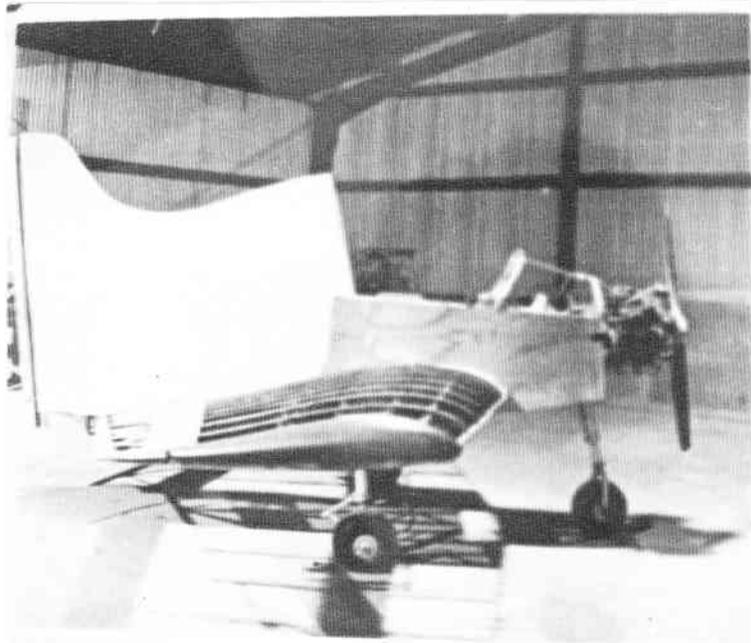
The center section of the newsletter is 3-view of the AV 222 Motor Glider.

We will try to get a few extra copies of the newsletters with the AV-60 material in it off to you so you can share it the others involved in the project.)

Picture # 1



Picture # 3



10/24/96

Dear TWITT:

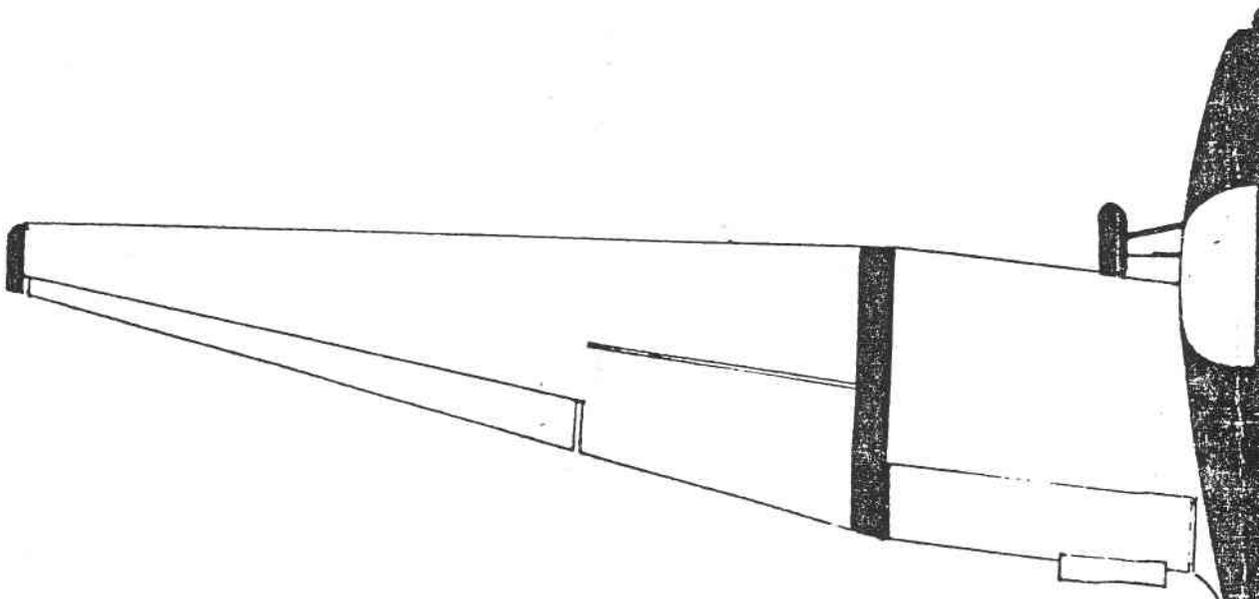
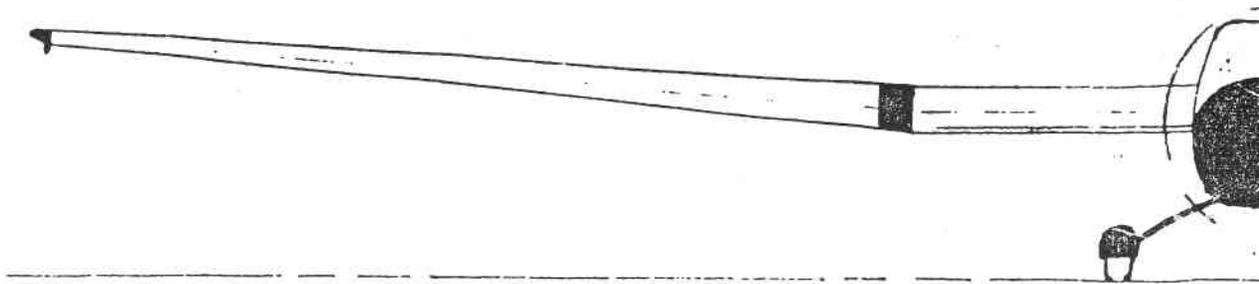
For my experiments on balsawood "sailplanks" I need suggestions. I know Marske, Fauvel, Backstrom and Arnoux ideas in photos and designs or descriptions. Can you help me by sending some photocopies of photos or designs from your library or TWITT Newsletters on "Planks"?

