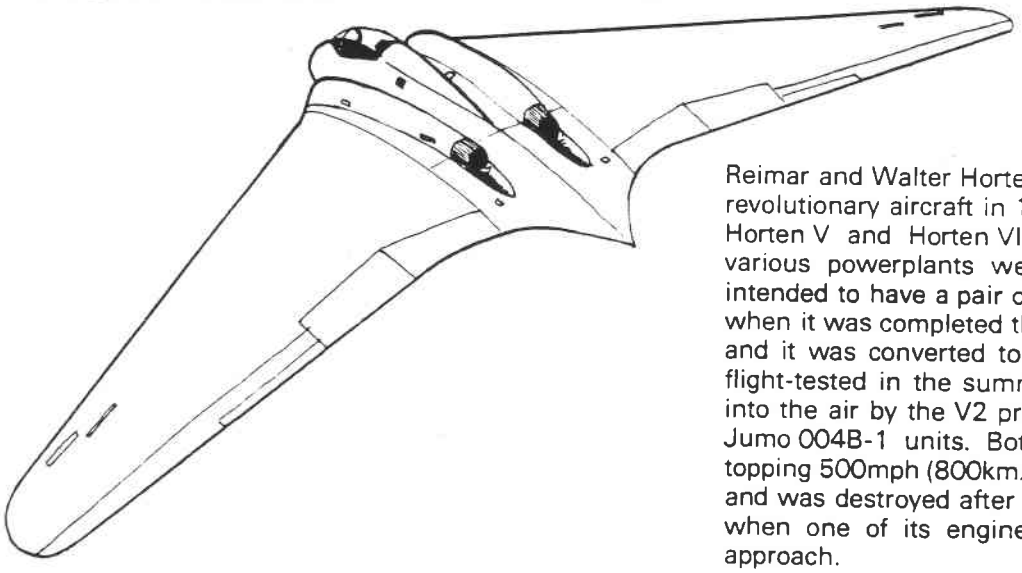
No. 57 MARCH 1991

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

## Horten Ho IX



Reimar and Walter Horten started design work on this revolutionary aircraft in 1942, developing it from their Horten V and Horten VI. Four prototypes based on various powerplants were proposed. The first was intended to have a pair of BMW 003A-1 turbojets, but when it was completed the engines were not installed and it was converted to fly as a glider. Successfully flight-tested in the summer of 1944, it was followed into the air by the V2 prototype, powered by a pair of Jumo 004B-1 units. Both flew successfully, the V2 topping 500mph (800km/hr). But then the V2 crashed and was destroyed after only a couple of hours' flying when one of its engines stopped during a landing approach.

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., 9103 means this is your last issue unless renewed.

**Next TWITT meeting: Saturday, March 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**

Subscription Rates:
$15 per year (US)
$19 per year (Foreign)
Information Packs: $ 2 (includes one newsletter)
Back Issues of Newsletter: $0.75 each



**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

I am not going to say much this month since there is an awful lot of good information to get published.

As you can see from the minutes, the January meeting was quite a success. The February program promises to equally good. Bob is trying to cook up a surprise meeting location for us in the future, and if it works I know those of you who attend will enjoy it. So, stay in touch on this one, and we will announce it in big type.

That's enough whetting your appetite.

Andy

## MARCH PROGRAM

The March program will be centered around the models and ideas of Jerry Blumenthal, whose designs have been seen on the cover of the newsletter on many occasions. He has many more that have never been shown before, and he has agreed to spend the day explaining his thoughts behind many of these unique aircraft designs.

These kinds of meetings are always very interesting, since the group will be asking a lot of questions which will lead to many theoretical discussions on the hows and whys of the aerodynamics of Jerry's designs.

## MINUTES OF THE FEBRUARY 16, 1991 MEETING

The meeting was opened by Andy asking if anyone had comments about the Board of Directors minutes or whether there were any questions on what we have planned for the future. There were no comments from the floor, so at this point we will continue with the program as outlined in the minutes.

Andy asked if the members would save any foreign stamps they might receive so we could give them to Philip Burgers. He is starting a stamp collection for our young TWITT, his son Francisco. We had a good group of stamps on the letter from Peter Selinger to add to the collection.

Bruce Carmichael introduced Dr. David Marsden from the University of Alberta in Edmonton Canada who is with the Department of Mechanical Engineering. They operate the world's longest low turbulence wind tunnel. He has also designed and built several sailplane, which he discussed later in the meeting.

Andy introduced L. Pazmany who was going to tell the group about his latest project, a 3/4 scale version of the Fiesler Fi-156 "STORCH" which he calls the PL-9 "STORK." He brought along a mockup of the cockpit section

that had been made out of standard PVC pipes.

Paz began by showing a series of overheads of the original Storch from which he developed his design. Rather than relate bits and pieces of what he said, we have published elsewhere in this issue Pazs' three view, a table of comparative data, and a summary of the project which includes some of the specifications. For those of you who may be interested in this project, and would like to hear all of what Paz had to say, we will be glad to send you a copy of the tape covering his portion of the program (over 90 minutes) and Dr. Marsden's. (The entire program takes two 90 minute cassettes.)

Paz also brought along a video tape of test flights performed on the Storch by the U.S. after the war. The performance with a 240hp engine was quite impressive, even with two people on board. It was capable of taking off and landing in extremely short distances, and maneuvering in very small areas.

