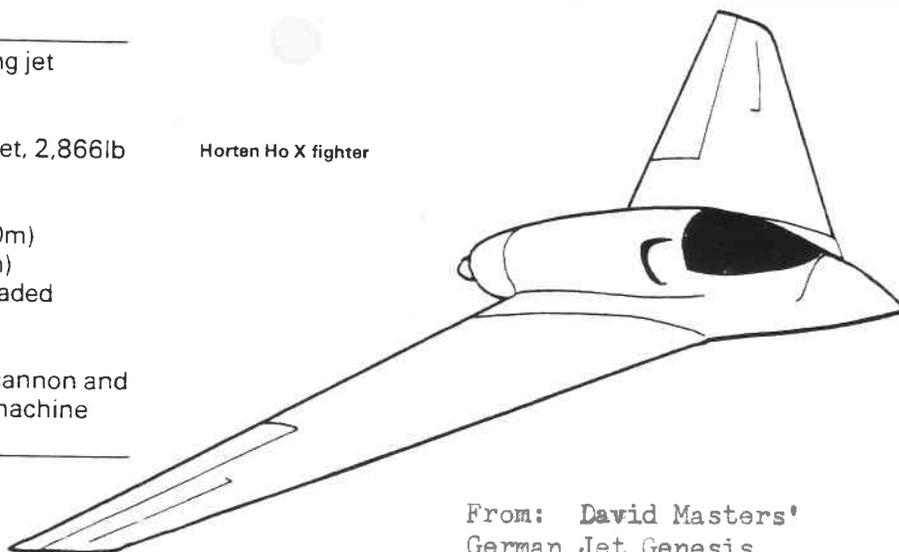


# T.W.I.T.T. NEWSLETTER

### Horten Ho X data

|                        |   |
|------------------------|---|
| <b>Role</b>            | Single-seat flying-wing jet fighter                     |
| <b>Ultimate status</b> | Design  |
| <b>Powerplant</b>      | One HeS 011A turbojet, 2,866lb (1,300kg) st             |
| <b>Maximum speed</b>   | 683mph at 19,690ft (1,100km/hr at 6,000m)               |
| <b>Range</b>           | 1,932 miles (3,110km)                                   |
| <b>Weight</b>          | 13,228lb (6,000kg) loaded                               |
| <b>Span</b>            | 45ft 11in (14.0m)                                       |
| <b>Length</b>          | 23ft 7½in (7.20m)                                       |
| <b>Armament</b>        | One MK 108 30mm cannon and two MG 131 13mm machine guns |

Horten Ho X fighter



From: David Masters'  
German Jet Genesis  
 Contributed by Kevin Renshaw

### 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., 9207 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, July 18, 1992 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.

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

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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).

**PRESIDENT'S CORNER**

**First**, I would like to apologize to those members who accidentally got removed from the mailing roster. Apparently there was a problem between June, who keeps the membership records, and myself. It has all been fixed now, and hopefully there are no others out there we haven't heard from. We are sorry for the delays in receiving your newsletters.

Well, the final results are in, and the logo winner is Richard Avalon's design shown again on page 2. There were only 20 votes cast, with Richard receiving 8 and the Ed Lockhart's triangular design in the lower left corner on page 10 of the May 1992 newsletter receiving 4. Congratulations go to Richard for a simple, yet communicative design.

I would like to thank Gene Turner for sending in his proxy vote for use in case there was a tie. As he can see, we did not have to use it since there was a clear winner.

Due to the low voting response, we are not sure how much real interest there is in pursuing having the design converted into a patch or decal. We will look into the financial requirements and see if we can afford to carry them while members decide about buying them. If you have any thoughts about this, please drop us a line.

Don Santee's letter last month did solicit a response. He writes that "A man named Avalon (Ed. -could this be the same as our logo winner) is going to buy the engine & prop." Apparently the Mitchell U-2 airframe will go to a museum as a loaner. We are happy that there was a positive outcome as a result of Don's letter.

This month's newsletter will complete the reprint of the Polish flying wing article. We hope you enjoyed a view of what type of development work has or is going on in other countries when it come to flying wings. The letter from Clark Calkins seems to indicate that there is more flying wing activity, at least from the modelers perspective, within the European community than here in the USA.

This points out what this organization is all about. It is here for your benefit in furthering the needs of the aviation community in providing information about flying wings. But the organization is only as good as you, the general membership, make it. We know we will never be able to actually produce a flying machine due to the costs and liability problems. However, this does not stop us from helping all of you get your pet projects "off

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the ground."

So, the bottom line to all of this is "keep those cards and letters coming" so we can provide you with a forum in answering any questions or getting information on a design.

That's all for now.

Andy

## JULY PROGRAM

### THIS IS A DON'T MISS MEETING.

We have a real treat for you this month. Phillip has arranged for **Brig. Gen. Robert Cardenas, USAF (Ret)** to talk with us about his experiences test flying the **Northrop YB-49** and **N9M**, and as program manager for the **X-1** project when Chuck Yeager broke the sound barrier. Gen. Cardenas will show a short video covering both subjects, and also open the floor for questions after his presentation. This is your chance to get some inside information on the early Northrop flying wing program, so be sure to mark your calendar and be there at 1:30.

Gen Cardenas had a varied Air Force career. He has flown over 30 different types of aircraft, including the XB-45, XP-59, XB-46, XB-48, F-86, and F-105 during the Viet Nam conflict. He has shot down over Europe in a B-24 during WWII. He was also involved in setting up one of the early glider schools at Twenty-nine Palms in 1942.

Barring any further last minute problems, Capt. Roger Flower, USN (Ret) will fly in his Sea Hawker biplane amphibian that was originally planned for last month.

We will also be having a delayed **Sixth Anniversary Birthday Party** with cake and ice cream.

## MINUTES OF THE JUNE 20, 1992 MEETING



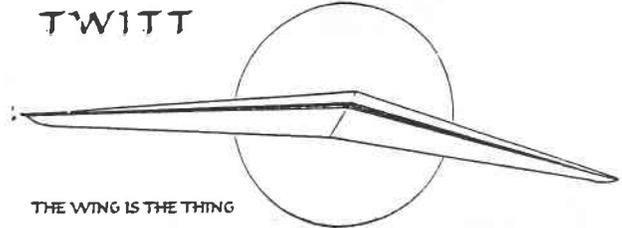
Andy opened the meeting by welcoming everyone, and explaining that the amphibian would not be there due to an emergency in the owner's family. However, there were still several things to cover which would make

for a pleasant day.