Especially welcome are German (but also elsewhere) designs from early times to now, with the "Golden Age of Soaring" 1920-1940. Models, airplanes, ideas.

With this letter you are receiving some money for these copies.

I also include pages from my booklet for boys or model beginners that want to enjoy the right "Aerodynamik" of sailplanes with a few diagrams added to the paper. If someone in the USA that you know is interested to see and perhaps publish it, you can give them my address.

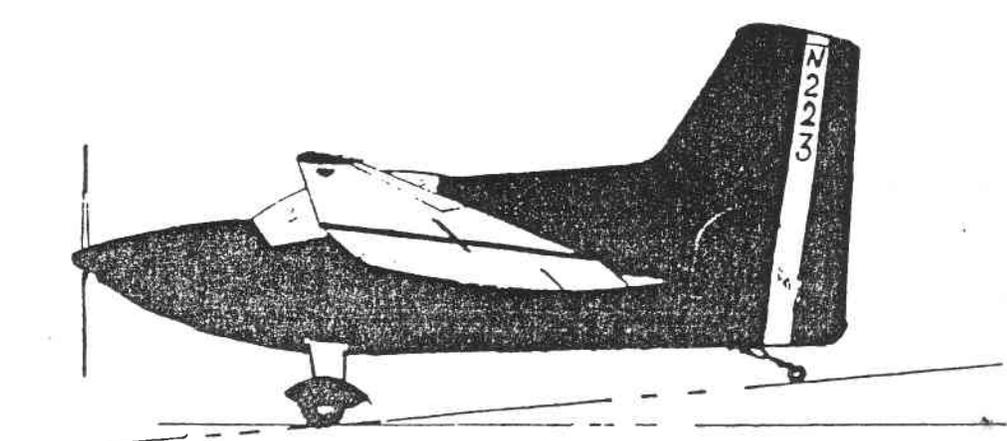
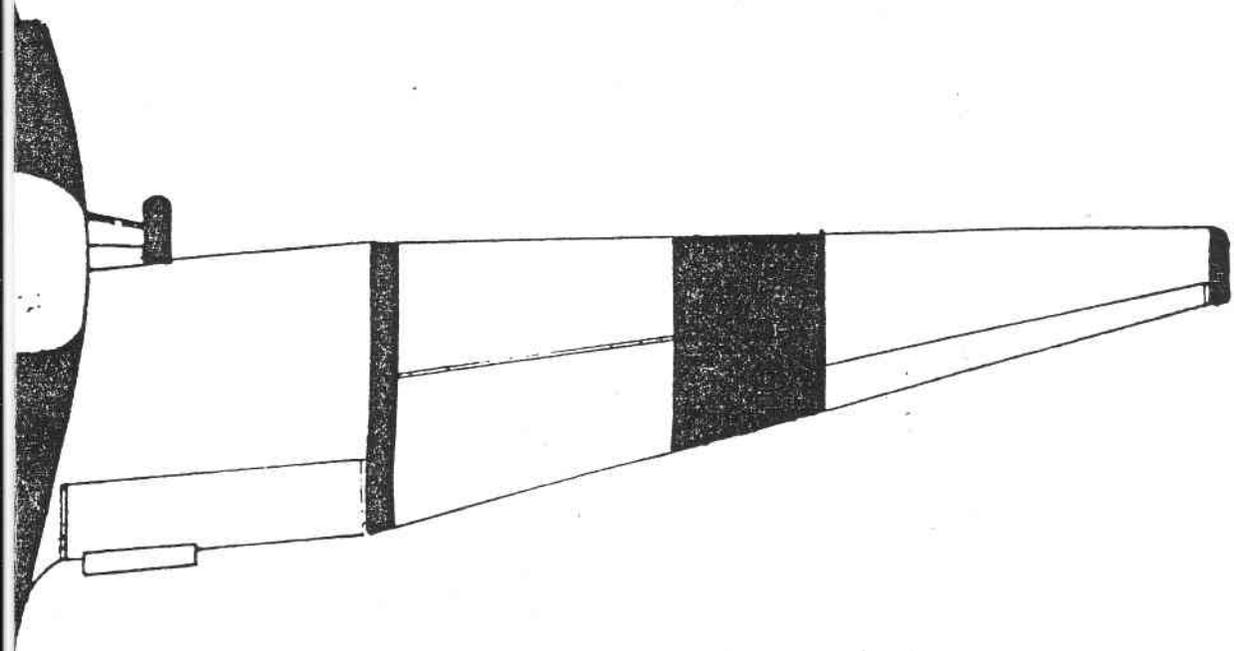
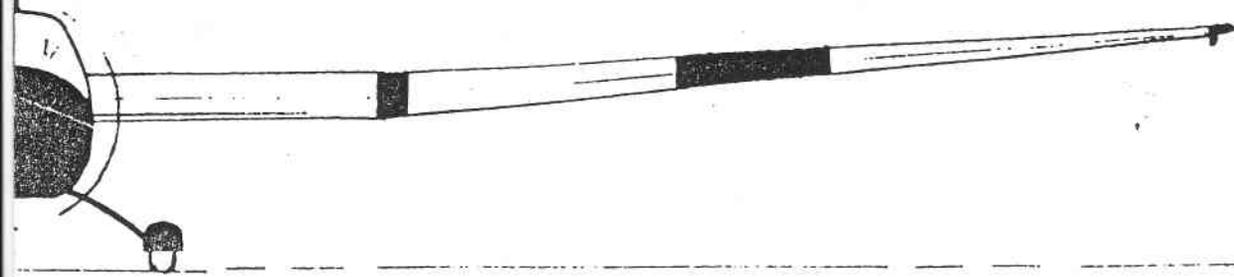
If you don't find anything, please send TWITT Newsletters with sweptback wings of Germany, not Horten or Lippisch. Is there someone in history that built a biplane "sailplanks"? My experiments result in some very graceful flights and
(continued on page 7)



AV 222 motor glider

length 17.1 ft
 height 7.8 ft
 span 53.8 ft
 area 247.6 ft²
 empty weight 716.0 lbs
 gross weight 1212.0 lbs

wing loading 4.9 lbs/ft²
 glide ratio 30:1 @ 56 mph
 min. sink v. 2.65 ft/sec @ 46 mph
 min. flight v. 39 mph
 max. rough air v. 103 mph
 never exceed v. 141 mph



ph

good stability (see designs on back of letter). Please, any info on Lippisch m. 6 "Brett"?

