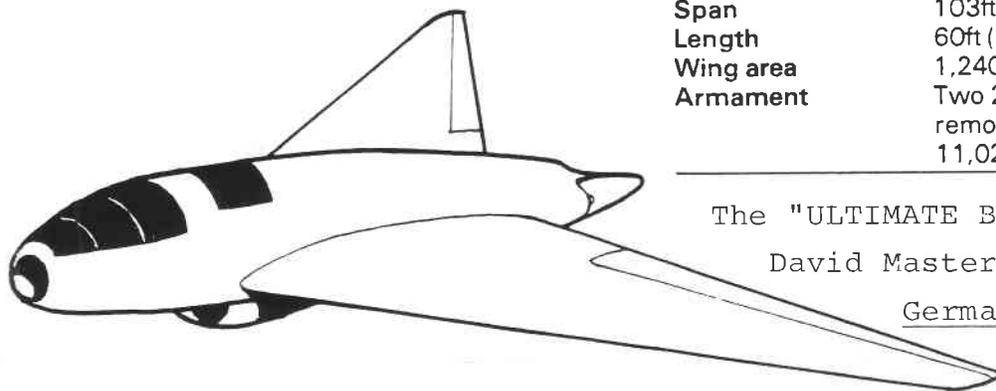


T.W.I.T.T. NEWSLETTER

BMW Strahlbomber II

The second BMW *Strahlbomber* was larger and faster than the first. It was also tailless and was highly unusual in completely lacking vertical control surfaces. Powered by two of the more powerful BMW 018 turbojets, the *Strahlbomber* II was expected to be up to 80mph (130km/hr) faster than the earlier project. The crew of three were to be housed in separate pressurised cabins: the pilot in the nose, the navigator behind him and facing rearwards, and the bomb-aimer lying prone in a blister beneath the central fuselage.

**BMW Strahlbomber II data**

Role	Three-seat tailless jet bomber
Ultimate status	Design
Powerplant	Two BMW 018 turbojets, 7,496lb (3,400kg) st each
Maximum speed	612mph at 13,120ft (985km/hr at 4,000m)
Range	1,951 miles (3,140km) with 11,023lb (5,000kg) of bombs
Weight	69,400lb (31,480kg) loaded
Span	103ft 6in (31.56m)
Length	60ft (18.30m)
Wing area	1,240ft ² (115.2m ²)
Armament	Two 20mm cannon in a remotely controlled turret and 11,023lb (5,000kg) of bombs

The "ULTIMATE BEAMER" from
David Master's
German Jet Genesis

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., 9102 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, February 16, 1991 beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, Calif. (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 types of tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is an affiliate of 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., Dave Pio
(619) 789-1650
Secretary, Phillip Burgers
(619) 563-5465
Treasurer, Bob Fronius
(619) 224-1497
Editor (Acting), Andy Kecskes

The T.W.I.T.T. office is located at Hanger A-4, Gillespie Field, El Cajon, California.

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

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\$19 per year (Foreign)

Information Packages: \$2 (includes one newsletter)

Back Issues of Newsletter: \$0.80 each

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Meetings are held on the third Saturday of each month, 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).

PRESIDENTS CORNER

There isn't a lot to say this month. Those of you who didn't make it to the meeting missed an enjoyable afternoon of multiple speakers covering a variety of subjects. It always seems that the times we don't have a speaker

scheduled, the program turns out taking care of itself and is better than ever. So the next time you see we don't have a speaker be sure and come on down so you won't miss the good times.

As you can see the newsletter has changed in its appearance again this month. It was decided the cover was getting to cluttered with information that was more appropriate on the inside. The masthead also gives us the opportunity to tell you who the officers are and provide some phone numbers so they are easier to contact.

Also in this issue is a recap of that Directors meeting. I have left out a lot of the detail, trying to just get the main points across. I hope those of you who may disagree with some of the things we are proposing for 1991 and beyond will speak up, since that is the only way we can make this a better organization for everyone. If you agree, we would like to hear that too, along with any other ideas which you think would further the efforts of TWITT in serving its members.

That's it for this month.

Andy

FEBRUARY'S PROGRAM

Ladislao Pazmany will be speaking to us about the design and structure of the Fiesler Storch. He will also present some material he is preparing for an article in Sport Aviation covering retractable versus fixed slates.

Bill & Bunny Kuhlman (B²) sent us some more material on their Penumbra series. They have asked us to go over the plans and additional information learned through #3 and give them any feedback. The plans and text of their letter are published elsewhere in this issue. Please read it carefully, give it some thought, and bring your newsletter to the meeting ready to help them with some of the problems they've encountered. It always seems these turn out to be the best kind of meetings, so don't miss it.

MINUTES OF THE JANUARY 5, 1991 BOARD OF DIRECTORS MEETING

Members Attending:

Andy Kecskes, President
Bob Fronius, Treasurer
Phillip Burgers, Secretary
Marc dePiolenc, Member
Jerry Blumenthal, Member

Hernan Posnansky, Member
Not Attending:
Dave Pio, Vice President

The president called the meeting to order and explained the meeting was to develop plans and goals for the organization for 1991. The floor was opened for a discussion of any ideas the board or members present felt should be considered.