Paz commented that he is going to attempt to reduce the development time for this design by hiring consultants and engineers to perform some of the test work. However, he noted that in order to do this it will require some advanced orders from those who have or will have a great interest in this project.

After Paz completed his excellent coverage of the design, Andy asked to group to offer their comments on the Kuhlman designs included in the newsletter. As it turns out there is no need to send a tape to the Kuhlmans, since everyone seemed to agree that they had solved most of their own problems.

It was noted that the construction they were using did not include the use of spars. Bruce Carmichael commented that the WindRose sailplane, which had glass spars, found that there was foam compression between the spars. The fix was to place vertical dowels between the spars at about four inch spacing, which prevented the spars from moving towards each other and compressing the foam.

There was one question concerning the actual wing span of the model. The drawings included in the newsletter showed a half-span dimension of 134.5 units, but there was no indication of what scale these numbers represented. Perhaps $B^2$ would enlighten us on just how big the model really is.

It was the consensus of the group that they were on the right track and TWITT had no fabulous input that would give then a sure winner.

Bruce then reintroduced Dave Marsden, who graciously consented to give an impromptu talk on some of the projects he has been, or is currently, involved with. He began with a discussion of wingtip modifications including winglet configurations. Induced drag measurements of various tip configurations showed that the squared-off tip had the best overall results when compared to a Horner tip or an original tip. The variations in performance were within several percentage points of each other so it really didn't make much difference which tip was used.

However, there was approximately a 22% gain from the winglet configuration. His task was to try and improve on this, which he has managed to do by achieving about a 30%. This has been accomplished through placement of another smaller winglet on the inside and ahead of the main winglet, like a leading edge slotted flap. (Two vertical surfaces at the tip, versus one.) The additional surface is about half the size of the normal winglet.

There was a discussion on the vertical angle of the winglet surfaces, with it being decided that the almost vertical position produced the best results without any additional increase in span.

The winglets do redistribute the span-wise loading of the wing. This also has an effect on the root bending moment. The discussion went on for a few minutes covering various theories about the overall effects on performance due to these factors.

Jack Lambie offered the explanation that the winglets acted like the sails on a boat. As the wind hits the winglet at certain angles it produces some forward propulsion. He tells people that his winglets begin this action at about 60 mph, and that spoilers have to be used to slow the glider down due to this added thrust. (You got to love this guy's theories.)

Ralph Wilcox explained that some civilian aircraft, like the Bonanza A-36, have had significant gains with the addition of winglets. Dave added that winglets on a Cherokee resulted in a 28% increase in the rate of climb and an 11 mph reduction in the indicated staff speed. Ralph also noted that many of the new commercial aircraft coming

out now have winglets, therefore, they must have some significant positive effect on performance. (The discussion went on for another 10-15 minutes. If you want more information on winglets and their relationship to performance, send in a request for a tape of this part of the meeting. $4 should cover the cost of two tapes, a mailing package and postage.)

Bruce asked Dave to talk about building very light, high performance aircraft. Dave told the group about his experiences with developing a 6 lbs per square foot sailplane. The idea was to come up with a 100 lb aircraft to meet the Canadian hang glider rules. What they have so far is a 20 lb fuselage and they are expecting the wing panels to weigh in at about 25 lbs with a 50 square foot area (about 30' span, 19" mean chord).

The wing has a straight taper with a standard plan form and aspect ratio of about 19. The fuselage has a "V" tail at a 45 degree angle. He anticipates about 30:1 L/D.

Dave went on to talk about the British Sigma project from a few years back. This was a variable geometry wing aircraft with an aspect ratio of 36. He felt it didn't work very well due to the flexibility in the control system that created difficulties. The aircraft had a 21 meter span, weighed in at 1325 lbs (empty), a 900 lb wing with a 360 lb center section, and a 450 lb fuselage. It took two hours and three men working hard to rig the aircraft for flight.

Dave submitted a proposal to the British in reply to their request of what to do with the sailplane. They like his ideas and gave him the plane.

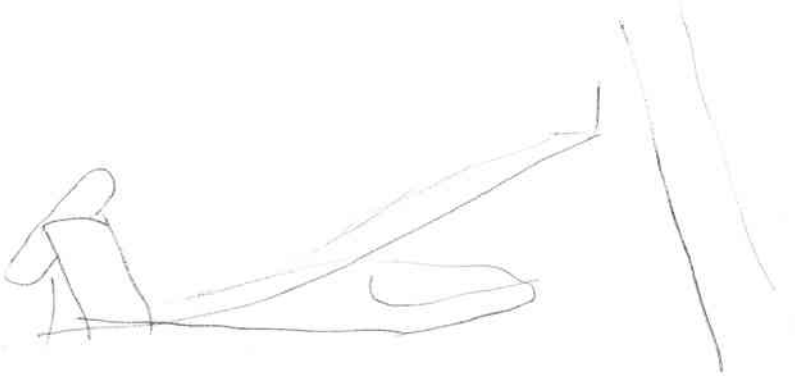
He replaced the flaps with slotted flaps that would run out on tracks. He replaced the cabling that drove the flaps with a torque tube arrangement similar to the Blanik. The outer 12' of flap were also hinged to act as ailerons, with the inner portion being able to achieve 80 degrees for landing flaps. He managed to get the roll rate to about 5 seconds on a 45 to 45 roll, and a stall speed of about 39 knots. The performance was very good, except in tight, weak thermal.

