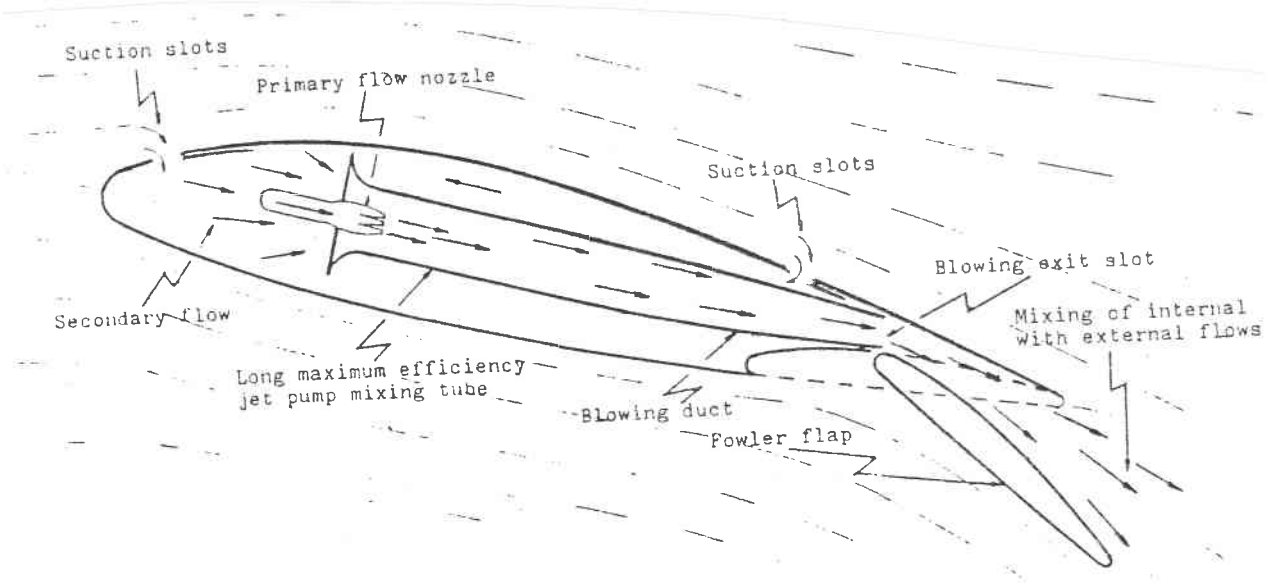
NO. 40 OCTOBER 1989

# TWITT
## NEWSLETTER




TWITT
(The Wing Is The Thing)
PO Box 20430
El Cajon, CA 92021

The nuabers to the right of your name indicate the last issue of your current subscription, e.g. 8906 aeans this is your last issue.

NEXT TWITT MEETING: Saturday, Oct 21, 1989, beginning at 1330 hours. The location is Hanger A-4, Gillespie Field, El Cajon, Calif., in the first row of hangers on Joe Crosson Drive.

# MINUTES OF THE SEPTEMBER TWITT MEETING

Andy Kecskes opened the meeting with the announcement that Don Hunsaker of the Hunsaker Foundation, an educational tax-exempt institution, had reviewed his by-laws and believed that it would be possible to allow TWITT to affiliate with the Hunsaker Foundation and to share its tax-exempt status. TWITT would continue to exist as a separate entity, but could accept donations (and solicit them) as a Hunsaker affiliate. The donations would thus be tax-deductible, hence more interesting to the donors. Don will submit the idea to his legal staff for review. Don also has a well-equipped computer center in his home, including a laser printer, and may be able to assist directly with the production of the Newsletter, restoring to it some of the look that it lost when Marc de Piolenc resigned as Editor. This month's raffle prize was a P-51 "Mustang" ride. The P-51 in question was up at Reno, Nevada for the air races there, but its owner had a backup plan ready in case some mishap left the machine unflyable: the lucky winner could wait for the airplane to be back in the air, or could take a ride in an AT-6 instead.

Bob Fronius then rose to deliver the Treasurer's report. It seems TWITT is doing a brisk trade in back issues of the Newsletter. Bob feels we need a list of articles, so that we can offer copies of specific items! TWITT has $ 150 or so coming in renewals and $ 141.93 cash on hand. It cost about $ 97 last month to print and mail the Newsletter. Bob is looking for another meeting place for TWITT; in order to leave room for TWITT in his own hangar, he is storing some of his stuff in the hangar next door (Hernan's) and of course paying some of Hernan's rent in compensation. He is therefore eager to find other digs for TWITT if that is possible.