After a discussion it was decided that the new emphasis for the organization should be to foster the development of flying wing projects among TWITT members, rather than try to design and build a single design. This is not a new direction, but rather a new commitment by the group to do what it can to help each member bring his/her project to a successful fruition.

There were a number of ideas presented which would help TWITT achieve this goal. Among them were:

a. Contacting professional groups, such as, the American Institute of Aeronautics and Astronautics, Academy of Model Aeronautics, and American Society of Mechanical Engineers, to determine if we could start some type of exchange program of publications and information.

b. Conducting a design competition within TWITT to spur its members to submit their project designs. There would be rules requiring specific items be provided so that all entries would be evaluated on the same level. Each winner would have his/her design featured in a centerfold of the newsletter. Any runners up would be given honorable mention with their design published elsewhere in the newsletter.

c. Once the library is completely organized, offer the members a catalog of items and services which can be provided by TWITT. These items would be priced to produce a little income while serving the membership's needs.

d. Providing the membership with whatever help it can to see that their designs are adequately reviewed, engineering drawings produced, preliminary performance data calculated, etc., so that a proof of concept or actual aircraft could be built.

e. Re-institute the TWITT logo contest to see if we can come up with a distinctive design which could be put on hats, lapel pins, letterhead, etc., to give the organization a true sense of distinction.

f. Produce a list of previous speakers and their topics, and possibly the means for contacting them so others could try to use them

for group meetings.

g. Produce an index of the topics covered in each of the past newsletters.

h. Organize TWITT members in the local area to help with the performance of some of the daily routines involved in meeting the expanded services to members.

i. Attempt to get some type of display case which could be used to store and showoff members initial proof of concept scale models.

Marc dePolenc offered to provide us with a database format for use in cataloging the library. He also said he would design a masthead for the inside of the newsletter which would take a lot of the information off the cover page and put it in one central location.

Jerry Blumenthal mentioned that we should be trying to get the membership to come up with new and creative ideas, and not try to repeat previously attempted designs or concepts.

There was a discussion on the issue of fund raising and how we should go about it. The problem is one of getting started with some small contributions so we can show bigger foundations or corporations that we have a viable financing program. It was concluded that many of the items discussed above will require more funds than are currently available and that some type of marketing tool will have to be designed to obtain the initial donations.

We then discussed corresponding with Dr. Karl Nickel about providing an English translation service for his new book using any members who would be willing to take on small parts of it. This would be a long term project, with the anticipated payoff being a credit in the book. This would help lend additional credibility to the organization.

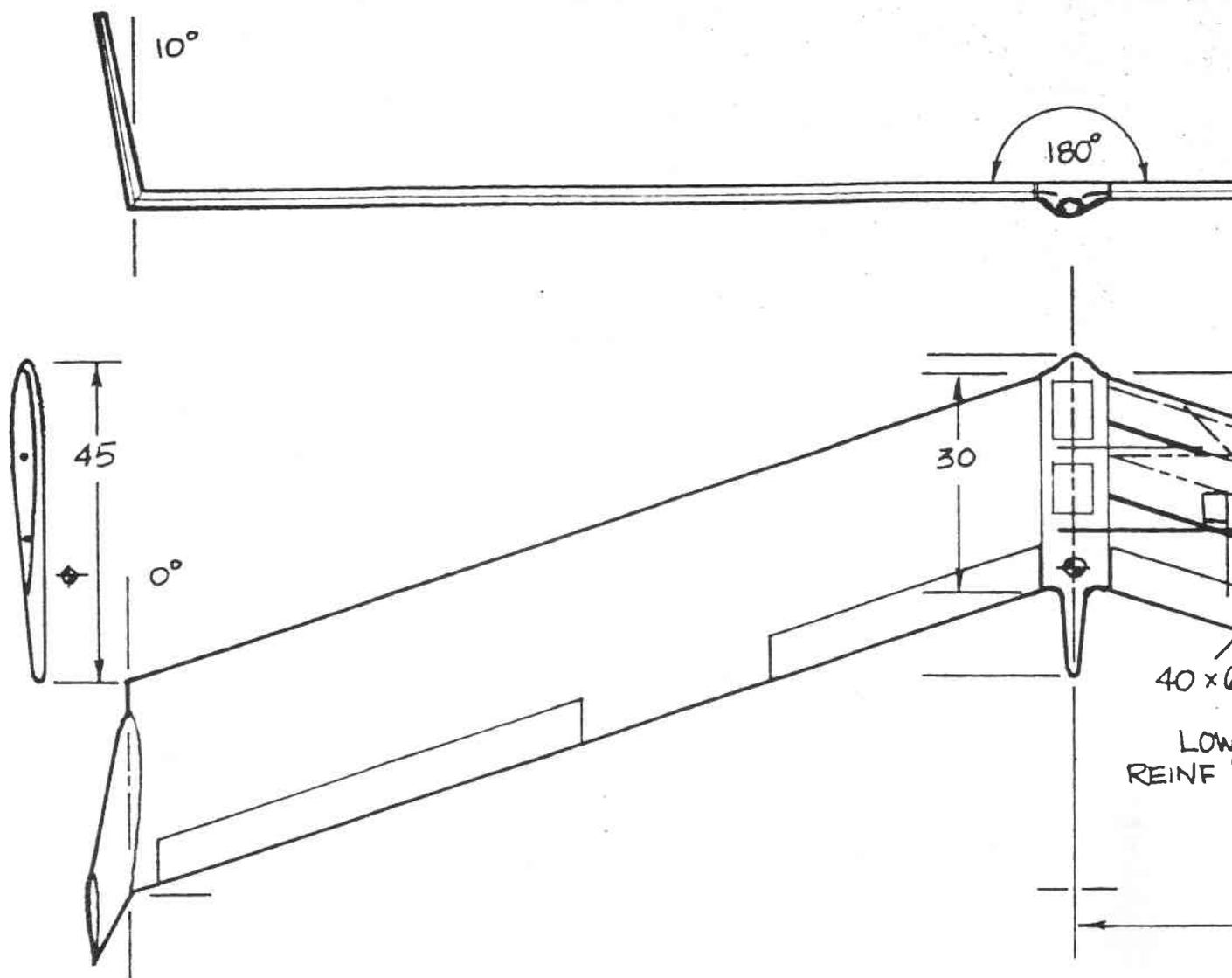
The meeting was closed with the thought that all these subjects would be submitted to the general membership for review and comment. Hopefully the ideas will be seen as a means of getting TWITT on the move towards helping more people reach the successful conclusion of the projects.