Since he has another plane to fly, and was having trouble with the aviation authorities, he has not done much more with it. (We have included some diagrams and data on the Sigma elsewhere in this newsletter.)

Bruce then asked Dave to talk a little about the low turbulence wind tunnel. It is a closed return tunnel, 75' long, on two floors of the building, with a 4' by 8' cross section and a 35' long test section. It has a 8:1 contraction ratio. The air goes through a settling chamber after leaving the fan, then passes through a set of three very fine screens, and then enters the contraction chamber. This speeds the flow up and squeezes it down to a nice uniform flow. The turbulence level has been measured at less than .1% (this is the mean free deviation of turbulent motion compared to the speed of the tunnel).

If you look at the data concerning the transition from laminar to turbulent flow, you find that if the turbulence level is less than .1% it shouldn't have any affect on transition. The results from this tunnel are coming out remarkably close to theory, they are seeing many laminar flow bubbles.

He has been using one meter chord section test sections. The sections are mounted vertically in the tunnel, giving them a 4'



Dave Marsden's 15 meter "SPECTER" sailplane.

length. They have primarily been testing airfoils operating at low Reynolds numbers, between a half million up to 2 million (this is the max for the tunnel.) One project they worked on was the modification of windmill blades so they would not be so sensitive to bugs.

Another project recently was a group of speed skiers (snow) who were looking for the best tuck position to achieve the lowest drag configuration. They were able to give them a real time readout of the drag levels as they changed positions in the air stream.

The tests on wing sections contain pressure tapes chordwise on the wing that feed information to a Scani Valve which activates transducers. They measure drag with a weight rake.

We all thanked Dave for his presentation. Before Andy closed the meeting Jack Lambie told us that Paul Bikle had passed away recently. Jack related several short stories of Paul's exploits over the years as a competition pilot. Paul piloted sailplanes and held the world's altitude record for soaring, 46,267', for more than 20 years. He was the Director of the Dryden Flight Research Facility at Edwards Air Force Base from 1959 to 1971, overseeing projects like the X-15 and XB-70. Jack read a tribute called "When a Pilot Dies," which he wrote as a result of Paul's death, and those of several others involved in the aviation family over the past several months.

==========

LETTERS TO THE EDITOR

SB 13 (Photo by Peter Selinger)

Dear Bob (Fronius): 2/10/91

Thank you for your short note in asking for the SB 13. You will find enclosed three color shots of the SB 13 made this past summer in Aalen-Elchingen during a test-flight period on this airfield, 120 km northeast from Stuttgart.

Here, every year in the summer, the German Akafliegs belonging to the IDAFLIEG held their flight evaluation test program in flying all available old and new sailplanes and motorgliders Mostly you will find there the newest types being tested in their characteristics and flight performances. Also the Akafliegs own constructions being flown there, and also this time again the SB 13 to look for further improvements in flight handling characteristics.

Standard configuration now is one boundary layer fence on each side of the wing. But they also looked for the alterations being induced by three fences on each side. But this had no better results, so they will fly again with only one fence.

Now five pilots of the Akaflieg Braunschweig are allowed to fly the SB 13, so the first critical stages of evaluation are passed. But they say that the SB 13 will never be a club sailplane. I hope that they will compete with it one day in the German Nationals.

In my opinion there are three main results now:

1. The flutter problems of such a difficult shape were solved with HM-fibers and a very clever art of building it, in layers of rovings for the spar, and webs for the shell of the wing within each other.

2. They proved to build with HM-fibers and got the certifications for this experimental sailplane as the first step for general use.

3. It is possible to fly such a configuration with sufficient characteristics and very good

flight performances.

Only an Akaflieg could perform this and this is one of the most important values of the Akafliegs, to test things with less demand for economical restrictions.

I hope you may be satisfied for the moment with this not very hard information.

Best regards,
Peter (Selinger)

*(Ed. Note: Thank you for the photos, one of which we have used in this newsletter.)*

---

TWITT 1/23/91

My subscription renewal has been sent today by means of an international money order from the local post office.

As a modest contribution to TWITT NEWSLETTER, I am sending you the sketches of two remarkable tailless flying models, built by a friend of mine, Gianni Diano (Via Giacomo Puccine 13, Viadana, MN, Italy): The DG 60 RONDINE II (SWALLOW II) and the DG 87 Delta Condor.

The former is a contest winner free flight glider he built in 1950. The latter is a powered aerobatic model, perhaps the first one (at least in Italy) which tries to reproduce the STEALTH bomber: it has been built when very little was known about this magnificent tailless.

Best regards,
Gale'
(Dr. Ing. Ferdinando Gale'
Via Marconi 10
28042 Baveno NO
ITALY)

*(Ed. Note: Thank you for the contribution, none of which we consider modest. All are most welcomed, since we have such a broad spectrum of members with interests in all sorts of tailless designs. We will try to publish at least one of the models in this issue.)*

---

TWITT 2/1/91

Enclosed is our check for membership renewal. We still think our TWITT membership is the deal of the century!

$B^2$ (Bill & Bunny Kuhlman)

*(Ed. Note: We appreciate the compliment, and are sorry that the group was not of more help with your Penumbra projects. We will be looking forward to hearing the final results of all your hard work.)*

---

The following information was extracted from an article in Aerospace Engineering, February 1991, titled "Subsonic Transport Aircraft for the 21st Century," written by Jerry T. Callaghan and Robert H. Liebeck of McDonnell Douglas Corp. It is "Reprinted with permission © 1991 Society of Automotive Engineers, Inc." It was sent to us by Karl Sanders, and is being reprinted with the permission of the publishers. Karl commented that Liebeck is know for his airfoil research!!!