The raffle prizes were announced as a video tape of Navy combat aircraft, waterless hand cleaner, an AIM handbook, and an aviation humor book.

Andy announced the winner of the logo contest as being Richard Avalon. He also discussed some of the options available for patches and decals since we now have one.

TWITT



THE WING IS THE THING

Andy then asked if anyone there knew what flying wing was hanging from the rafters of the National Soaring Museum. He had started to answer Phil McCoy's question in the newsletter and then didn't get it completed. So far no one has offered the answer yet, so please help if you know.

**Bob Chase** was then given the floor to tell us about his recent experience learning to fly his Trike. It has been his experience that when you start flying a new aircraft you either have a lot of fun or you learn a lot. In his case he learned A LOT.

When he had first tried flying it, he busted the nose gear. Since then he has obtained some dual Trike time and was cleared to go solo.

He knew the plane was a little out of balance, but due to the rigging he couldn't make the necessary adjustments without a lot of work. He decided to go ahead with the test flights.

After several ground runs and short pop-ups, he took-off for a trip around the traffic pattern. He found it did not want to fly at anything less than about 40 mph, but his wing area should have allowed for a stall at about 20 mph.

In rounding out during the approach, he added a little power to assist and instead entered a high-speed stall. The wing dropped and he again came in on the nosewheel. However, this time it broke off leaving behind the point of a triangle fuselage frame to dig into the dry lake bed. Witnesses indicated he had made three full rotations before coming to a stop.

The triangular shape of the entire fuselage and support framework acted like a roll cage, and Bob came out with only some scratches and bruises, along with being sore for quite a while. The framework was bent up, but stayed rigid enough to keep him secured to the seat and stop the wing from coming down on his head. He was also wearing a polo style crash helmet which provided some additional protection.

In analyzing why it had happened, Bob said the first thing he had done wrong was to fly it in the out of balance condition. He was unable to determine what caused the stall, although he had been warned by some other pilots that this particular wing had a tendency for this reaction.

One other thing Bob said he would change in any future ship, would be to add a curved skid type structure to the nose area so it would slide along any surface instead of

digging in with the collapse of the nose gear.

He had bought his ship to experiment with weight shift controllability instead of having aerodynamic controls thus saving the drag penalties. After this experience, he is going back to a more normal control setup.

**Budd Love** was given the floor to update us on the HIAM's progress. He said that although the Air Force had declined to look further into the concept, his backers, Mission Research Corp., were continuing to pursue other means of promoting it as an alternative to conventional propelled aircraft. They are working a new proposal for NASA, and Budd is optimistic that they will see the value of HIAM for the future.

Andy turned the floor over to **Doug Fronius** who was going to tell us about his recent trip to Egypt and Switzerland. He goes to Egypt as part of his job with remotely piloted reconnaissance drones. This year he was able to stop in Switzerland to fly gliders with an acquaintance.

Some of the more interesting comments about flying in Europe will be related, rather than detailing what was said about the various slides he showed.

Doug mentioned the contrast between aircraft storage here and in Europe. The Europeans use every inch of the hanger, including hanging aircraft from the rafters. Therefore, if you want to fly you must take the other planes out of the hanger in a prescribed order and then put them back before you leave. Of course, the process has to be reversed when you are ready to put your plane back.

He also mentioned that ownership of private aircraft was far less prevalent there than here in the US. Cost of hangering or even tying down is very high, as well as landing fees at each airport where you land, and the fuel is no bargain either. Landing fees are based on the noise level of the plane, so many have very good mufflers. The kicker is that the fee is also predicated on dividing the decibel level by the gross weight of the aircraft.

Glider flying is much easier and cheaper, since it is considered recreational whereas power flying is considered a commercial activity. Many people are flying motor gliders as we would private aircraft due to this difference in operational capability and cost.

Doug had the opportunity to fly a single place ship belonging to his host and partners. One thing he noted was the variation in instrumentation types within the different sailplanes. Some instruments are calibrated in MPH, others in knots, some in meters, etc., whereas, ours are somewhat more standard.

He managed to have a flight of about 1 1/2 hours, never getting above 2000' and having to work in relatively weak lift.

At the conclusion of Doug's talk, Andy conducted the raffle, with Budd Love taking the Navy video, and Andy taking the AIM book. The remaining two items were held over for another raffle.

With that last piece of business completed the meeting was adjourned so those remaining could view a video on the CG-4 cargo glider in operational use during WW II.

## LETTERS TO THE EDITOR

6/18/92

Tailless News Readers



**Guess** what? TN is

not dead after all! John Pool has produced TN #21. They are not as thick as they used to be and no real schedule is in place although I expect #22 to be ready sometime this fall. This is being sent to all who sent me a SASE plus others that I thought had a genuine interest. Postage and duplicating costs are not a real problem, but SASEs save me from hand writing so many addresses...

As always, if you have any info on American activities, pass what you have on to John or myself. By looking over this issue (and previous issues), John gets very little data from the USA. By the way, and data and pictures that I am sent will get passed on to John unless you tell me that he already has copies.

A week ago I received my copy of Tailless Tail, by F. Gale, published by B<sup>2</sup> Streamlines, PO Box 976, Olalla, WA 98359, (206) 857-7249. This is a large publication (8.5X11, 250 or so pages, glued binding) that's loaded with information on tailless designs. Some of it is quite technical. Some data and plans from TWITT and TN are reproduced here. However, it is nice to have this data organized into a single volume. While Mr. Gale is Italian, his English is very good making the chapters easy to read and understand. This book is highly recommended (especially if you like to delve into the more technical aspects of these planes).

Tell next time...

Clark A. Calkins  
1907 Alvarado Avenue  
Walnut Creek, CA 94596  
(510) 939-8153

(Ed. Note: Thanks for the information on Tailless News. TN is a newsletter similar to ours in the type of information it tries to present to its subscribers, although it does seem more geared to modelers. It is completely (and neatly) hand written, so you know it is a labor of love of John Pool. If you are interested in a copy, get in touch with Clark.