Andy then rose again to introduce speaker John Chalmers, who had been invited to Germany to fly the new Stemme S-10 motorglider some months before. He made a side trip to visit Fulda and the Wasserkuppe, birthplace of soaring and site of a new soaring museum. One bonus was the discovery of a beautifully-built Mitchell B-10 (identified from John's slides by Tasso Proppe) with a custom fairing, a three-cylinder radial engine and a four-bladed propeller with a metal hub, presumably ground-adjustable. John did not meet the owner and could get no particulars from other hangar hangers-on. Tasso is mentioned in the new Wasserkuppe museum [that's it, Tasso--you're history!]. John's inside shots didn't come out too well, but he happened to be present when a newly-restored Habicht arrived. It seems that it, and some of the other machines on exhibit, are the property of a group of private parties who call themselves "Oldtimers." John noted that none of the exhibits has a tag--you're just supposed to know what you are looking at. John's remaining remarks concerned the Stemme, object of his visit. The machine is being produced at the rate of one per month, approximately, and the next 18 month's output is already sold, despite a base price of DM 200,000, trailer extra. The machine has a tail, but is not conventional in any other respect. A unique folding propeller retracts into a slot in the nose; the nosecap slides back and

presto! a clean, undisturbed contour. The engine--a Limbach L-2400 Volkswagen derivative or a Sauer 100 hp option--is housed in a steel tube cage behind the cockpit and drives the prop through a long shaft passing between the pilots. The landing gear is taildragger style, with long, narrow track retractable mains having a marvelously complicated retraction sequence. John felt that the gear track was dangerously narrow. Another problem is engine cooling--the usual mode of operation seems to be brief spurts of power followed by a cooling-off period hopefully spent inside an updraft. John felt this will be more serious at hot, high-density-altitude American sites. Overall, the machine is very complicated, and may be a maintenance problem for its owner in the long term. But boy, does it fly! Stemme claims a glide ratio of 51:1 and John, having flown the machine, believes them. Full-span flaperons give a high roll rate. Spoilers are also provided to comply with German certification standards. Ground handling with only the steerable tailwheel is not so good--John believes that the next version should have differential brakes as well. The machine is easy to rig; the controls connect up automatically. Wings consist of inner and outer panels, making them fairly easy to handle despite their considerable span. Max takeoff weight is 1874 lb. Airfoil section is called HQ 41 1435; John calls it "ultra-sophisticated." [Your humble recorder calls it a mystery; I've never heard of this series.] BREAK.

After the break, Harald Buettner rose to give a talk which he called "Introduction to Composites for the Homebuilder (to be)." It included basic safety precautions, basic tool inventory, and an introduction to the available materials and their properties. The talk was long and rich with detail--so much so that we would have to serialize the September minutes to report it in extenso. Perhaps Harald will let us crib his notes and assemble an article...Meanwhile, here are the highlights. Harald's long acquaintance with resins and fibers has given him a healthy respect for their toxic potential. He wears rubber surgical gloves to protect him from allergic sensitization to resins and to ward off the strong solvents he must use. He noted that the alleged hypoallergenic properties of SafetyPoxy (I think that's how they spell it) only apply to persons not yet sensitized; the already allergic will get no benefit. Acetone he considers dangerous; MEK (methyl ethyl ketone) he does not allow in his shop. When sanding, a dust mask is essential. A compressor is useful not only because it can power air tools (which seem to outlast electric ones in a composites shop), but because it offers the only effective means of ridding one's skin and clothes of sanding residue--a strong blast of compressed air. And speaking of skin--Harald recommends long-sleeved shirts and long trousers to minimize exposure, even at the cost of additional sweat. Mix small batches of resin to prevent runaway exotherm. Do not use "no-fill" or "open-coat" sandpaper when preparing a surface for bonding or laminating; it contains a release agent! Carbon fibers require special care in handling and layup due to their brittleness; if you use a squeegee to dispose of excess resin (a procedure Harald does not recommend) then do not use it with carbon fibers. The best bond strength that can be achieved between a cured laminate and a fresh layup is about 65% of that

of a wet layup, and is achieved by laying peel-ply--a polyester fabric--over the layer to be bonded to before it cures. When the peel ply is stripped, the resulting surface is clean and has the right texture for bonding. Of the three resin systems in common use--epoxy, vinyl ester and polyester--vinyl ester has the highest glass transition temperature, that at which the material begins to creep. Harald showed off samples of several resins which he has used.

Mark Motley won the raffle--again! That's two wins in two consecutive meetings. Next time, I think somebody other than Dave Pio should sell the tickets...

## PRESIDENT'S CORNER

The good news this month is that incorporation under the Hunsaker Foundation appears to be going well. Dr. Hunsaker has had a positive initial response from the Internal Revenue Service (the "friendly" IRS) indicating it would be no problem to include an organization like TWITT within his foundation. There should be more on this by the November Newsletter.

I would like to thank Marc de Piolenc for preparing September's meeting minutes, although he says he has "resigned." Our Secretary and official Editor is now working on Saturdays teaching, so cannot make as many meetings as he would like, so Marc's help is greatly appreciated by Phillip and myself.

As you can see from the Letters to the Editor column this month, we have finally gotten a chance to catch-up on some back correspondence. Of course, what this means is that we are not receiving any new material in the form of questions, results of projects, etc., to pass on to our members. If you have any information or questions, please jot us a line and we will put it in the Newsletter. The exchange of ideas is part of what this whole organization is all about, "so keep those cards and letters coming."

That does it for this month. Hope to see at the October meeting for an interesting presentation on Aerothermaldynamics.

Andy

## OCTOBER'S SPEAKER

Our speaker this month is Budd Love, founder of Airlove, Ltd. in La Jolla. The presentation will be on his propulsive-lift system call HIAM (High Internal Air Mass), which does not drive a propeller or depend upon the engine tailpipe jet for thrust. He claims the HIAM system provides a conventional looking airplane with near helicopter performance without the helicopter performance compromises.