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MINUTES OF THE
JANUARY 19, 1991 MEETING

Andy opened the meeting by explaining about the Board of Directors meeting which had been held on January 5. (Ed. Note: No detail will be gone into here since the minutes of that meeting are published above.)

Andy also announced that Vic Saudek has written to us asking if any of our members have old copies of the SCSA's Thermal newsletter they no longer want to hold onto. If so they



- = SERVO LOCATION (S)
- = SERVO CABLE CONDUIT
- = ANTENNA CONDUIT (ONE SIDE ONLY)
- = BORDER OF 'GLASS CLOTH LAYERS
- BATTERY PACK (4 x 1200 mAh) IN FORWARD COMPARTMENT
- RECEIVER IN REAR COMPARTMENT
- AIRFOIL: EH 1-0/9.0

can either send them directly to him at 7216 Kentwood Ave., Los Angeles, CA 90048, or bring them in to Bob at the hanger and he will see they are delivered to Vic. Vic proposes to send the bulk of them - those in order - to the National Soaring Museum, with the duplicates remaining in the SCSA's files. Bob also mentioned that if you have any old Wing & Wings from the AGCSC he would like to have those for his personal collection.

TWITT received a letter from Damon Hassan representing the San Diego State University's branch of the American Institute of Aeronautics and Astronautics. They are an aerospace engineering club made of mostly sophomores, juniors and seniors. Their club is interested in hearing a talk about composite materials and are asking if any of our club members could possibly make a presentation. Phillip Burgers, TWITT Secretary, has spoken to them in the past and says they are interested in just about any aeronautical engineering subject. If you want to volunteer but don't know much about composites, ask another club member for help. They have proposed the following dates for the talk: March 21, April 4, 11, 18, 25, and May 2, or 9, which are all Thursdays. Their meetings are at 11:00 AM which might make it difficult for some. If your interested contact Damon at: 4914 67th St., Apt. 9, San Diego, CA 92115, (619) 465-3376.

The raffle prize for the day was announced as a Stearman ride from Gillespie Field being offered by Addison Pemberton.

Andy introduce Budd Love, of Airlove, Ltd., who gave a brief talk about his HIAM (High Internal Air Mass) system of lift augmentation and thrust. After explaining his unique concept that will enable a passenger/transport aircraft to takeoff and land on a 500' airport, he noted that one of his biggest problems still remains finding sufficient manufacturer support for the idea. After loosing some initial support from Rolls Royce on producing the necessary compressor sections, he has now managed to get some indications of interest from Allison Turbines.

Since he has not been able to find the needed financial support he has been unable to design and perform the tests needed to demonstrate that the concept does work. What Budd was looking for are any volunteers, who like him, believe in the need for such an aircraft system to help solve our future airport problems. He has developed a business plan, and perhaps would like to form some type of non-profit corporation for the purposes of raising the necessary funds. If you are