Clark's is the second high recommendation of Tailless Tails. Its author has been a member of TWITT for several years and contributed numerous articles, pictures and

a logo. It sells for \$38, postage and handling included (also applies to Canada and Mexico). For other shipping arrangements, contact B<sup>2</sup>.

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6/22/92

TWITT

**Enjoy** the TWITT newsletter greatly and I hope to get out west some day and attend some of your meetings.

Flying wings have been a particular weakness of mine for years - I built many RC models in various configurations. They all flew, once I hit on the proper combination of CG and upsweep in the trailing edge. Enclosed are some photos from 20 years ago of two of my experiments. After you finish with them, please return in the enclosed SAE.

I never had the thrill of flying in a full scale wing, but accumulated over 300 hours solo in various sailplanes - the L-Spatz 55 and the Ka-6 were my favorites.

I also kept up a lively correspondence with some more knowledgeable types like Dennis Harmon, Larry Linville, Al Backstrom, Herschel Smith, and Jim Marske. Fine people, and very good about sharing their knowledge with others. Have lost touch with them all except for Jim Marske and Al Backstrom. If anyone knows the whereabouts of these people, please drop me a line.

I enclosed some sketches & letters from Herschel Smith on his "Angel," a sport flying wing. I'm sure Herschel, if he is still around, would not object to your using it in your newsletter - just give him credit.

Close for now. Keep up the good work!

Alex Rogers  
10660 N. Sundust Court  
Tucson, AZ 85737

(Ed. Note: Thanks for the material. We will try to use some of it in future newsletters.)

Hopefully, someone out there will be able to give you a line on the people your looking for. If you do get back in touch with them, try to sell them on becoming members of TWITT so that we might benefit from their experience in flying wing development. Al is already a member, but we would very much like to get Jim Marske to join, so any help here would be greatly appreciated.)

---

### INFORMATION NEEDED

**Bob** Fronius, TWITT's Founder, along with some other early aviation pioneers in the San Diego area, are trying to get a National Monument established on the soaring sites at Point Loma. He is looking for information and/or pictures of flight activity from the Point Loma area during the period of 1929-30, including any flights of Hawley Bowlus. If

you don't have pictures, but were an eye witness and could provide some detailed accounts of the soaring, that would be great. If you can help, contact Bob at home in the evenings, the hanger during the day, or through the TWITT post office box. Thanks for your help.

---

### LIBRARY ADDITION

**Alan** Lewis of Paddington, New South Wales, has sent us copies of two articles on the Fauvel AV36 as published in Silent Flight, Spring 1992. One is titled "The Fauvel AV36," pages 25-30, which covers the scale documentation for the Fauvel AV36 flying wing sailplane, with some details of the Av 361. The other is "Gordon Waite's Scale AV36," pages 31-34, and covers his 136" or 145" span model of the Fauvel AV36 Flying Wing.

Depending on room and photocopy results, we will try to publish a three-view and one picture from the articles in another newsletter. If you are interested in the information, send \$1 to cover copying and postage and we will get it off to you.

---

### AVAILABLE PLANS & REFERENCE MATERIAL



Tailless Aircraft Bibliography  
by Serge Krauss  
Cost: \$20

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**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.

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Pages 5-9 are the continuation of the "Polish Flying Experience With Tailless Gliders," as published in Technical Soaring, April 1992 Edition, Volume 16, Number 2, pp. 48-55. It is being re-printed with the permission of Technical Soaring.

**Variant III:**

- In steady straight flight aileron deflection (without rudder) led to the following result:
  - small, relatively vigorous nose down pitching,
  - entering a turn opposite to the aileron deflection,
  - banking opposite to the aileron deflection (increasing to steep circling).
- In aero tow small aileron deflection (without rudder) caused slight directional deviation and banking, both opposite to the aileron. Every attempt to correct by means of more aileron only made matters worse. The very poor aileron efficiency made it possible to control the glider mainly using the yaw effect of the slotless aileron.

**General Appreciation**

Variant III, without the central rudder, was considerably more difficult to control in yaw by means of the asymmetric action of one aileron only than the previous variants with rudder or fin. The main reason was the negative aileron moment.

Further development of this variant would have required great improvement of aileron efficiency and elimination of the negative moment.

**3. SZD-13x "Wampir" (VAMPIRE) and SZD-20x "Wampir 2" (figure 8).**

On the basis of the experience gained with "Nietoperz" the SZD factory at Bielsko-Biala returned in 1955 to the tailless concept.

The new model SZD-13x "Wampir" designed by Irena Kaniewska employed the laminar 6-H-15 wing profile. The swept-back wing was arranged in the mid position. Two vertical tail surfaces were installed on the wings.

This design was not actually built but provided many general ideas and technical background for its successor namely SZD-20x "Wampir 2" (Figure 8).

**Description:**

Experimental tailless glider. Mid-wing arrangement. Trapeze planform of the swept back wing. Wooden structure. Fuselage of egg-shaped cross section integral with the wing central portion. The undercarriage comprised main wheel aft of the c.g. and twin nose wheels with solid rubber tires. Towing hook in the fuselage nose. Two part elevator on the wing central portion adjacent to the fuselage. Two anti-balance tabs and rubber cord trimming device. Increased elevator action by means of aileron coupled for pitching with control stick by means of continuously adjusted clutch. The slotted aileron mass balanced, compensated, with no differential. Two considerably swept back vertical tail surfaces installed at 70 percent of wing semi span. Air brake located between the vertical tail surface and elevator.

**Special Features:**

- Unconventionally small wing/ground clearance. The wing tip to surface distance was 53 cm only, corresponding to 4 degree bank when touching the ground.
- Outstanding elasticity of the wing. The eigenvibrations of frequency 128 per minute gave the period of 0,47 sec.
- Inverted elevator deflection when compared with standard sailplanes. With the stick pulled back, the elevator is deflected downwards but the glider response is correct i.e. the fuselage nose lifts above the horizon (Figure 9).