Budd Love is an aeronautical engineer with quite a varied background. He has worked as part of the Apollo program which put a man on the moon, been a Thermodynamics Engineer with General Dynamics concentrating on STOL aircraft, and was a Senior Engineering Scientist for Douglas Aircraft. In his earlier days he was interested enough in flying wings to have built several freeflight gas models.

The TWITT library has a copy of Budd's HIAM proposal, complete with diagrams and performance data.

## NOTICE

TWITT will replace your Newsletter if lost or damaged in the mail. We have received one back from Birmingham, Alabama, but the label was so badly torn we could not tell to who it belonged. Drop us a postcard and we will send it back to you.

## ODDS AND ENDS

Bob reports that Mark Motley has received his P-51 ride from Bill Speer and it was a shear joy. I guess they did some aerobatic work out over the east county area and then made a "very low" high speed pass down the runway at Gillespie for a grand finale. Thanks to Bill Speer for a super raffle prise.

Bruce Carmichael has given TWITT some of the low speed flight publications listed in an index published several months ago. Copies of these will be added to the TWITT library, and we will print a summary of some of this material in the Newsletter as space and time permit.

The membership is now around 120, with newletters going to Australia, Switzerland, and Germany, with additional correspondents in Tasmania, France, and New Zealand. We sure do get around don't we.

For those who are introducing their friends to TWITT, the following information is provided:

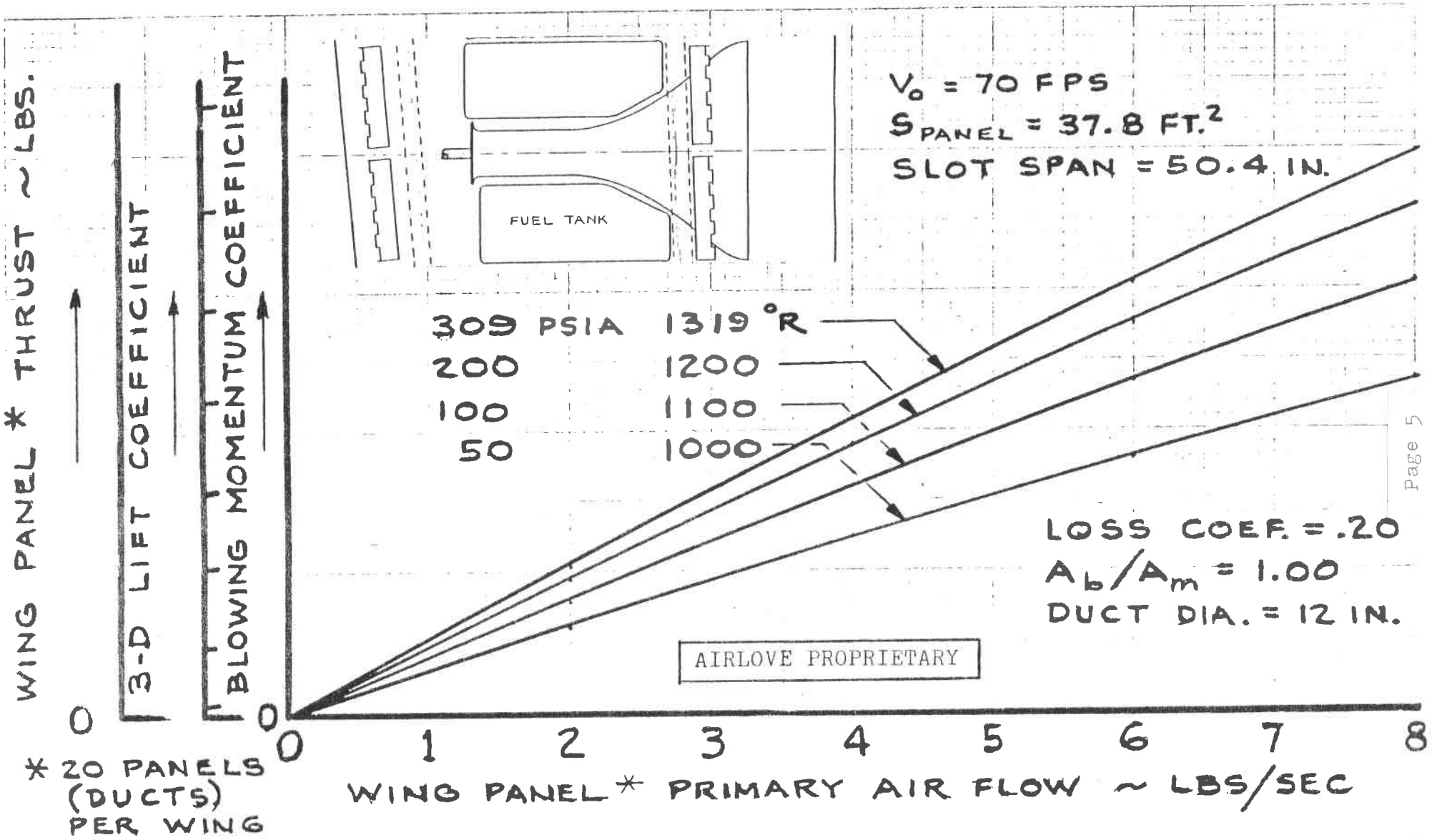
An application and facts sheet on "What is TWITT" can be obtained simply by sending a Self-addressed Stamped Envelope to our post office box.