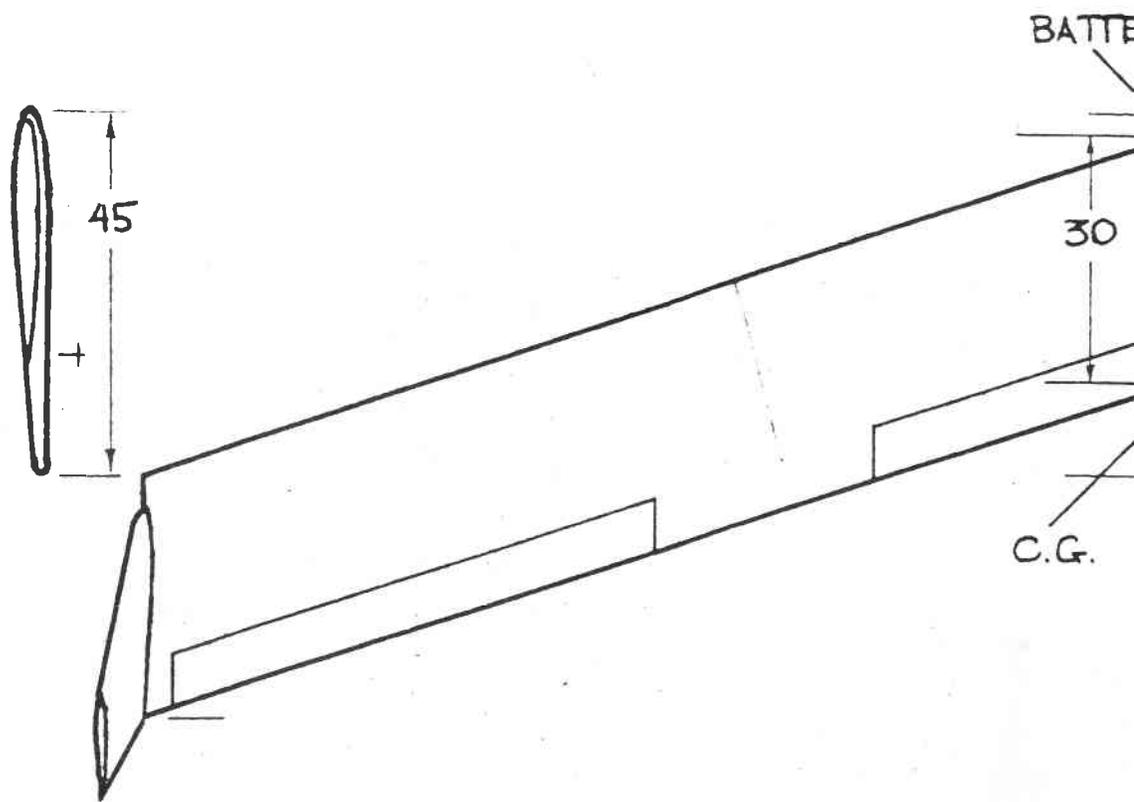
interested in participating in such a project you can contact Budd at (619) 459-1489.

Bruce Carmichael was the next speaker to take the floor (which he gave back to us later). Bruce thanked Bob Fronius for putting together this organization several years ago and keeping it going for everyone to enjoy. He also thanked Andy for taking over the newsletter and putting out a good publication each month.

With all the buttering up completed, Bruce talked a little about what is being planned for the Sailplane Homebuilders Association (SHA) meet to be held at Tehacahpi in September. There will be more hands-on demonstrations, with this year's also including a competition on who can build the strongest composite spar. If Eric Raymond is not in Japan at the time, he has indicated he will bring the solar powered sailplane he flew cross-country. He mentioned he has just met Rick Harp, a mechanical engineer, who has been experimenting with composite sailboat hull testing. He has been developing some structures that would lend themselves very well to construction of wing leading edges, and he will be showing the attendees about this new technology. He also has developed a variable camber wing for use as a sailboat mast and sail. Bruce mentioned how much information can be obtained through this cross pollination between the various disciplines, which is one of the things the SHA is trying to promote through these workshops.