**Flight testing**

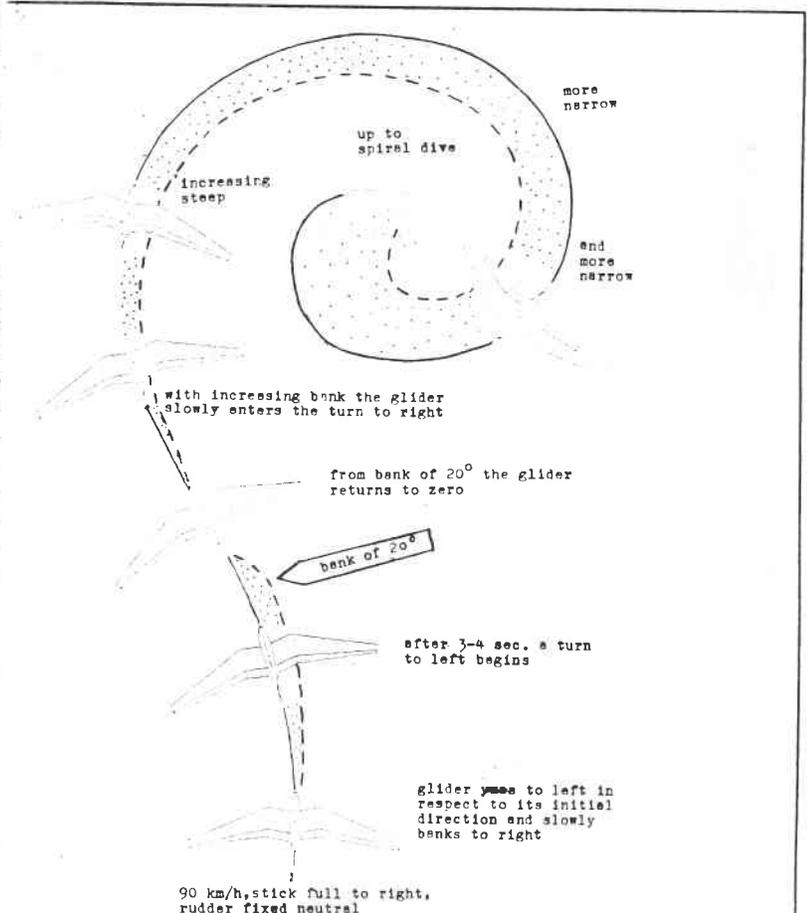
Before the first flight, several short hops free of towing airplane turbulent wake were necessary. With respect to the small wing tip to ground clearance, a concrete runway was selected. Motor car take off using nylon launching cable of 50 m length was chosen. To test this take off method (at this time not popular in Poland), initial launches were performed on a "Mucha 100" glider having a similar all up mass.

For the first flight of "Wampir 2" the c.g. location was 27 percent of standard mean chord. The aileron was adjusted as combined with elevator.

The glider became airborne at about 60 km/h airspeed. 14 motor car launches were made to an altitude of about 10m to check control, air braking and landing, before the decision of aero towing was taken.

The first surprise appeared in the first aero tow at a few meters of altitude the glider began to oscillate in pitch, maybe as a result of moderate turbulence. It was difficult to hold the stick against the movements. The pilot's safety helmet beat against the canopy forwards and backwards. Disconnection of the aileron/elevator coupling did not eliminate the pitching. When a safe altitude was attained, the pilot got some degree of familiarization. In every case it was possible to retain the necessary height distance above the towing aircraft turbulent wake. At 1800 m and at 110 km/h airspeed this height margin was slowly reduced and when the glider entered the airplane wake it sank into it briskly. The towing cable swung dangerously above the wing, so it was necessary to release.

In free flight the glider flying behavior was found to be



**FIGURE 7. SZD-6x. Glider response on the steady full aileron deflection to right (rudder fixed).**

satisfactory. When the aileron/elevator coupling was disconnected, the control sensitivity decreased but the stick had to be pushed nearly fully forward. Extending air brakes tended to stall the ship.

The first stalling test was carried out at an airspeed of 56 km/h. In stalled condition control was lost, the glider made a flat half turn to the left and then pitched down below the horizon.

At low altitude the sensitivity came back in the gusty conditions. The landing was performed on the concrete runway using careful air brake action.

The next take off was for the transportation flight from Katowice to Bielsko Biala (about 50 km distance) which finished with a safe landing on the grassy surface.

In the course of flutter testing the exceptional sensitivity of the glider in even small air turbulence was confirmed and found to be worse than that of "Nietoperz."

The short period oscillations, shorter than 1 second could not be measured with a stop watch or controlled by elevator action, since after some time they returned automatically. Apart from these oscillations "Wampir 2" also performed phugoids of 1/2 to 1 minute period (calculated value of 22 sec.).

Entering the towing airplane wake was tested many times and after some practice it was possible to pass through this zone. It was easier to do this in the upward direction. The glider lifted the nose itself but it was necessary to pay attention to the towing cable which swung freely above the wing. If it struck the wing, a rough rather brutal pull out would be necessary to avoid getting too low.

One of the stalling tests for c.g. location at 23,5 percent of standard mean chord ended with an unintentional spin. After one turn to the left the glider nose dropped below the horizon but the flat rotation remained. Recovery action, taken at once, had no effect. Additional impulses with controls and air brake had no appreciable effect. After a few turns in about 10 seconds the glider slowly pitched nose down and allowed recovery. Unfortunately, these characteristics could not be tested more.

In spite of the difficult flying characteristics, 14 high altitude flights were completed and allowed the pilot to gain some experience. The c.g. locations varied between 21,5 and 27 percent of standard mean chord.

The last flight in which the glider was completely destroyed in a surprising manner, was described by the pilot in the following way:

"As in the previous flights on this day (October 6, 1959) I found favorable smooth air conditions in the whole altitude range. No clouds in the sky, zero wind, very stable air...just after releasing the towing cable at 1500m altitude, I wanted to glide through the towing airplane turbulent wake to test the ship properties in this "artificial turbulence." Sudden strong pitching oscillations of less than 1 second period took place. After 1 minute this turbulent zone disappeared and in the smooth air no other turbulence could be found. I began to test the lazy eight. Increasing the airspeed on the glide I entered a climbing curve. In every test I increased the initial airspeed step by step. The critical case took place at an altitude of 1200 m about 3 minutes after release. Shortly after the last controlled airspeed indication of 140 km/h, attained for the first

time on this ship, there started a pitching impulse, the same as encountered in turbulence but very sudden, similar to the motor car reaction when at full speed on an asphalt highway it would pass into a grassy surface. The swing instead of being damped began to grow rapidly.