"Researchers examined a blended wing-body/span-loader, called the MD-BWB, as an example of a revolutionary concept for a large transport airplane. They foresee that the technology, which would be an extension of that developed for the B-2, will be well-established by the turn of the century. The design will include a fully augmented flight control system and two VHBR engines embedded within the wing-body structure.

"The MD-BWB (see Figure 4, page 6) was sized for the same mission as the AD and STT airplanes. Structural and system weight improvements were assumed to be the same as for the STT, and LFC and riblets were included on both upper and lower surfaces of the airplane. Comparison of the MD-BWB with the STT indicates a moderate reduction in takeoff gross weight and a significant reduction in fuel burn per seat-mile. This appears to be a consequence of the almost 50% improvement in L/D, which permits the engines to be reduced from three to two of the same thrust. This should also reduce direct operating cost.

"Researchers point out that the dramatic configuration change of the MD-BWB yielded improvements over the AD that were surprisingly low when compared to the improvements offered by the STT, which were based solely on existing technologies. This may be explained by the fact that the design of this class of airplane is embryonic; a careful and detailed development would likely

provide a further increase in performance.

"Because the MD-BWB configuration is a revolutionary concept and still in an embryonic stage, researchers feel that the depth of the present study was insufficient to offer the results with a high level of confidence. However, they agree that various classes of revolutionary configurations should be examined in more thorough studies."

Figure 4. Three views of the blended wing body/span loader.