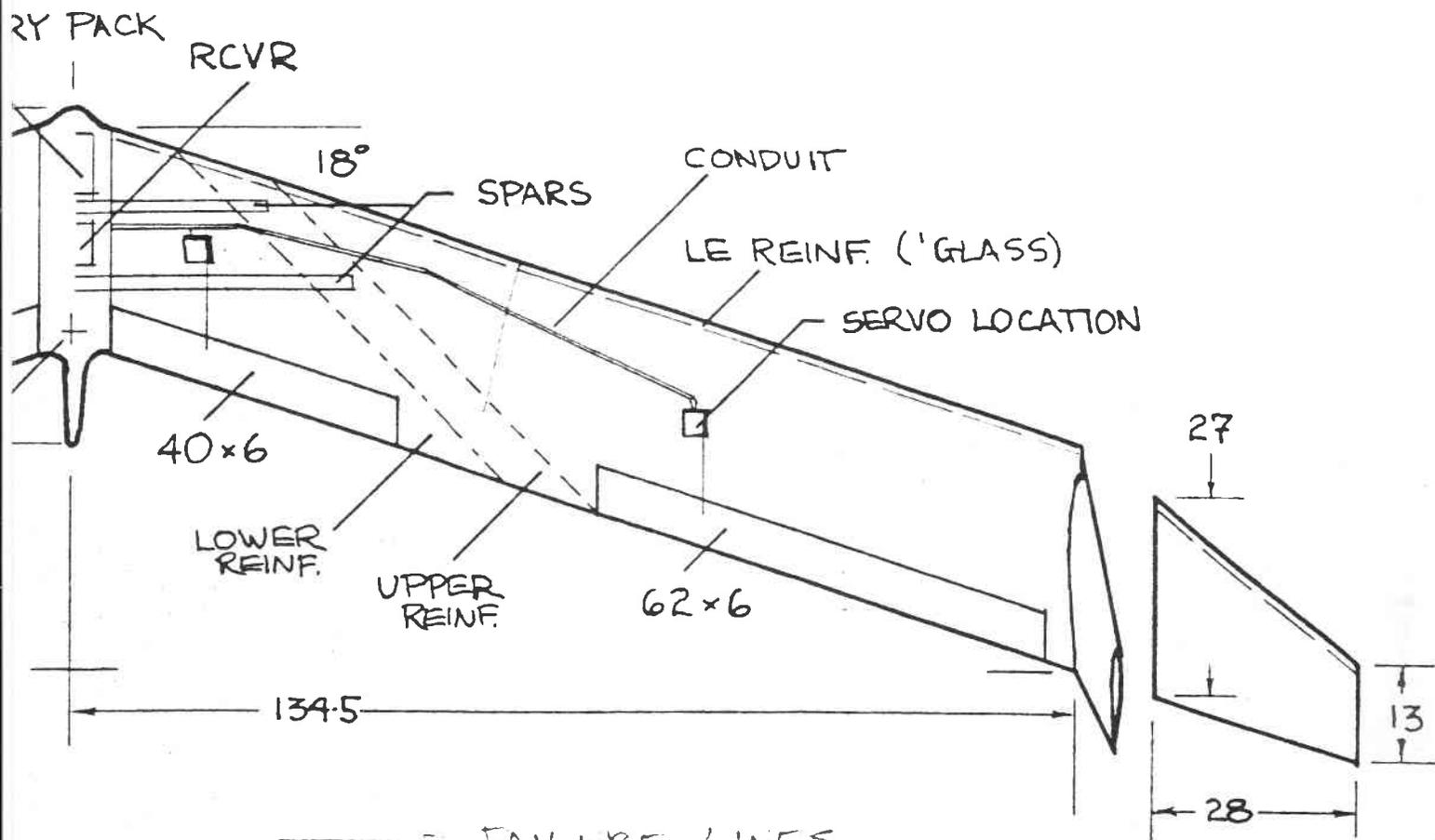
Bruce showed us some of the various models he has build over the years. One model resembled a Marske flying wing, and it flew so well Bruce even made a mockup of the fuselage to test its fit for his small frame. He took a 67 series airfoil, rotated, made it about 20" wide and 100" long that he could just get into. The only problem was that his toes stuck through the mold line so he would have to use some old rocker arm fairings for a 1930s racer to cover them up. He was then told by Bob Noble that if he wanted to fly such a contraption for a civilized airport he would have to put a brassiere on it.

He had a joined wing sailplane model based on some ideas he had gotten from Julian Wolkavich. He then showed us his circular flying wing which was the outgrowth of an earlier design resulting from a beer glass stain left by Al Backstrom. Bruce reported the original glass size circle flew well, but when he upscaled it the flying characteristics went to hell. The next model, "Mach Twain," was a supersonic delta wing configuration that



AIRFOIL EH 1.0/9.0

PROJECT PENUMBRA



----- = FAILURE LINES
 (UPPER SURFACE COMPRESSION)

ENTIRE WING USES '150' PINK STYROFOAM; VACUUM BAG TECHNIQUE:

- COVERED WITH TWO LAYERS 30Z 'GLASS
- CENTER PANEL USES 3 LAYERS 60Z
- LE REINFORCEMENT 60Z 2" TAPE
- TAPERED ROOT REINF. ONE LAYER 30Z
- SPARS OF Balsa & PLYWOOD
- WING RODS OF 5/16" DRILL ROD,
 & 3/16" MUSIC WIRE

flew reasonably well in the heavier atmosphere of the hanger.

With the lighter side completed, Bruce then introduced Bob Noble, as a hands-on type of engineer that could not only design aircraft, but also build the prototypes. Bob brought along a model which incorporates a new composite construction technique. It was an outgrowth of the SHA's design contest with a theme of being easy to build and cheap.

The aircraft has a foam core wing with a circular carbon fiber spar and a Finnish plywood outer skin. The chord is determined by the 50" wide plywood sheet, which yields a little more than 24" chord. There is no shear webbing, and it uses one pound bead foam. The plywood could probably be put on with contact cement, since the spar will carry most of the torsional loads. The spar is capable of handling a 17% airfoil. The foam is designed to carry the loads to the spar, which is a function of the outer skins.

The control system would consist of a spoiler and spoiler-aileron system to keep the setup simple and easy to build. It would only require cutting a couple of holes in the top of the wing for the controls.

The outer surface would probably use 1/32nd Finnish birch aircraft plywood. This technique was used to build a 48' sailboat mast and it has held together for quite a while despite some severe bending. (Crossing of disciplines again.) The plywood may be a little heavier than some other materials, however, it provides more protection from general knocking around.

The fuselage is made out of sheet foam; 1/2" on the sides and top. The corners are rounded by cutting them off at a 45 degree angle, placing sheet foam across it, and then scarfing it off to provide some shape. The whole thing is then glassed on the inside and outside, which provides sufficient torsional strength. There are only the main and drag spar bulkheads left in the fuselage, although you could leave others in, if desired.

The butt joints on the wing skins would be covered with about a 3" wide doubler of plywood with its edges scarfed down. Bob felt there wouldn't be much degradation in performance since this was not meant to be a high class performer anyway. The 40' span would probably result in about a 6 pound wing loading, giving it decent penetration.

It would require a stub spar of about four diameters to provide ample strength. (Two might be enough, depending on how much trust you have in the principle.) The carbon spars can be commercially produced, and there are

several fabricators around, especially within the boating industry, who can build them.