In sympathy with these swings my body was subjected to increasing periodic loadings of 1/2 to 1 second period against which, in spite of very well fastened safety harness, I was completely helpless. As a passive component of this vibrating system, I was periodically pressed into the seat and pulled upwards into the back belts with increasing brutality leading to loss of consciousness. My senses registered an increasing flutter noise.

After a few (5-8) swings, only a few seconds after this situation started, while being subjected to the high loadings, I suddenly felt a boom associated with the load being released. The rhythm was broken in a moment. The glider entered an inverted flight path similar to that of negative looping. It was not necessary to jettison the canopy since it went off before I noticed what happened. I released the safety belts and with a great force I was thrown out..."

The above is the report of the pilot who safely landed with the aid of a parachute but owing to suspected internal injuries and visible blood effusions—probably as a result of reciprocal loadings—he was placed under medical observation for a week.

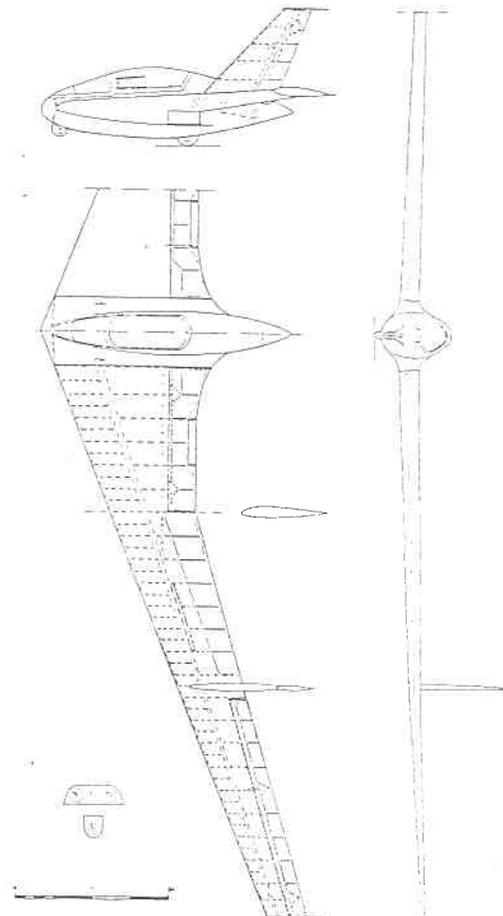


FIGURE 8. SZD-20x. Wampir 2 designed by Jan Dyrek, 1959. Maiden flight, Katowice, 1959 by test pilot Adam Zientek.

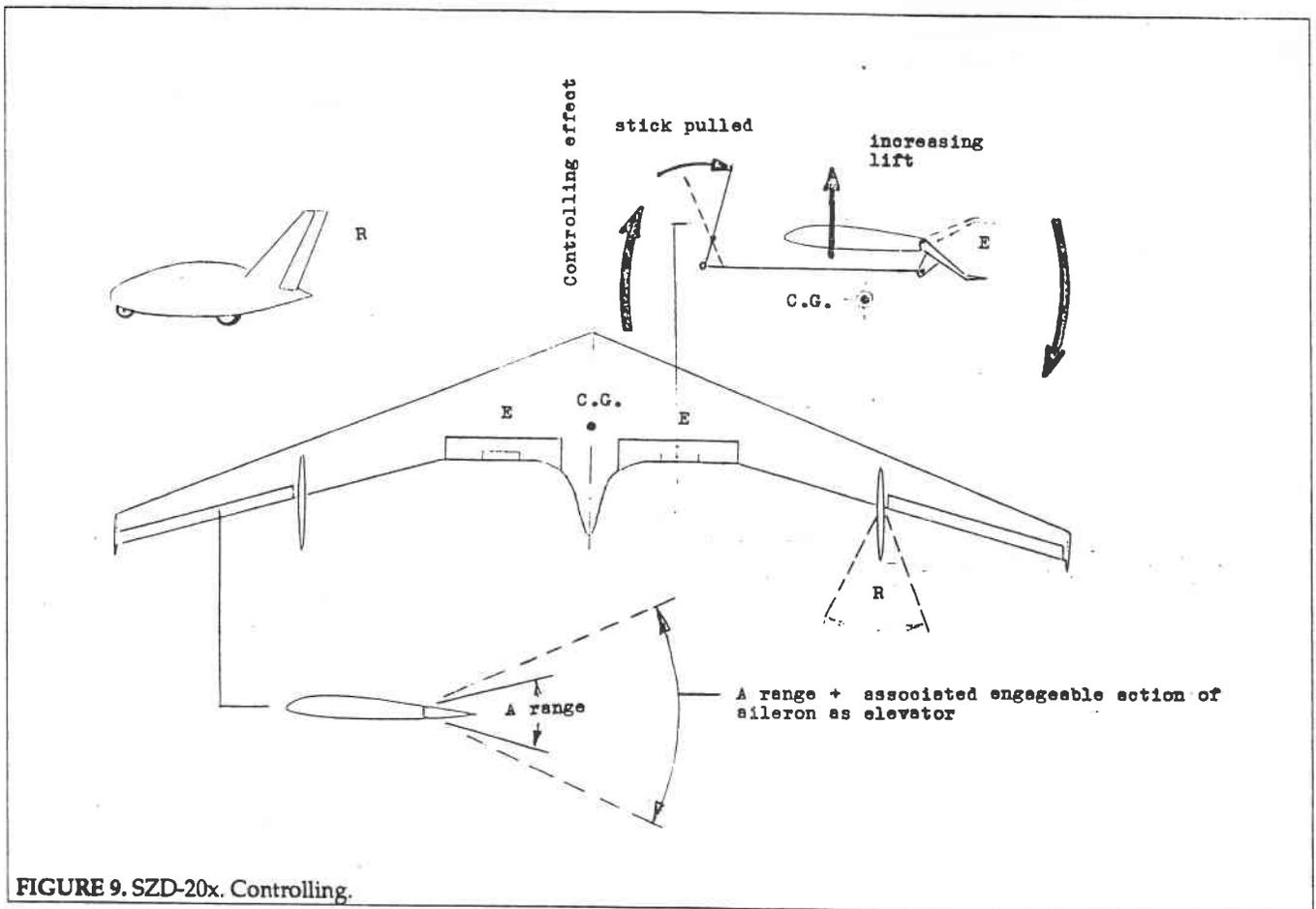


FIGURE 9. SZD-20x. Controlling.