If you desire more information, send $2.00 and we will include a back issue and other details, postage paid.

If you want back issues, they are $.75 each, postage paid. (This is the 40th newsletter so a full set would run $30 at this time.)

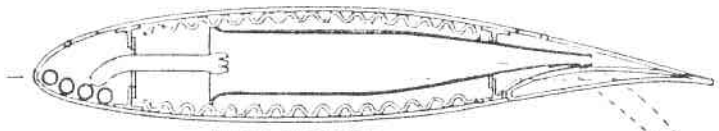
We are currently exchanging Newsletter copies with RC Soaring Digest, Sailplane Homebuilders, and Flypaper.

To our European members we are known as "Nürflügel." TWITT




# F-5 HIAM WING DUCT PERFORMANCE

## SINGLE DUCT ANALYSIS



## LETTERS TO THE EDITOR

The following letter was received earlier this year and somehow it and Tasso Proppe's answer got lost in the paper shuffle. We apologize for the delay.

TWITT Berkeley, CA
Jan 7, '89

Robert Fronius:

I have been continuing to build a Mitchell B-10 Flying Wing Ultra-light for the last 3 years from a partially built kit. This is my first attempt to build any airplane and it is going very slowly. Partly because of my experience and partly because the plans, drawings & pictures I have to go by are so minimal & inadequate. The "M" Company in Porterville has gone out of business, taking $40 of my money & not sending me new plans as they had promised. So I thought I had better look around for some more help from people who know tailless aircraft. I believe I saw your ad in a Hang Gliding Magazine or the Soaring Magazine. Could you please send me some information, perhaps an old back issue, or something.

As I see it a couple of my major problems are these:

1.) How to bend the 1mm, 3 ply plywood without cracking it and epoxying those sheets to the leading edges of 4 wing sections & 2 elevons (even a tighter bend)?

2.) Designing a fuselage structure to get the pilot into the plane of the wing with a light 10-20 hp pusher engine to reduce drag for better motor-glider performance.

3.) I know that the C.G. & aerodynamic center relationship is very important especialy in tailless aircraft, but how exactly do I figure where each thing should be placed for best balance? When I don't have all the things and don't know how much each weighs. (Gas tanks, battery, landing gear, engine & prop., etc.)

4.) How to make a simple, reliable, controllable trim system? With pilot weight shifting?

Richard J. Briar
Zaratustra Flight Enterprises
P.O. Box 4511
Berkely, CA 94704

[Ed. Note: Tasso Proppe's reply is printed elsewhere in this newletter as he sent it to Richard Briar. We obviously don't have room in the newletter to print the extensive amount of written material and drawings he also sent. We have included a Mixer Assembly Control System parts list and schematic for your information.]

The following are excerpts from Lewis Dewart's follow-on letter received in June and, unfortunetly, also lost somewhere in the paper mill. Sorry about that.

Dear Mr. de Piolenc:

My last letter was written to you prior to my receiving the May issue of the newsletter. How surprised I was to find that you published the photos and scant (my fault) data on my wing project.

You asked that I keep you informed of progress, so I enclose a few more pictures (please do not use valuable space in the newsletter for these).

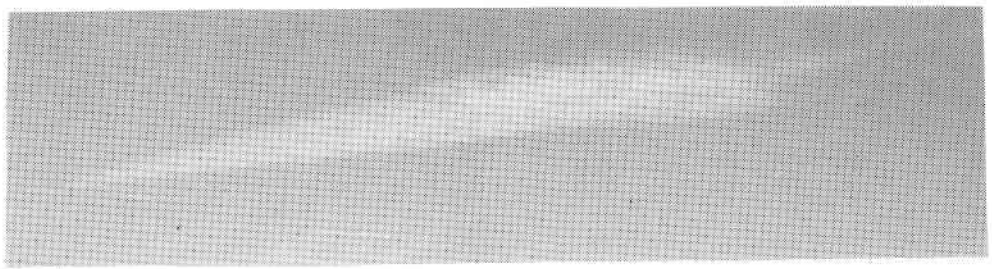
First I enclose my "poor man's CAD/CAM", my often reworked model of the DAW-1. Notice the directional stabilizers are on the wing tips as was the case with the original drawing. I took leave from these for my first powered appempts in order to insure good directional control on the takeoff roll. I now feel the drag plates will give me the control that I need, so you can see by the second photo that I have gone back to the wingtip features.

The "trip string" in front of the leading edge of the scale wing was necessary in order to trick the model into thinking the RN was higher. All the model did was a series of whip stalls as the flow alternately attached and detached from the upper surface. With the string in place the model flies as well as any I have ever built. [Ed Note: The string runs parallel to the leading edge about an inch to inch and a half in front (looks like a foam core cutting wire).] The reflex was not great enough so two pieces of file card gave me the needed trim. The model is used mostly for studying construction details before I start to cut precious metal. We have lots of CAD/CAM facilities at Bucknell so I guess it is about time I start using them with this project.

In closing, I wish to mention that your readers were probably confused to see stabilizers on the wing in the plans but the rudder behind the propeller in flight. I know plan to stay with the tip features, as previously mentioned. Am thoroughly enjoying the newsletter. Having had 12 years experience in the daily newpaper racket, I can greatly appreciate your "labor of love" of getting it out on time. If you should ever need a cash contribution to inclue a high quality, offset page in your newletter for the purpose of getting greater detail in extra special graphs or photos, please let me know.