Jerry Blumenthal offered another suggestion on how you can cover surfaces, other than with fiberglass, and retain good strength with less weight. He used brown paper to cover some 18" X 24" control fins, attaching it with regular 3M contact cement. He then sprayed it with auto primers and enamels to provide for weather proofing. He indicated it was very strong and virtually puncture proof.

Bob also had several pictures of a laser designator RPV that he had designed for Ford Aerospace. The interesting thing about them was that the nose section forward of the wing would be rotated 180 degrees after takeoff so the range finder that was on top would be on the bottom allowing for a 360 degree view.

The designers of some of the John Street Aeronautical Society briefly described their creations. Hernan Posnansky explained his was an attempt to get laminar flow by putting the wing above the fuselage via a cabane. He also swept the wings forward. Ed Lockhart told us his triple wing creation was an attempt to have the fewest tails possible, so with three wings he was saving a bunch of tail drag. He also showed us his tissue paper, pusher, canard that won a duration contest two years in a row. He had experimented with shrouds around a three bladed prop, but found that no shroud was the best solution.

Ed then showed us his proof of concept flying wing with all moving wing tips. The rudders would be capable of rotating about 80 degrees to provide drag brakes with very little change in trim. It was designed to fold in half in the downward direction so the rudders wouldn't conflict. The spars would all hook up automatically and the controls would be separate in each side so there would be no connections. It was to be a hang glider in the Icarus concept with a small canopy on top.

Bob Fronius explained the rules for the model building and flying contest that was supposed to follow the meeting. However, only several people tried their hand at it so there was no contest.

While those hardy souls were building, the raffle was conducted. Jack Lambie won the Stearman ride and was able to get in just before dusk on a beautifully clear night over San Diego.

The meeting was adjourned for some good hanger flying.

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LETTERS TO THE EDITOR

TWITT

Enclosed is my membership renewal. I have also enclosed some more old German flying wing designs. These are from David Master's book German Jet Genesis. They are mostly concept sketches from designs found in captured documents. Many of them were never built, but they are still interesting. If nothing else, the art work could be used in the newsletter. There are some more in the book, and I'll send them along later.

Best Wishes

Kevin Renshaw
10056 Farmers Branch
Fort Worth, TX 76108

(Ed. Note: We would like to thank Kevin for his continued support with material such as this. We will use a lot of it as space filler material over the coming months. We will also place a copy of it in the TWITT library.)

TWITT

Enclosed please find a photocopy of an article which recently appeared in "Hang Gliding" magazine, regarding the SWIFT. This aircraft is very exciting for me, just the kind of thing I'd like to see more of in the TWITT newsletter. (By the way, if you wish to reprint this, you can obtain permission from the editor, Gil Dodgen, 6950 Aragon Circle, Suite #6, Buena Park, CA 90620, (714) 994-3050). Ilan Kroo and company are people who are not just studying flying wings, not just designing them, but are actually getting out there and flying them! As Otto Lilienthal said: "To design an aircraft is nothing. To build it is not much. To test it is everything."

Please find enclosed as well my money order for another year's subscription.

Yours sincerely,

Stewart Midwinter
Calgary, Alberta, Canada

(Ed. Note: The enclosed article is 5 1/2 pages long, which will take over half of a newsletter. However, in the months to come, after getting Gil's permission, we will try

to find an issue in which to put it for those of you out there like Stewart. Thanks to Stewart for the addition to the library. If you can't wait, send us \$1 and we will forward you a copy.)

ADDITIONS TO THE TWITT LIBRARY

The following was donated by Harald Beuttner:

"Resurrecting The Burnelli Wing" by Jerome Greer Chandler, published in the First Class magazine (year unknown), pp. 16-21.

We received the following in the mail:

Weston Aerodesign, January 1991 Catalog. It contains a variety of things from cloth, epoxy supplies, foam cutting equip., etc. You can call or write to: 944 Placid Court, Arnold MD 21012, (301) 757-5199, FAX (301) 757-8580.

AVAILABLE PLANS/REFERENCE MATERIAL

Tailless Aircraft Bibliography

by Serge Krauss

Cost: \$20

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

Horten H1c construction drawings with full size airfoil layout. 30 sheets 24" x 36" with specification manual. Price: \$115.

Horten Newsletter

Cost: \$5 per year for US/\$7.50 foreign

Order from:

Flight Engineering and Developments
2453 Liberty Church Road
Temple, GA 30179
(404) 562-3512

FLYING WING SAILPLANE PLANS AND KITS: Two time-proven, 13m homebuilt designs suitable for the novice pilot. Build either the MONARCH "F" ULTRALIGHT (19 to 1), or the PIONEER II-D (35 to 1) sailplane. Info packs \$8 each, or \$15 for both. Marske Aircraft Corp., 130 Crestwood Drive, Michigan City, IN 46360

The following is the additional material supplied by B² for review by the TWITT membership. I have also included their address so you can past your comments on directly to them if you

cannot make it to the meeting. I know all you modelers out there may be able to save them some time and effort in trying to make this project work. Give it your best.