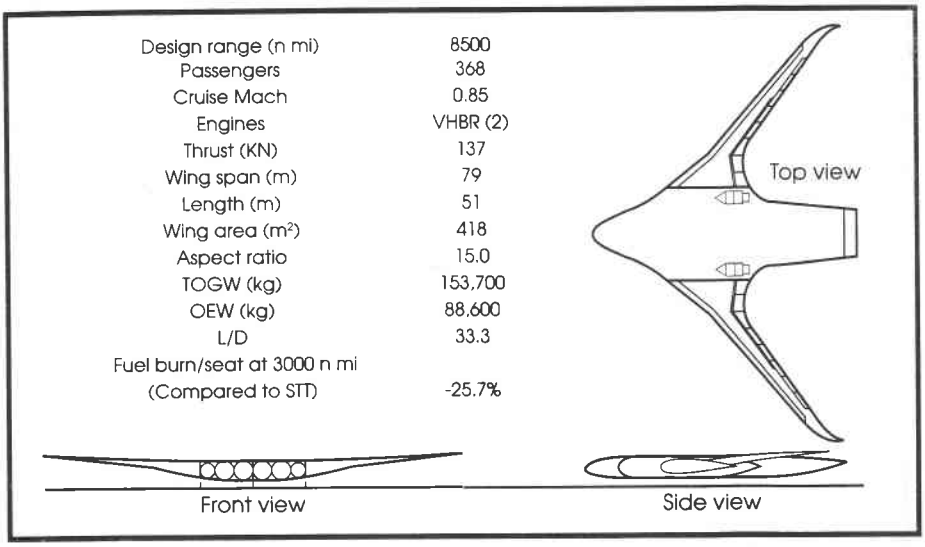
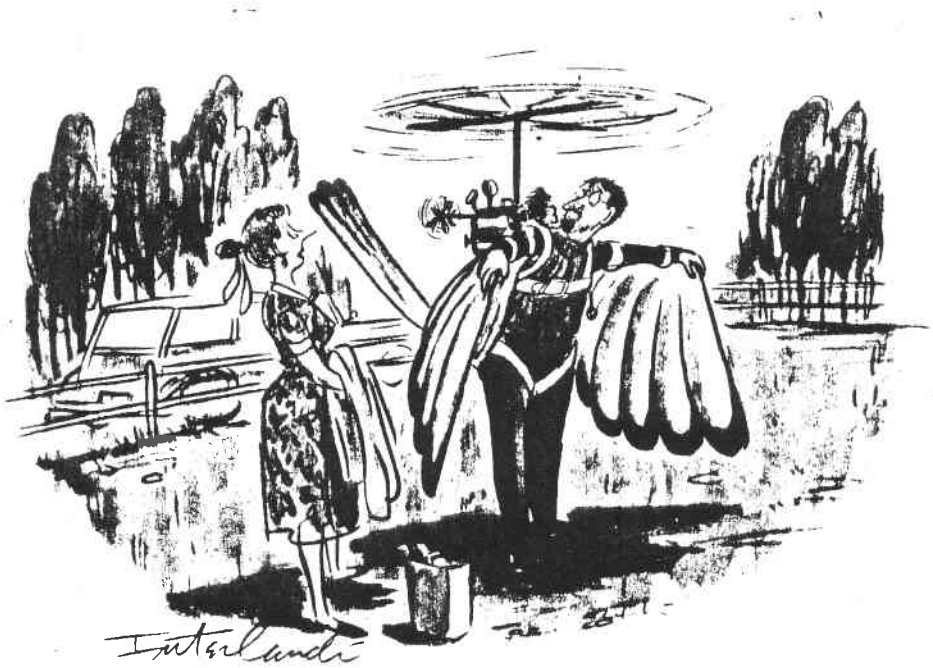
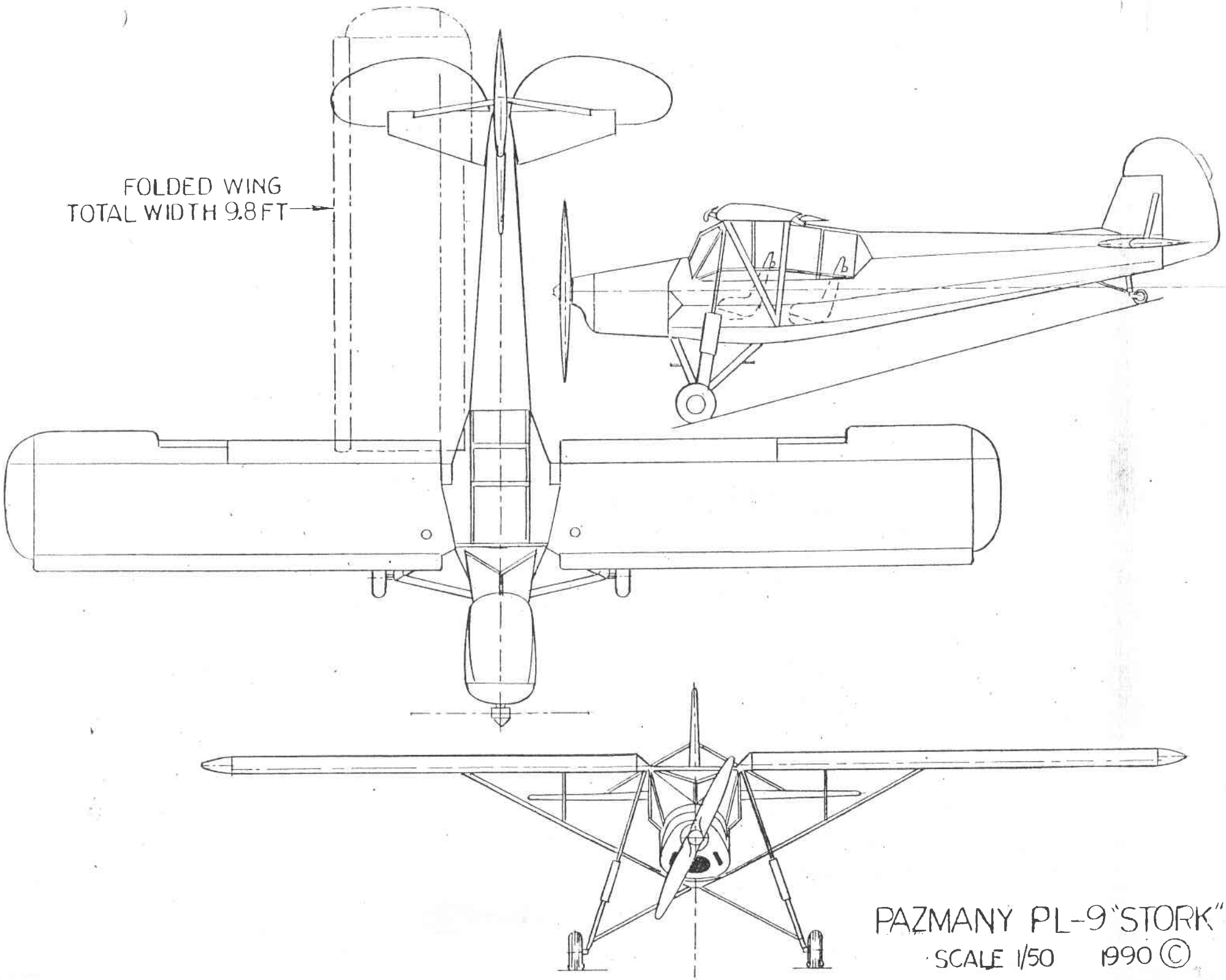



Table 1. Technology improvement predictions for the 21st Century.

| Technology | Improvement (%) |
|---|---|
| Aerodynamics (L/D) | |
| • High AR, LFC, turbulent drag reduction, etc. | 35 |
| Propulsion (SFC) | |
| • VHBR, Materials, aerodynamics, etc. | 40 |
| Propulsion (Weight) | |
| • Improved materials | 20 |
| Structures (Weight) | |
| • Improved materials | 40 |
| Systems (Weight) | |
| • Distributed avionics (using optics) | 50 |
| • Hydraulics | 25 |
| • Mechanical controls | 80 |
| • Environmental | |
| - Ducts | 40 |
| - Pumps/APU | 25 |
| • Landing gear | 10 |
| • Furnishings | 15 |
| • Operating items | 10 |
| Maintenance | 25 |



**"Who'll I call if you crash — Civil Aeronautics or the Audubon Society?"**




PAZMANY PL-9 "STORK"

SCALE 1/50 1990 ©

# The Pazmany PL-9 "STORK" and the Fiesler Fi-156 "STORCH"

The Fiesler Fi-156 "Storch" was an outstanding WW2 airplane, designed to be able to take-off and land in extremely short distances. According to flight tests results quoted by S. Hoerner, (Chief Aerodynamicist of the Fiesler Company), the Storch had a take-off ground roll of 131 feet and a landing roll of 36 feet with 13 miles per hour head wind.