Sincerely,

Lewis Dewart



Mother Natures Cloud Airfoil

Richard J. Briar
Zaratustra Flight Enterprises
P,O Box 4511
Berkeley Cal. 94704

Tasso Proppe
1786 Eldora St.
Lemon Grove, Cal. 92045

Jan. 24, 1989

Dear Richard Briar:

The TWITT people - Bob Fronius - gave me your letter and asked me to come up with a reply because I have been building and flying a Mitchell B-10 some time ago. It is so long ago that I have a hard time to recollect the experience. Since I am 78 years old, I have quit worrying about airplanes, flying, building, and otherwise tinkering with those machines - but I will try to give you at least some hints that may help you.

Your first statement: plans, drawings and instructions are inadequate; that is a fact you have to live with on every homebuilt design. The economy of selling plans does not allow elaborate instructions; you would not afford the cost of selling and buying them. Much worse is the fact that the product has not been tested and improved sufficiently. It is expected that the builder has some degree of experience both, in working the materials as well as flying and de-bugging the endproduct. Many don't stick to the design anyway but modify the basic idea, sometimes dangerously diverting from elementary principles.

To my knowledge, the M-Company is defunct. At my time (1978/1981) I worked with them quite frequently. They were very cooperative, when I visited them in Porterville occasionally; we experimented together. I put some of my experiences, observations, and suggestions on paper, some of them were incorperated in the subsequent drawings (plans), and some found their way into various publications. I do not know what the serial number of your set of plans is, and I dont not know w h e n this re-inforced spar modification appeared on the plans. To be sure, I send you a copy of some of the publications of that time: (4)

Code number (1) ; I prepared that parts list for my own clarification, to get an idea h o w this mixer box is supposed to fit together. I sent this sketch to them to challenge me for its accuracy, but I think they incorperated it sight unseen in the plans

Code number(4) is the result of a cursery stress analysis of the main spar. From the dimensions on y o u r plans, you can find out whether this re-inforcement of the spar between rib#1 and #5 has been incorparated.

Code number (17) is a story on doing an organized assembly of the control system, that may help you t h i n k in terms of building procedure. you may notice that I have n o information on how to place the various weights along the longitudinal axis. I took t h e i r concept for granted and determined the finer points during flight tests. That turned out to be quite right because I used the same engine (the McCullough 101) If you are using another engine with a different weight, the story becomes more involved but that requires a course in weight and balance computations which goes beyond the scope of this letter.

Code number (18) again, relies on test flying the ship to find the proper stability balance. . I added huge trim tabs to the trailing edge of the control flaps ("stabilators"), not like you have in mind, a trim system operated from the cockpit, but aluminum flaps (soft alu) that could be bent after a flight, retested, fine adjusted, and then leave them alone, so you could fly the ship hands off for a short period of time,

Item (21)is a story I published somewhat later because a lot of discussion happened about the overall subject. I tried to keep the story a little generalized, not only pertaining to the B-10; it fits a l l tailless concepts.

Your other questions: To bend 1 mm 3 ply plywood doesn't seem to me to be much of a problem. The outer grain (ply 1 and ply 3) should be parallel to the spar,or better to the leading edge. If that doesn't help, you moisten it at the sharpest curvature with a v e r y hot rag of water and bend it over a rod or a tube. The r e a l prblem is to make a solid glue bond between this plywood and the individual ribs. The Instructions recommend "surgical tubing", but it turns out that's not the full story. You must make sure that all ribs are in line so that the plywood has only o n e curvature to bend around (not a compound curvature like a sphere - it just doesn't do that).

Your idea of designing a fuselage shell for a pilot to sit inside the wing has been tackle by m a n y people. The Pilot is the largest piece of weight of the machine. It h a s te be placed close to the center of lift, and that is the s p a r . So the Pilot has to be placed either on top of the spar or underneath it. On the U-2,Mitchell had tried to accommodate the pilot by providing a break in the spar line so the spar passes through the center of the airplane at abount the 60 % point of the cordline of the center rib. It was not enough. Subsequent improvisations, modifying the airfoil section for part of the wing, adding lead here and there, only made things worse and contributed to the demise of the U-2 concept. A single central wheel is an idea along the same line, but there again, it would have to be exactly under the seat; nobody I know tried it although there might be a better feasibility.

Back to your concern about a trim "system": it's not needed. Once you have established the proper trim (see item 21) there is no requirement to change that during flight. Your speed range is limited from stall to a little more than "best climb". Gusts and turbulence keep you busy maintaining a decent flight attitude, and trim changes wouldn't do you any good. Most airplanes before 1932 didn't have it. If you went on a cross country flight, you had to keep foreward pressure on the stick during the entire flight; I remember the relief when I flew the first plane with this little trim lever ! I remember one of the early airliners (a Junkers F 13 - no brakes !) where you pumped fuel from a rear tank into a foreward tank (manually, of course) when you arrived at flight altitude to maintain level flight; this comfort only lasted until you had to use that fuel for propulsion purposes...