Regards,

Curzio Vivarelli
via Aspromonte 6
I - 37126 VERONA
ITALIA
0451 8345331
fax 04441 927555

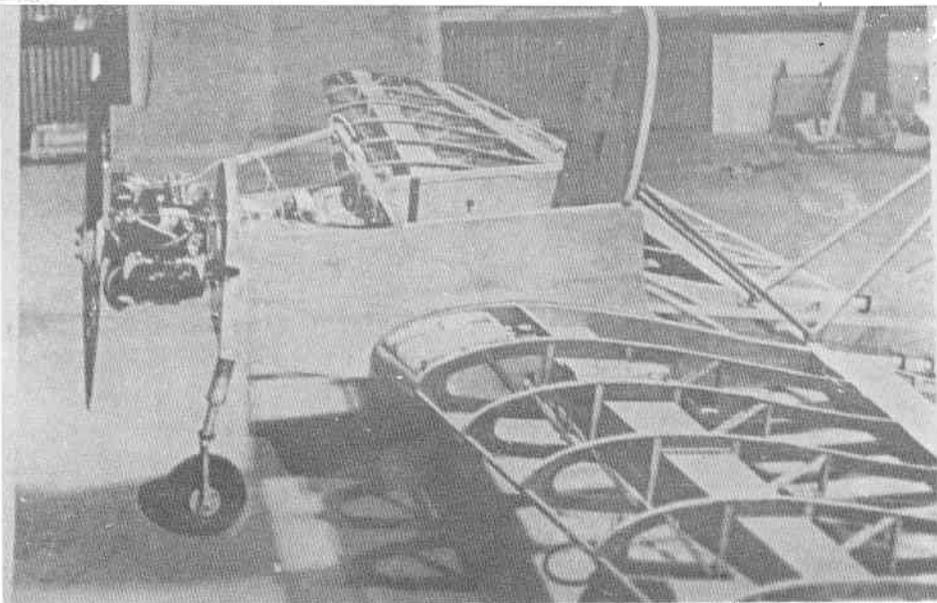
(ed. - We just received this request from Curzio who seems to have some very interesting ideas on biplane type flying planks.

We will look through the library for some of the type items he has asked about and mail them to him in the next week or so. If any of you have anything interesting you think he might like, please make a copy and send it on.

I have also included one of the pages from his booklet, which apparently has 64 pages of color and black and white photos, instructions and notes on aerodynamics, and 25 models including tandems, canards, all wing, and tailless. The material is all in Italian, and the letter didn't indicate whether he would translate it into English if someone were interested in publishing it in the US.

We have two full time members in Italy and now have contact with at least two more who are interested in flying wings. It is very encouraging to see this type of interest in flying wings in just one country within the European area.)

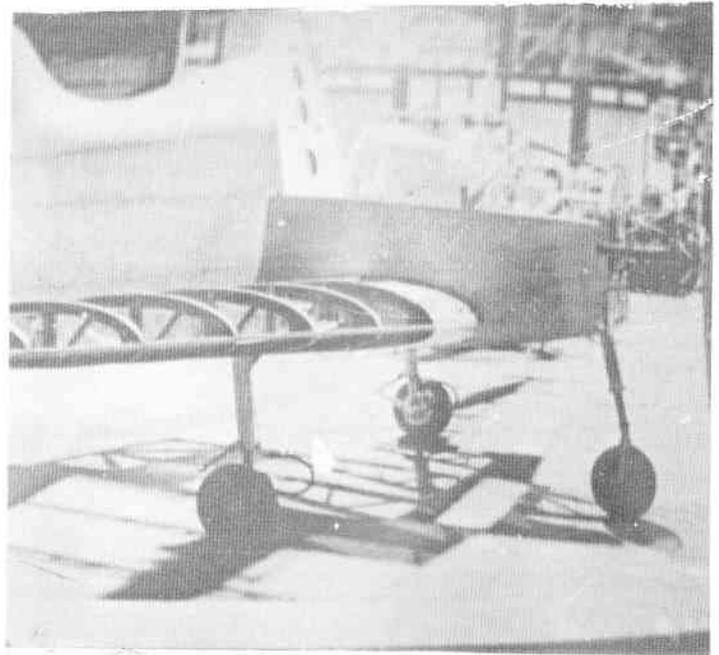
Picture # 4 (from Alan Lewis letter)