The aircraft was used by the Luftwaffe for reconnaissance, VIP transport, casualty evacuation, and other functions associated with a versatile utility aircraft. It was powered by a 240 HP, Argus As 10c engine, (eight cylinder air cooled, inverted "V" ), turning a fixed pitch wooden propeller.

The construction was: welded steel tubes fuselage, wooden wings and tail surfaces, all fabric covered. The extremely long stroke (15.7 in) main landing gear was designed to absorb energy at very high sink rates. Folding wings will not be available at least in the early part of the program. Later it may be an optional feature.

Fifty three years after the flight of the prototype Storch, a 3/4 scale replica of this aircraft is offered to the amateur builders, designed by L. Pazmany (PL-1, PL-2, PL-4, Ryson ST-100). Maximum effort has been made to reproduce the performance of the Fi-156. The Pazmany PL-9 "Stork" has the same wing airfoil with fixed leading edge slats, Fowler flaps and drooped ailerons. The only major deviations are: Wing and Empenage construction is aluminum sheet metal, (fabric covered as the Fi-156). Also the cockpit has been enlarged slightly from a true 3/4 scale (hard to scale down people). The PL-9 main tires and wheels are larger than a true 3/4 scale size of the Fi-156 tires, that were rather small for rough field operations. In lieu of the 500-5 tires which would be almost perfect 3/4 scale, the 600-6 are used.

The pilot and passenger seats will be molded Fiberlass, probably reinforced with Graphite. The seats will be designed to provide energy absorption in case of a crash. The pilot's seat will be adjustable for easier access to the cockpit.

The compelling reasons that L. Pazmany designed the PL-9 "Stork" are:

1. To provide amateur builders a professionally designed STOL aircraft which will please the sport pilot, the "nostalgia" pilot and the "bush" pilot.

2. To provide a well proven aircraft configuration design for a number of functions (most of these in foreign countries) such as: Border Patrol, Fish Spotting, Highway Patrol, Forest Fire Detection, Property Surveillance, Farm Work, Pollution Detection, Missionary Work, etc. At the present, certification of the PL-9 is not considered and "EXPERIMENTAL AMATEUR BUILT" aircraft can not be used for hire in the U.S.A.

3. The welded tube fuselage, aluminum sheet metal/fabric covered wing and empenage, seem to be very popular with the amateur builders, although it is 50 year old technology. (Avid Flier, Kit Fox, etc.)

An established aircraft kit manufacturer will supply the welded fuselage, oleo pneumatic shock absorber main landing gear, controls, formed sheet metal parts and molded fiberglass cowl, seats, fairings, converted automobile engine with cog-belt reduction and wooden fixed pitch propeller.

A converted automobile engine, probably the 2.2 liter Subaru Legacy or the Honda Prelude, both approximately 150 HP, will be used, the engine should fit in the "pear" shaped cowl, so distinctive with the inverted V-8 cylinder ARGUS used in the Fi-156. A specially designed wooden propeller shaped after the original Storch propeller will be part of the kit.

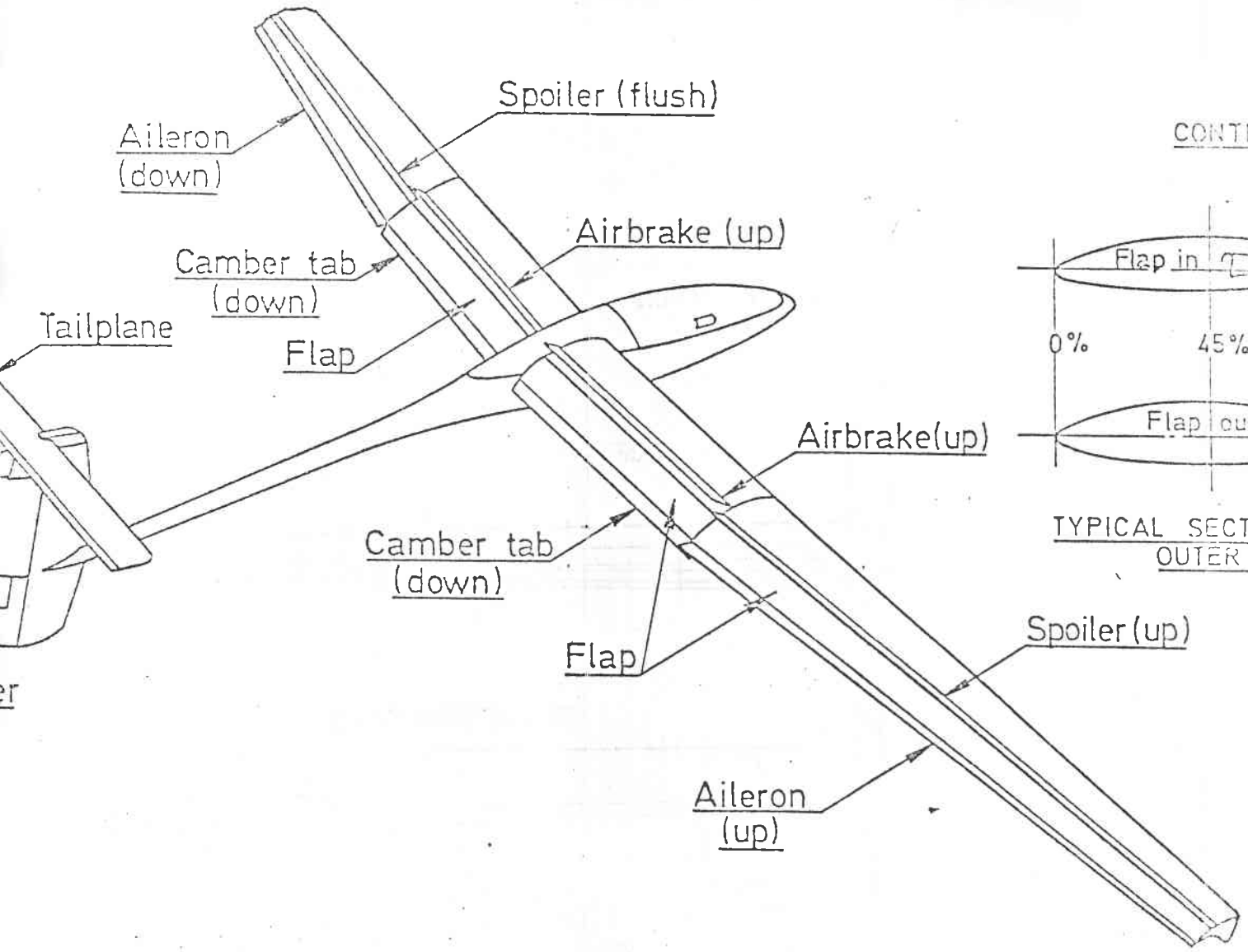
Pazmany Aircraft Corporation will sell the plans for the assembly of the airplane and for the fabrication by the builder of simple parts, such as sheet metal clips, gussets, etc. which do not require special tooling. All molded Fiberglass components (cowl, fairings, seats), all stamped sheet metal ribs, and all welded assemblies, such as fuselage, landing gear, control sticks, will not be detailed in the plans. The builder could buy all the hardware and bulk materials such as fabric, Plexiglass sheets, (no forming required), wheels, brakes, cables, bolts, nuts, rivets from any supplier of their choice. It is estimated that the plans will sell for $300.00/set. The kit of all prefabricated parts will cost probably between $12,000 & $15,000, including the automobile engine with the belt reduction and propeller. These are preliminary estimates.