As a result of oscillation induced resonance, the mass and force impulses rapidly increased in amplitude leading to the collapse of the ship. (See Figure 10). From the very careful investigation the following hypothesis was derived:

Both damaged parts (left wing separated, right wing with fuselage) dropped down together, and collided in the rotation. At this moment, the canopy was destroyed (yellow lacquer spots on parts of the canopy perspex and on the pilot's helmet were found) as a result of contact with the left wing. Then both destroyed parts of the damaged glider turned together and finally dropped on the ground (Figure 11).

**Summary of the flight experience**

It was found that the tailless glider experiences a tendency to short period oscillations. Therefore, it is difficult to fly even in the weak turbulence to be encountered in thermals. The flow disturbance on the swept back wing leads to rather great variations of the trimmed flight conditions. Moreover, when the eigenfrequencies of the wing and short period pitching oscillations are coupled the case should be investigated very carefully.

**4. AV-36 CR**

In 1961 the SZD factory bought the French flying wing AV-36 CR constructed in Oberlechner factory in Austria to carry out a short test program. This ship was the developed variant of AV-36 "Monoblock" designed by Charles Fauvel (Figure 12).

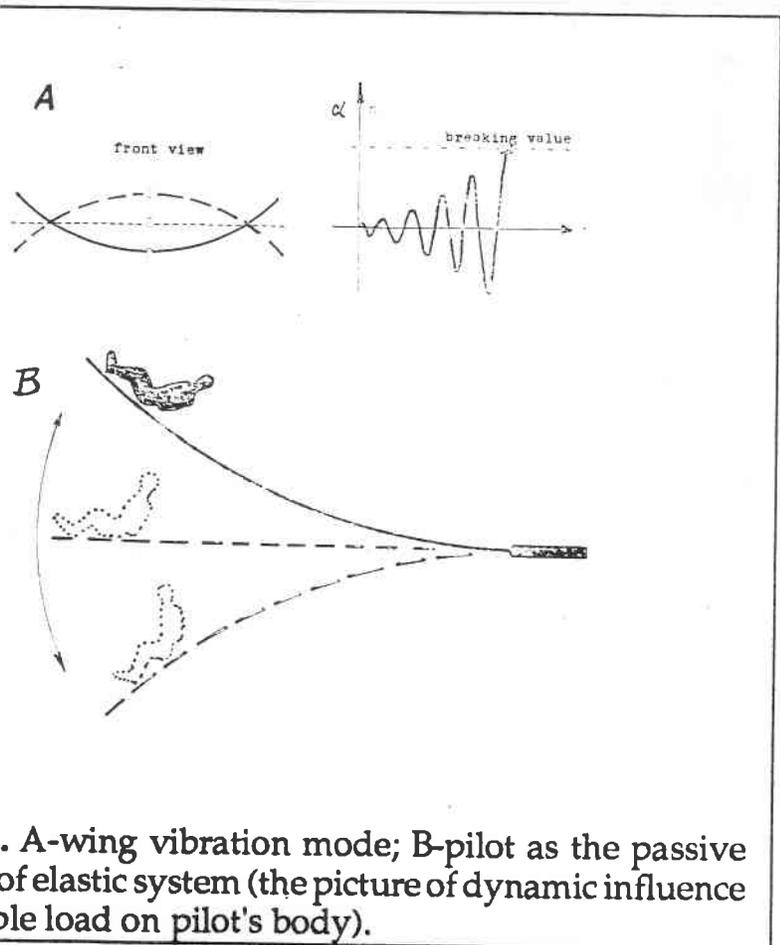
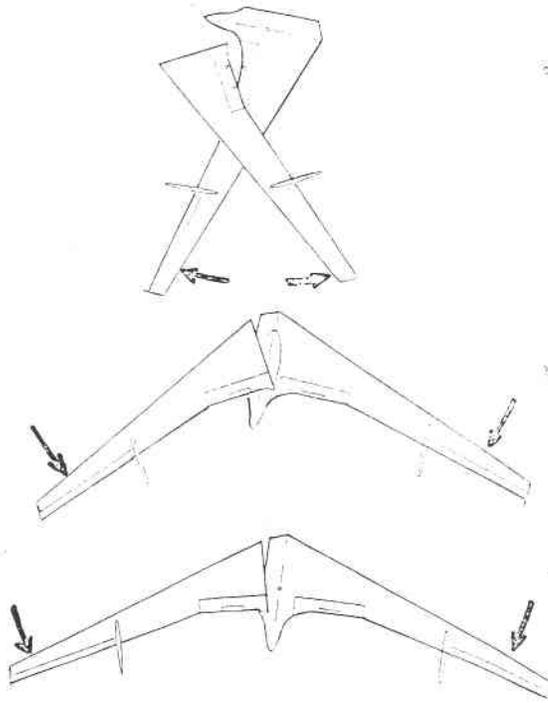


FIGURE 10. A-wing vibration mode; B-pilot as the passive component of elastic system (the picture of dynamic influence of the variable load on pilot's body).



**FIGURE 11.** SZD-20x. History of damage: a). Both parts begin to rotate one onto another; b). Left wing root end destroys the canopy; c). Further collision of both parts of the wreckage.

Contrary to both SZD designed tailless models AV-36 CR as all Fauvel's types has an upswept wing. The self stable F2 wing profile has the S-shaped camber line. Characteristic is its integral design with one piece wing. For road transportation only the fins and rudders are (on both wings) removed. The ship was then only 2,4 m long and could be installed on the trailer laterally.

The twin fins and rudders work similarly to those of the "Wampir 2." The elevator and aileron deflections are arranged in the conventional way. The flight properties of AV-36 CR in smooth air are conventional. The pilot has a feeling it is not a flying wing. Interesting is the fully controllable "stalled flight" without nose dropping. Spinning is impossible in the allowed c.g. range. In the towing airplane wake AV-36 CR reactions are like those of a conventional glider with tailplane. In gusty conditions the special tailless characteristics appear, namely the short period oscillations that create some problems in thermal flying. The flying properties of AV-36 CR are comparable to those of "Grunau Baby Class" today rather poorly known.