Dear TWITT Members:

The January issue of the newsletter contained a reprint of our October 1990 RCSD article describing Project Penumbra. Had we been informed of the appearance of the reprint we would have gladly provided the enclosed sketches prior to publication. (Ed. Note: Their article was a last minute addition and there was not enough room to have put everything. Getting this in two parts probably works out better.) As it is, several things have happened since writing the article and we'll provide you with details of our subsequent progress.

To review: Penumbra.1 was the 'wing which suffered the structural failure in compression along the upper surface of both wings, and the sketch shows the failure lines. Penumbra.2 has the flutter problem and a stalling problem, both during launch. These two difficulties have now been evaluated and conclusions drawn.

The flutter problem is rooted in two construction errors:

The first error has to do with the location of the main wing rod and the placement of the main spar. We had anticipated having fewer problems if we were able to place the main wing rod at the CG. While this dictated the placement of the main spar behind the 1/4 chord line we did not give this much concern. In laying out the bidirectional fiberglass cloth, however, we simply ran the grain parallel to the leading and trailing edges. This was an error as insufficient torsional strength was provided. The resulting structure, with the structural center behind the 1/4 chord line, responded to aerodynamic loads by twisting, hence the flutter.

The second error involves the fiberglass layers as well. The bidirectional cloth has half of its fibers running parallel to the leading and trailing edge. As the cloth used is of the 3.4 oz./sq.yd. type, the actual weight of 'glass providing stiffness in bending is but 1.7 oz./sq.yd. Even in the areas where the cloth was doubled there is insufficient strength. This led to bending of the wing when launch loads were applied. As the wing flexed upward the effective angle of attack of the tips decreased, causing the entire wing to rotate into a higher angle of attack. This caused greater bending loads which again

decreased the effective angle of attack and led to further rotation in pitch. When the center section finally stalled out Penumbra.2 went into what can best be described as a flat spin into the ground. The speed at contact with the ground was actually very low, and the structure never suffered any damage, but it was certainly hard on the nerves of the pilot!

Penumbra.3 was started at about the time the article appeared in RCSD. To increase stiffness we utilized 1/16" thick urethane foam over the foam core bed. Additionally, all fiberglass was laid out with the grain at 45 degrees to the leading and trailing edges in an effort to increase torsional strength. At this latter goal we succeeded, but the urethane foam provided no bending strength. Surprisingly, the urethane foam appeared to have increased the overall weight by a factor of 2 and construction of Penumbra.3 was terminated immediately.

Penumbra.4 is currently under construction. A solid core of pink foam is being used. Bidirectional fiberglass cloth will be applied at a 45 degree angle to the leading and trailing edges to provide torsional rigidity. To further control flutter, the main spar is being moved forward to the 25% chord line and the main wing rod will be moved forward as well. This should also reduce the required nose ballast. Layers of 4 oz./sq.yd. unidirectional cloth will be put over the foam cores with grain running parallel to the leading and trailing edges. Resistance to bending loads should be dramatically increased as a result.

Aerodynamically, the only change incorporated into Penumbra.4 will be the addition of two degrees of anhedral. This will place the towhook closer to the vertical CG and provide an additional safety margin during tow. The effects of anhedral on roll-yaw coupling are apparently all positive.

We would be most grateful if someone would provide a cassette tape of the discussion which takes place concerning Project Penumbra. Also, written comments will be most gratefully accepted.

We will be taking pictures as Penumbra.4 takes shape, and some of these are sure to find their way into the TWITT newsletter.