If you are interested in the PL-9 "Stork", please complete the included questionnaire and mail it to Pazmany Aircraft Corporation. As soon as additional information is available, you will be contacted by mail.

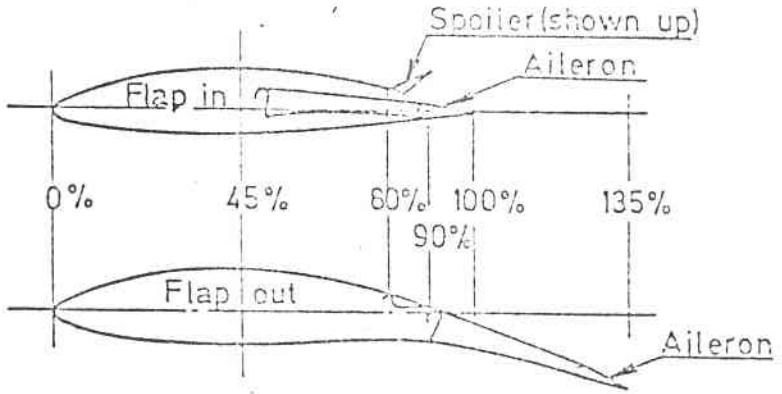
## COMPARATIVE TABLE

| | Units | Fiesler Fi - 156 | Pazmany PL-9 | |
|---|---|---|---|---|
| | | | with 30 Gal. | with 52 Gal. |
| **WEIGHTS** | | | | |
| Empty | lb. | 2006 | 1132 | 1132 |
| Pilot & Observer & Misc. | " | 416 | 350 | 350 |
| Fuel | " | 242 | 180 | 309 |
| Oil | " | 22 | 11 | 11 |
| Maximum weight | " | 2688 | 1673 | 1802 |
| **DIMENSIONS** | | | | |
| Wing Area | $ft^2$ | 280 | 166 | 166 |
| Span | ft | 46.5 | 36 | 36 |
| Length | ft | 32.5 | 24.3 | 24.3 |
| Width-Wing Folded | ft | 15.6 | 9.8 | 9.8 |
| **POWER (Max)** | hp | 240 | 150 | 150 |
| **AERODYNAMIC** | | | | |
| Wing Loading | $lb/ft^2$ | 9.60 | 10.07 | 10.85 |
| Power Loading | lb/hp | 11.34 | 11.15 | 12.01 |
| Span Loading | lb/ft | 57.8 | 46.5 | 50.0 |
| $C_L$ max - Flap Retracted | - | 2.49 | 2.49 | 2.49 |
| $C_L$ max - Flap Extended | - | 3.68 | 3.68 | 3.68 |
| **PERFORMANCE** | | | * | * |
| Stall Speed (Flap Extended) | mph | 31.7 | 32.7 | 34.0 |
| Stall Speed (Flap Retracted) | mph | 38.5 | 39.8 | 41.2 |
| Cruise Speed (75% power) | mph | 74.6 | 82.0 | 80.0 |
| Max Speed | mph | 108.7 | 112.0 | 110.0 |
| Rate of Climb (S.L.) | fpm | 905 | 905 | 900 |
| Service Ceiling | ft | 15,091 | 15,100 | 15,000 |
| Endurance @ 75% Power | hours | 3 | 3 | 5 1/2 |
| Range @ 75% Power | miles | 223 | 224 | 412 |
| Take-Off Ground Roll (no wind) | ft | 246 | 246 | 250 |
| Landing Ground Roll (no wind) | ft | 85 | 85 | 90 |

* The Pazmany PL-9 performance is estimated. Final values will be based on the results of the flight tests of the protoype aircraft.