NEW STRUCTURAL COMPONENTS

We recently received an promotional piece on a new product called COMPAL, a hybrid structural tube combining the durability of

Picture # 5 (from Alan Lewis letter)



aluminum with the exceptional properties of composites. What makes it unique is the placement of composite fibres on the inside of seamless aluminum tubing resulting in the standard dimensional tolerances and surface quality of aluminum being retained and the structural properties being greatly enhanced.

Included in the material was a comparison chart showing COMPAL's superiority over conventional steel. It showed COMPAL to be somewhat lighter, but with strength and stiffness far greater than steel.

COMPAL can be tailored to suit the user's strength, stiffness and/or weight requirements.

For any one interested in more information, you can write to:

Mark Bailey, Marketing Manager
Advanced Materials Inc.
P.O. Box 46318
Vancouver, B.C.
Canada V6R 4G6

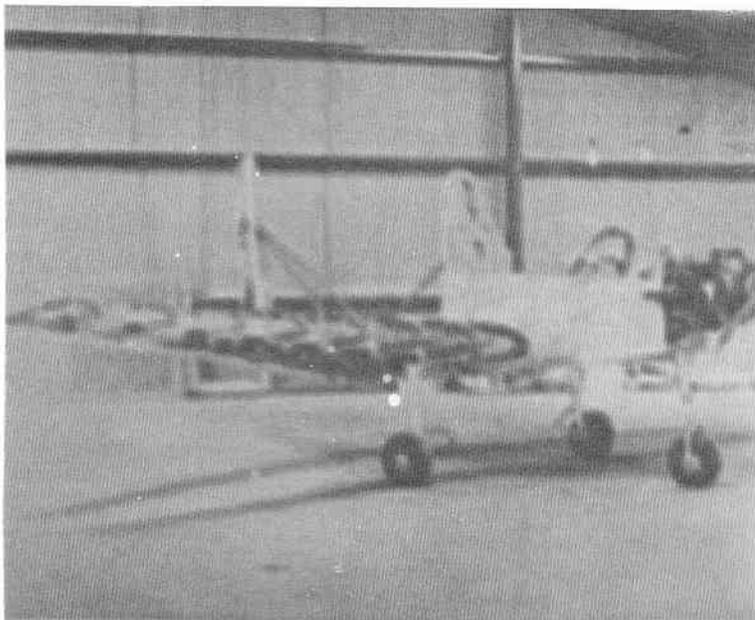
FOR HISTORY BUFFS

For those of you who like historical flying things, one of our members, William Foshag, has a 36" x 27" sheet of flying machines starting with Leonardo de Vinci circa 1500 to Edison in 1880. There

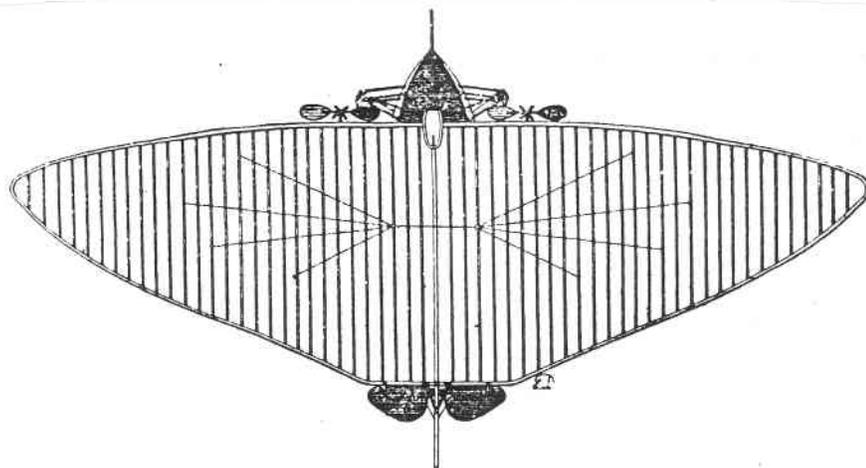
are 52 designs mostly from the mid to late 1800's (see the small sample in this issue) with descriptions all in French. If you think you might be interested in having a copy of this, write to:

William Foshag
 Heishmans Mill
 1206 Creek Road
 Carlisle, PA 17013-8933

Picture # 6 (from Alan Lewis letter)



BELOW: Example of an item shown on the historical table available from William Foshag.