I am not quite clear w h a t kind of fuselage you have: did you buy that w i t h your wing kit from the M-Company, as a set of alu tubes that are linked together with scaffolding hardware ? that was based on a quite satisfying weight distribution. Since I am not very heavy, I added a 2 inch coushion in the back. My only complaint was, that the ground attitude didn't establish enough angle of attack. I cut the front wheel off and re-welded it on a longer shaft so that I got some 3 degrees angle out of the wing (by merely eyballing it) (see also item (21), last paragraph)

That's about it. This discussion would be better face to face with a pencil and paper. I would find out how much you know already and I would tailor my dissertation accordingly.

I wish you luck,

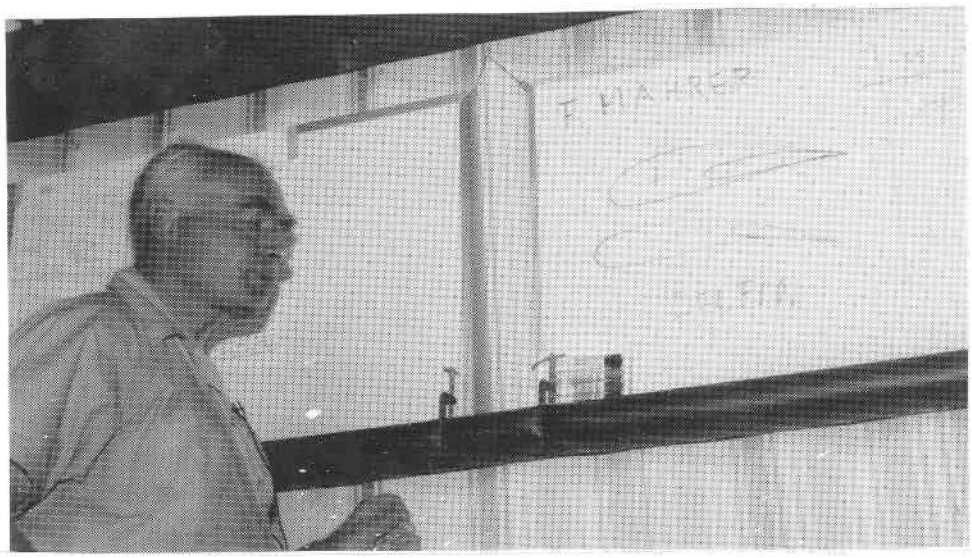
Yours,

Lennart Jorgensen

PARTS LIST, MIXER ASSEMBLY
CONTROL SYSTEM

1. Control bracket base plate, 0.04 2024-T3 Alu, 6" lg.
   1-1. Stiffener angle - 1" angle extrusion or bent from 0.04-T3 Alu
2. Mounting angle, 0.04 2024-T3 Alu, 6 to 7" lg.
3. Bell crank bearing rail 1" extrusion angle, nom 0.065 (kit it 0.08) 2024-T3 Alu or 6064-t6, 6 1/2" lg.
4. Elevator rod bearing angles, 1" extrusion angle or 0.09 2024-T3 Alu, two lengths, 1 3/4 and 2.0".
5. Spacer plate (shim) 0.09 2024-T3 Alu.
6. Bearing strip, 0.09 2024-T3, 5 1/2" lg.
7. Bell crank, mixer, 0.09 2024-T3 (2 reqrd).
8. Elevator rod, brazed assembly, 4130 steel tube, 1/2 x 0.025 (6") & 3/4 x 0.058 (1 1/8) & 5/16 x 0.065 (1.5).
9. Transverse lever, 0.04 4130 steel, 7/8 x 1/4 angle & 5/8 x 0.035 tube (1.75), brazed.
10. Control stick socket, 7/8 x 1/2 angle (2 3/8 lg.) & 5/8 x 0.035 4130 steel tube (2 1/4), brazed.
11. Mixer connecting rod, 1/4" dia 2024-T3 Alu rod 4.75" lg. (2 reqrd).
    11-1 Ball joint AN 276-6 (2 reqrd).
12. Twisted support strip, 0.04 2024-T3 Alu (2 reqrd).
13. Not shown: rivets.
14. Pushrods to control surfaces/outboard bell cranks - one long (9'1") and one short (8'9") 0.04 OD x 0.375 ID, 2024-T6 or 6061-T6.
15. Pins, bell crank, 3/16 probably bolts and nuts (2 reqrd).
16. Pin, elevator rod, 3/16 dia. not in kit, make from 1/16 rod.
17. Washer/spacer, 5/8 ID (2 reqrd).
18. Cotter pins.
19. Ball joint AN 276-6.
20. Wood screws or bolts, mixer-to-spar attachment.

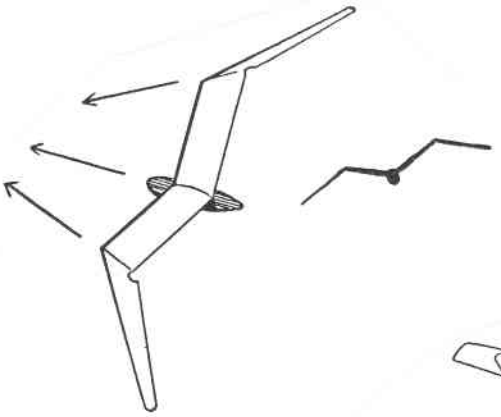
Prof. Wolfgang Hopff from Switzerland, one of the owners of Prometheus, a jet powered motorglider that now has the SB-10 wing.