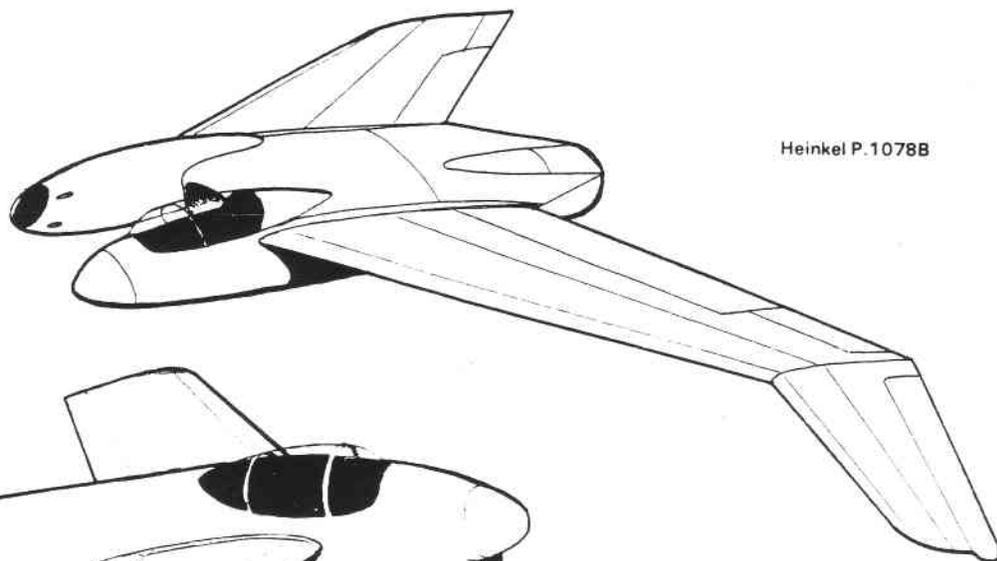
Sincerely,

B²

P.O. Box 975

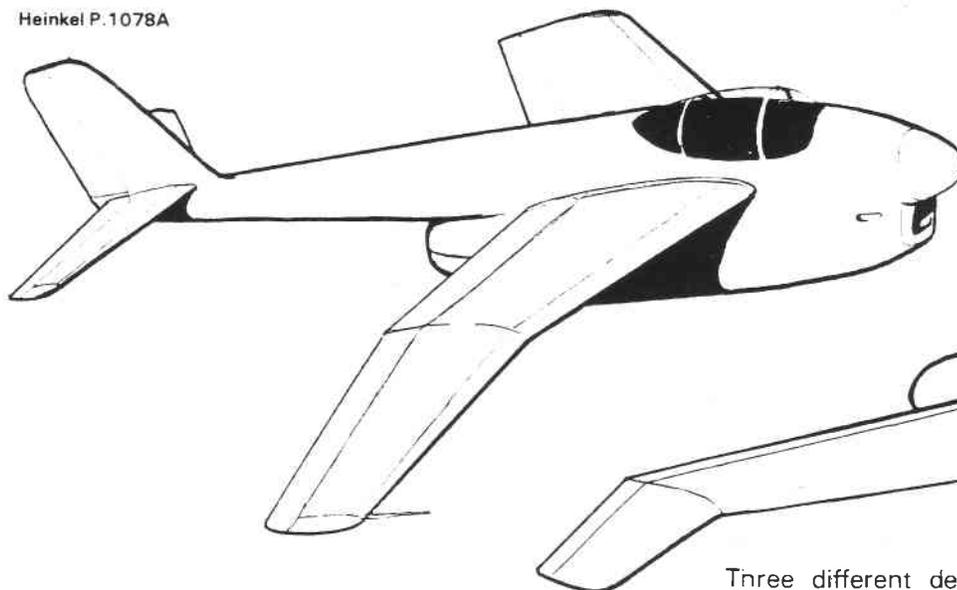
Olalla WA 98359-0975

Heinkel P.1078

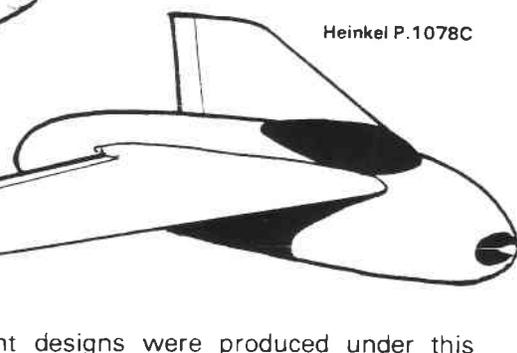


Heinkel P.1078B

Heinkel P.1078A



Heinkel P.1078C



Heinkel P.1078 data

Role	Single-seat jet fighter
Ultimate status	Design
Powerplant	One HeS 011A turbojet, 2,866lb (1,300kg) st
Maximum speed	609mph (980km/hr) (A), 636mph (1,025km/hr) (B), 624mph (1,005km/hr) (C), all at sea level
Range	932 miles (1,500km) at 36,090ft (11,000m) (A), 960 miles (1,545km) at 36,090ft (11,000m) (B)
Service ceiling	42,300ft (12,900m) (A), 45,000ft (13,700m) (B)
Weight	8,906lb (4,040kg) (A), 8,576lb (3,890kg) (B), 8,643lb (3,920kg) (C)
Span	28ft 11in (8.80m) (A), 30ft 9½in (9.38m) (B), 29ft 6¾in (9.0m) (C)
Length	31ft 1½in (9.48m) (A), 20ft (6.10m) (B), 20ft (6.10m) (C)
Wing area	182ft² (16.9m²) (A), 219ft² (20.3m²) (B), 191.6ft² (17.8m²) (C)
Armament	Two MK 108 30mm cannon

Three different designs were produced under this designation for the OKL Emergency Fighter competition of 1944, the last of them being submitted for approval (see FW Ta 183, page 57).

The P.1078A had 40°-swept shoulder-mounted gull wings and a fuselage similar to that of the Messerschmitt P.1101, which had a single turbojet located in the lower centre section and exhausting below a central tailboom. The single-seat cockpit was placed well forward, with single 30mm cannon on either side.

Altogether different was the B, which was to be tailless and with no vertical control surfaces. The wings were swept at 40° and gulled, lateral control being provided by the anhedral wingtips. The fuselage had twin nose cones, the air intake for the single turbojet being set between and to the rear of them. The armament of two 30mm cannon was housed in the starboard nose cone, with the pilot seated in the other.

It was the final version, the P.1078C, which was submitted for the OKL competition. Like the B, it was a flying wing without vertical control surfaces. The shoulder-set wings were swept back at 40°, had anhedral wingtips, and contained the whole fuel supply in the inner sections. A single 2,866lb (1,300kg) st HeS 011 turbojet was located in the short, centreline fuselage, with the air intake in the extreme nose. The air intake was flattened so that the cockpit, with a 30mm cannon on either side, could be superimposed.

Although well thought out, the P.1078C was passed over in favour of the Focke-Wulf Ta 183.