Now the ship, fully airworthy, is owned by the Student Flying Club of Technical University, Warsaw.

## 5. CONCLUSIONS

All three tailless models tested by SZD belong now to history. None of them would now comply the requirements concerning flying properties or have a satisfactory performance level.

The rapid development of conventional sailplane designs has rather pushed aside the tailless concept. However, against this priority of conventional ships there has come the brave creation of modern tailless models like the SB-13.

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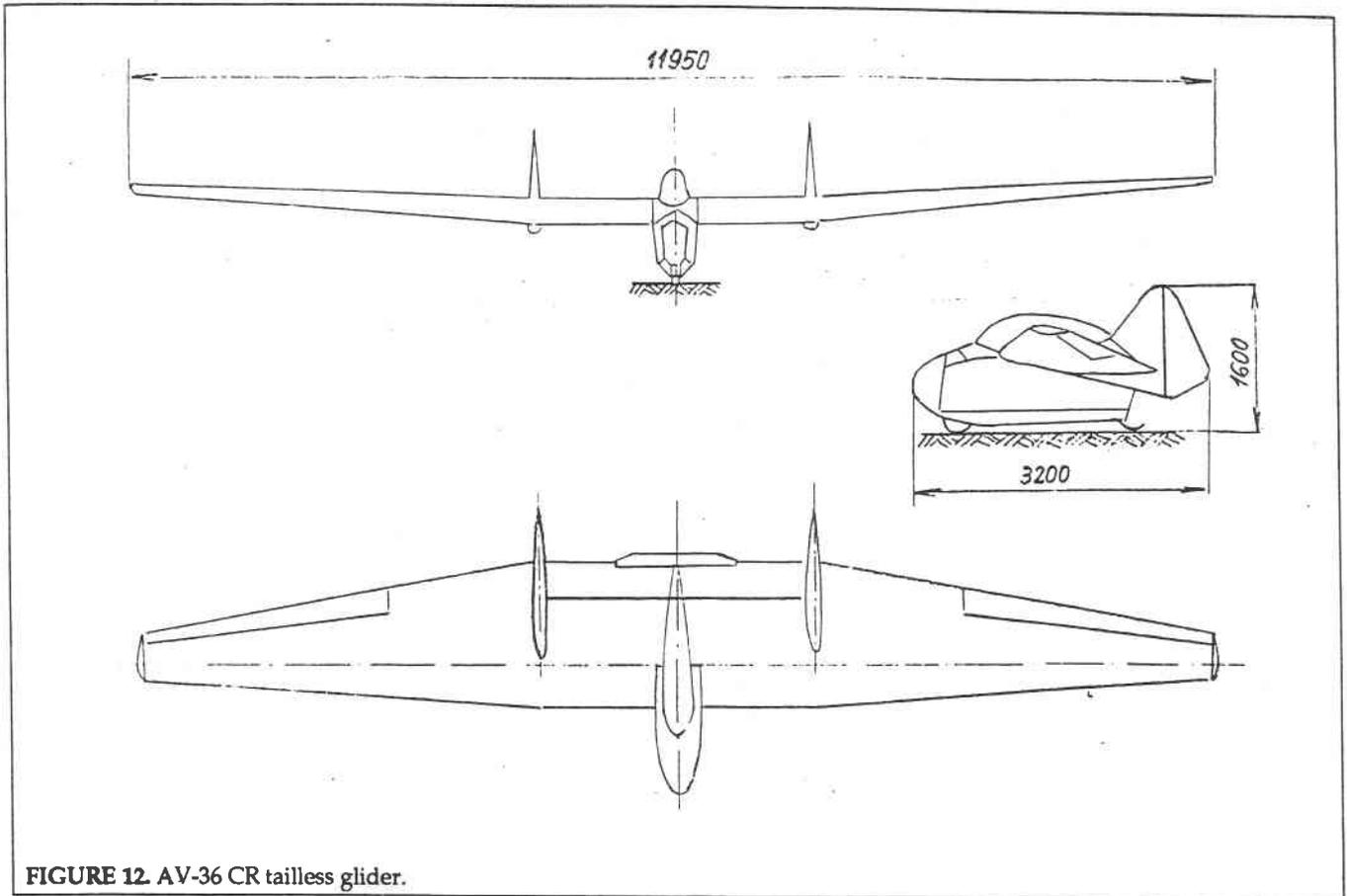
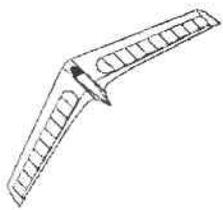


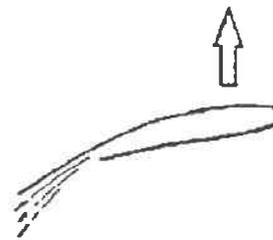
FIGURE 12. AV-36 CR tailless glider.

MODEL WINGS



The cover of the July 1991 issue of RCModeler features a flying wing called the "Stealthbat" offered by Wing Manufacturer. There was no price listed, but they can be contacted at:  
 306 E. Simmons  
 Galesburg IL 61401  
 (309) 342-3009  
 Catalog: \$4.00