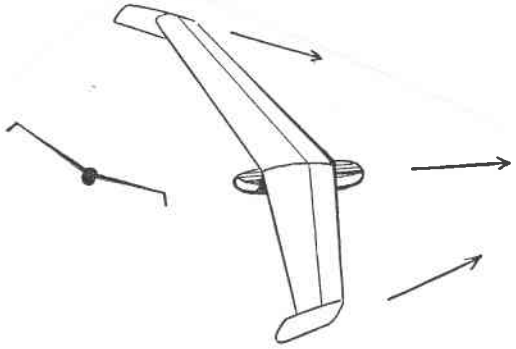
This variable area airfoil has distinct advantages over the use of water ballast. The designer is F. Mahrer. Beatty of South Africa has designed a variable thickness wing for changing lift.

from Tasso Proppe
Model Airplane News
Sept. 1938

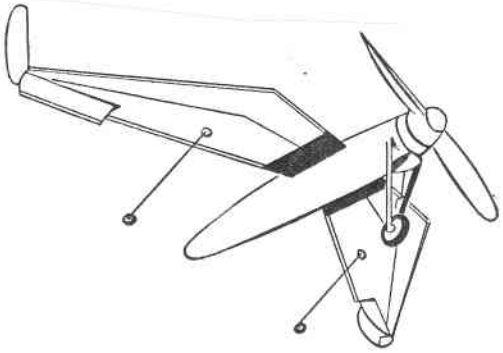
"Weltensegler" of Mr. Wenck, 1921. Note absence of rudders. Designer believed in getting sufficient directional stability only by means of of a suitable position of the wing panels to each other.



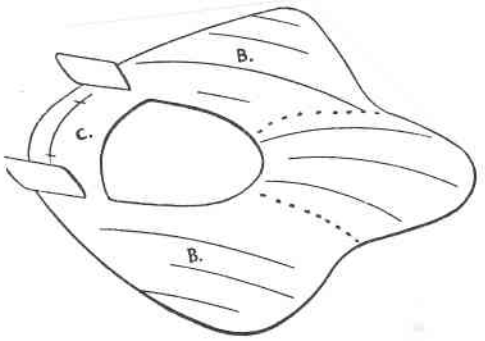
The "stork" of Mr. Lippisch, 1922. Procured directional stability by shrewing the profile from the inner to the outer side (by flattening the vault), and diminishing the angle of incidence by nearly 10 degrees.



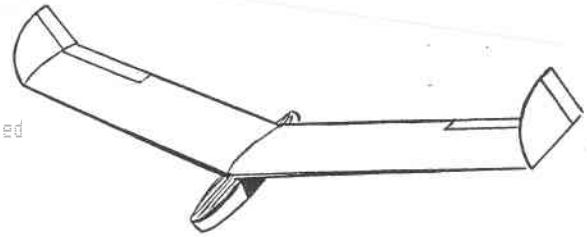
The tailless rubber powered model of Mr. Goodsir, England. Monocoque fuselage, midwing. Note slot for adjustment of wing.



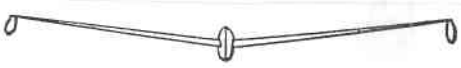
Mr. Antes' project of a tailless machine.

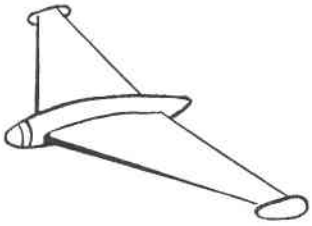



The "Flying Plank" of Mr. Lippisch, 1928. Gained directional stability by a symmetrical profile with a fixed centre of pressure.

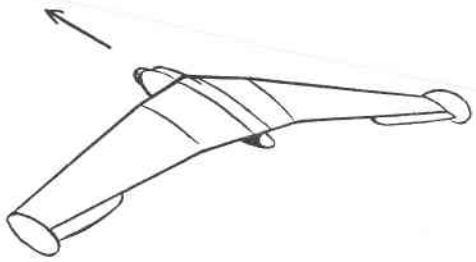


Delta wing, Rhoen, 1930.

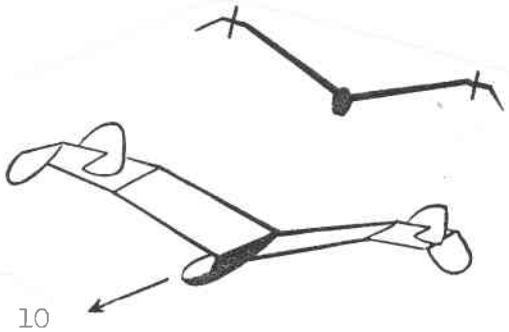




The "H.A.W.K." of Hans Adenaw. Strove for longitudinal stability by changing the profile (wash-out) in the following manner: the inner parts of the wing were vaulted flatly positive, the outer panels slightly negative.



The "Leipziger Flugel" Leipzig wing. Constructed according to the principles of elliptical distribution of lift; shown extraordinary gliding angles; directional stability is likewise good.



# THE MITCHELL VICTORY "V" WING

The "V" Wing is an outgrowth of the U-2. However, it is an entirely new design both structurally and aerodynamically.