1876. — PÉNAUD et GAUCHOT. — Système d'aéroplane à vapeur pourvu d'hélices, d'un gouvernail et de roulettes à pattes flexibles.

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 (216) 321-5743

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.

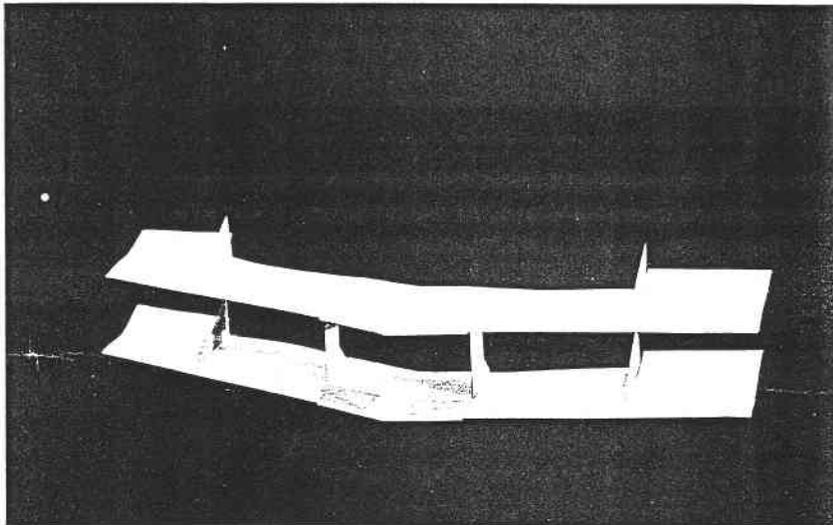
All these are available from B² Streamlines, P.O. Box 976, Olalla, WA 98359-0976, or (206) 857-7249 after 4pm Pacific Time. Orders shipped elsewhere will be sent surface mail unless an additional \$10 is included to cover air mail postage. Washington residents must add 7.5% sales tax.

BELOW: Page from Curzio Vivarelli's booklet showing how to construct a model bi-wing flying wing.

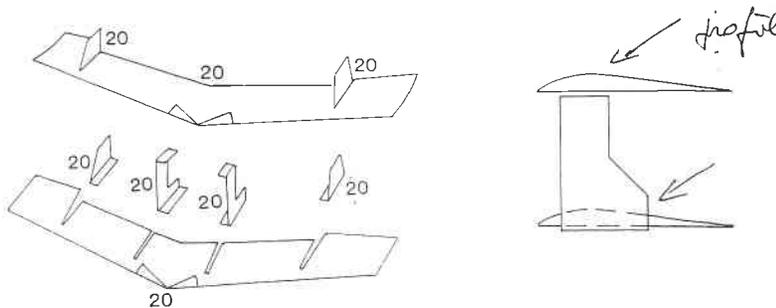
Bruce Carmichael
34795 Camino Capistrano
Capistrano Beach, CA 92624

21

DOPPIA FRECCIA



Si costruisce con due ali a freccia modificate come nel modello precedente. I montanti collegano i due cartoncini centrali.



È molto simile al n. 20. Avendo una doppia freccia ha minore tendenza all'imbardata. Per la regolazione si deve stare attenti a procedere in modo simmetrico e in linea di massima è meglio utilizzare prevalentemente gli alettoni superiori. Si può anche aggiungere un po' di zavorra a prua per aumentare la velocità e si possono montare le due ali l'una più avanti dell'altra per studiare gli effetti di diverse architetture (senza esagerare però).

58

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:

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

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BELOW: Sketches by Curzio Vivarelli on the back of his letter showing his experiments with bi-wing flying wings.