Tower Hobbies carries the Future Flight Klingberg Wing kit for \$39.99 (item #TE1130) and the Klingberg Wing 100 for \$149.99 (item #TE1131). They can be contacted at:  
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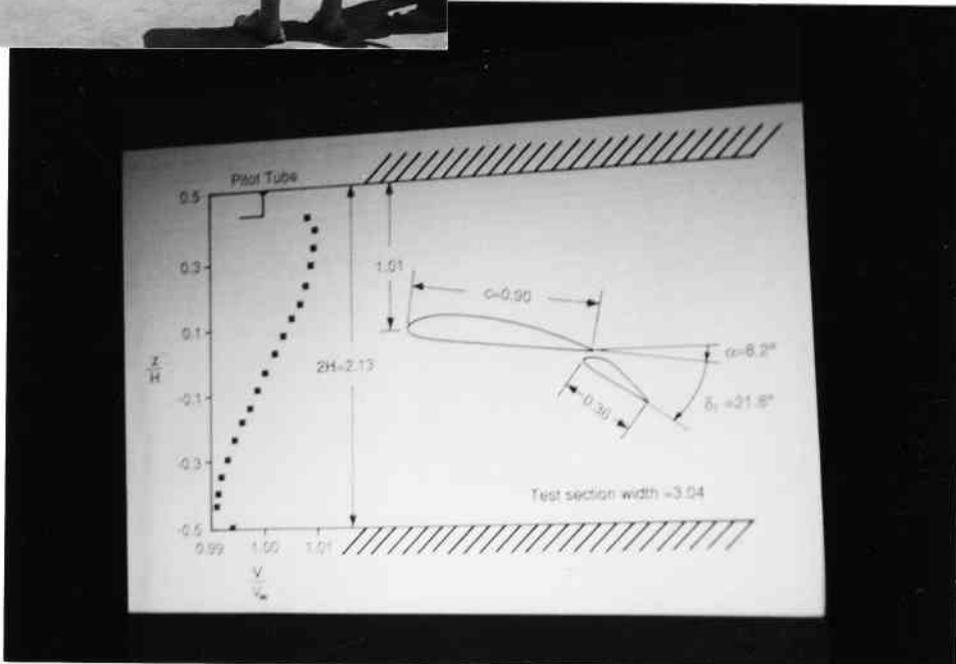



(Above) Dr. Joe Katz, Professor of Aerodynamics, San Diego State University, explaining the wind tunnel schematic seen better in the picture below.

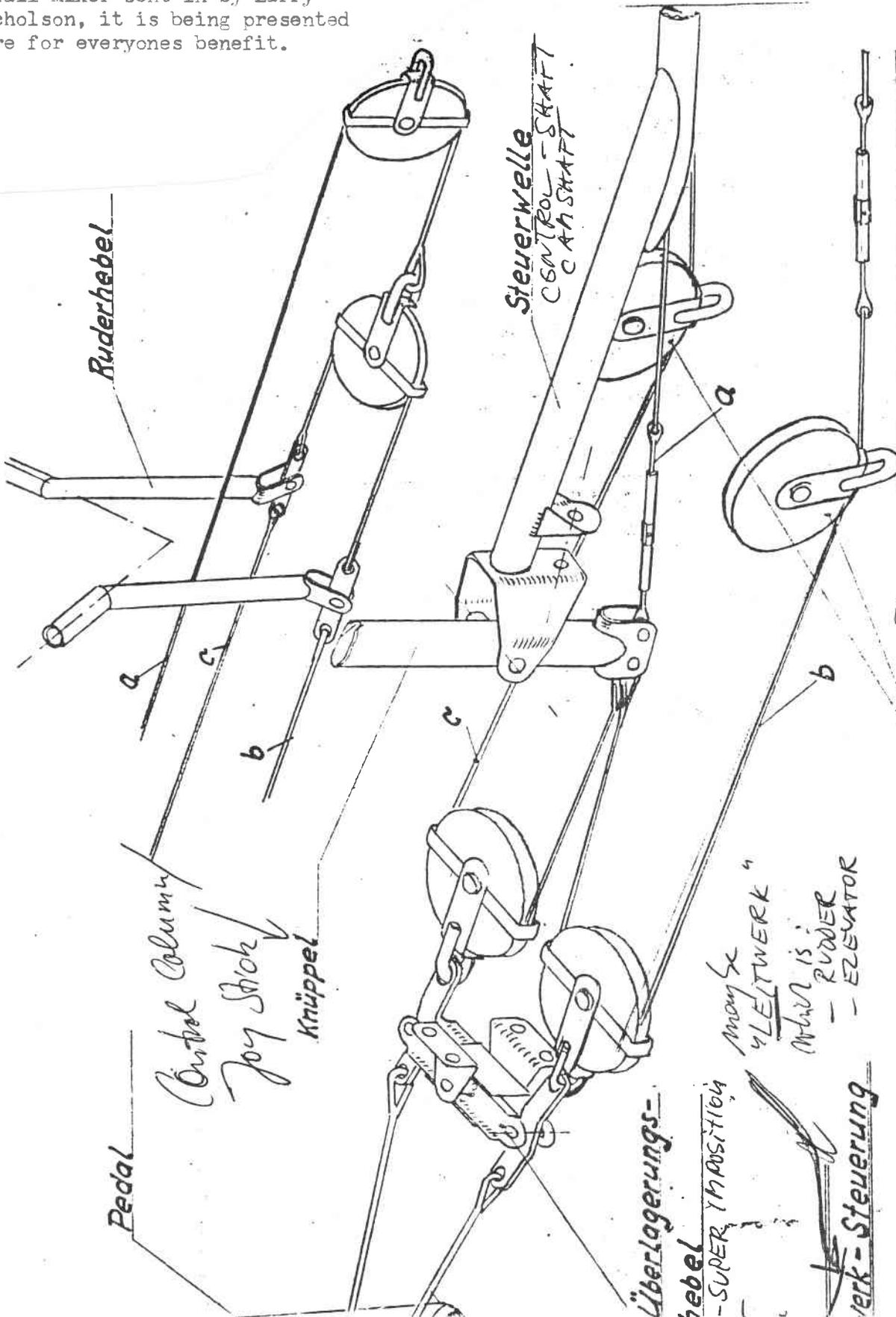
Dr. Katz's presentation was made during the May 1992 meeting, and covered computer simulations of wind tunnel testing.



Julio Paredes' MiniBat being assembled before the May 1992 meeting. It is extremely light and most pieces can be carried by one person.



Since we had the space, and Lewis Dewart asked for a copy of the V-Tail mixer sent in by Larry Nicholson, it is being presented here for everyones benefit.



Steuerwelle  
CONTROL-SHAFT  
CAH-SHAFT

Ruderhebel

Pedal  
Control Column  
Joy Stick  
Knüppel

Überlagerungs-  
hebel  
-SUPERIMPOSITION  
werk - Steuerung

Momente  
LEITWERK  
WHEEL IS:  
- RUDDER  
- ELEVATOR

Sent  
to me by  
Bob [unclear]

entfällt bei Ka 3  
not existing at Ka 3

|               |                           |
|---------------|---------------------------|
| Rudolf Kaiser | Waldsachsen b. Coburg     |
|               | Segelflugzeug             |
| gez.          | Steuerschema Ka 1<br>Ka 3 |
|               | CONTROL-SCHHEMA/Antrieb   |