It is not difficult to design a ship that is simple to construct, or is cheap to build, or is easy to transport and store in your clothes closet and which is aerodynamically good. But try to do all of this in one design and you have one great big Excederin headache. The demands are monumental and at this point I am not sure it can be done, but I believe the "V" Wing will come very close.

Structurally it is a single spar fabricated of spruce caps and birch plywood web. The spar has 12° sweep starting 4' outboard of the center line. This is necessary to get the spar in back of the pilot and through the pod. Why is it the spars are always where the people have to be?

Bonded to the front and rear of the spar is 1# foam hot-wired to contour and hollowed out inside. To save material and labor the L.F. and T.E. of the outboard sections are made from the hollowed out center sections.

The wing skin is 6 oz. glass applied at 45° with multiple plys added as required. Epoxy adhesive is used throughout.

The 19'6" center section includes the integral pod, hinged canopy, engine, controls and 2-wheel tandem gear. The 7'6" outboard wings carry integral fins and split rudders, and on the trailing edge the stabilators that function as elevators and ailerons. Outboard secures to inboard with pins at the spar and a drag and anti-drag fitting front and rear. 3½° twist is built into the outboard section and to prevent tip stall the leading edge has a cuilt in "C" slot. During flight test the slot will be sealed off in increments from the root out until minimum slot length is obtained, probably 4'. The outboard sections fold up and over the center section for transportation and the 18" nose cone is removable to keep the overall length front to rear to 8'.

The pod is all foam skinned with glass. It is roomy and very comfortable with the pilots back against the spar and a 6" cushion under him. In back of the spar is the 5 gallon gas tank with sight gauge for quantity. Visibility is exceptional due to the low nose profile and large hinged Lexan wrap around canopy and the 9" x 18" window in the lower surface of the wing next to the pod. The sides of the pod are cut out to allow storage in the wing and vision down through to lower window.

On the left side of the cockpit is throttle, choke, real wheel retraction and key switch for ignition and starting. The control column has elevqtor trim and brake lever with provisions for a radio switch if desired. Rudder pedals are ground adjustable a total of 4½". The pedals steer the nose wheel. The nose wheel retraction is right in front of the control column. Push pull tubes are used for stabilators and cable for rudder, throttle, choke and steering. The landing gear is 2-wheel tandem with drum brake on the rear. The 2-tier instrument panels are adequate for all soaring instruments and radio if required

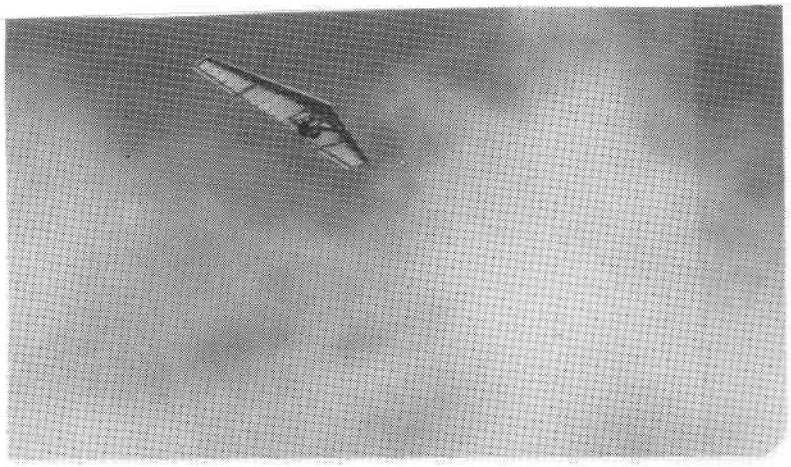
The KFM 107E engine with electric start is mounted on the back bulkhead and direct drives the 2-blade wood propeller. Direct drive is far from ideal but considering cost. simplicity and drag it appears to be a good compromise. A folding propeller is being developed to reduce drag but you boost cost and complications. The exhaust pepe, muffler, carburator and much of the engine is enclosedin the aft fairing. A ballistic parachute is installed behind the pilot.

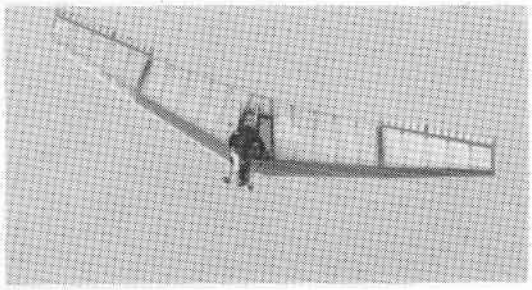
The "V" Wing with the correct propeller, gear locked down, and aft fairing removed will meet all requirements for the ultra-lite aircraft. It also should provide the soaring enthusiast a ship that is affordable, self-launching with good performance and ideally suited to light soaring conditions.

This is my 30th homebuilt and my 48 years soaring experience is in the design. It it turns out to be a success that will be good. If not, there is always the 31st, 32nd, etc., etc.

MITCHELL "V" WING
SPECIFICATIONS

| | | | |
|---|---|---|---|
| Span | 34'6" | Motor | Zenoa 18 HP |
| Area | 136 sq.ft. | Prop | Wood, 2 blade |
| A.R. | 8.8 | RPM/Engine | 6000 50"diam,30" pitch |
| Wt.Empty | 253# | RPm/Prop | 2800 |
| Payload | 275# | | |
| Gross Wt. | 528# | | |





Other Mitchell wings