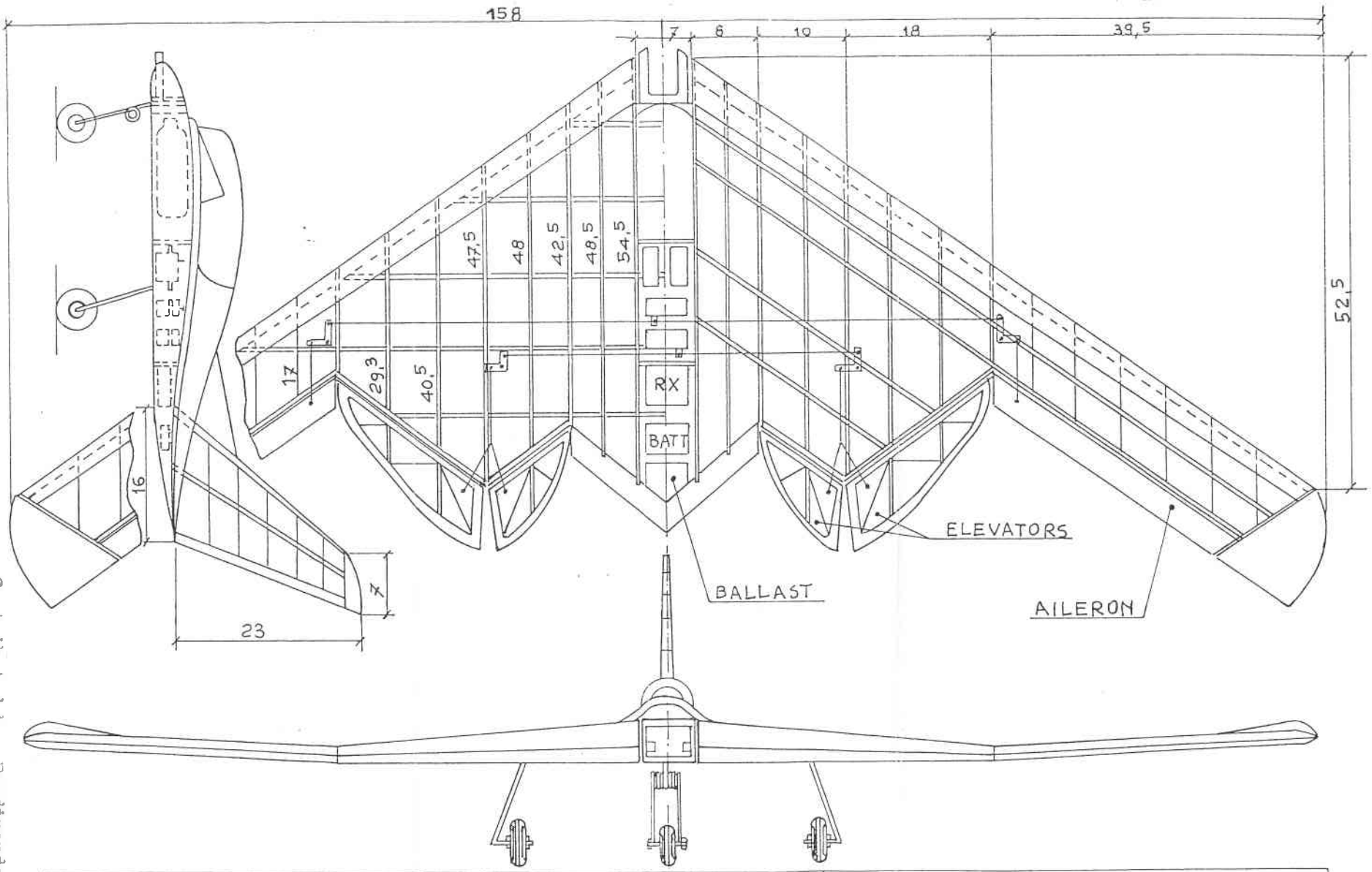

CONTROL SURFACES




TYPICAL SECTIONS THROUGH OUTER WING

(Note: This is the layout of the Sigma sailplane described by Dave Marsden. Diagram provided by Bruce Carmichael.)

7 AIRCRAFT SHOWN ROLLING TO STARBOARD, WITH FLAP OUT & AIRBRAKE APPLIED.




| | | |
|---|---|---|
| R/C FLYNG WING | WINGSPAN : 158 cm | WING AIRFOIL : EIFFEL 429 |
| D.G. 87 "CONDOR" | LENGTH : 58,5 cm | EMPENNAGE AIRFOIL: GÖTTINGEN 444 |
| DESIGNED BY GIANNI DIANO | MAX. CHORD : 54,5 cm | TAKE OFF WEIGHT : 2100 GRAMS |
| INKED BY MARIO MARENGO | MIN. CHORD : 17,0 cm | WING LOADING : 45 GRAMS/$dm^2$ |
| - JANUARY 1991 - | WING AREA : 46,0 $dm^2$ | ENGINE : ONE SUPERTIGRE 6,5 cc. |

Contributed by: Ferdinando Gale'