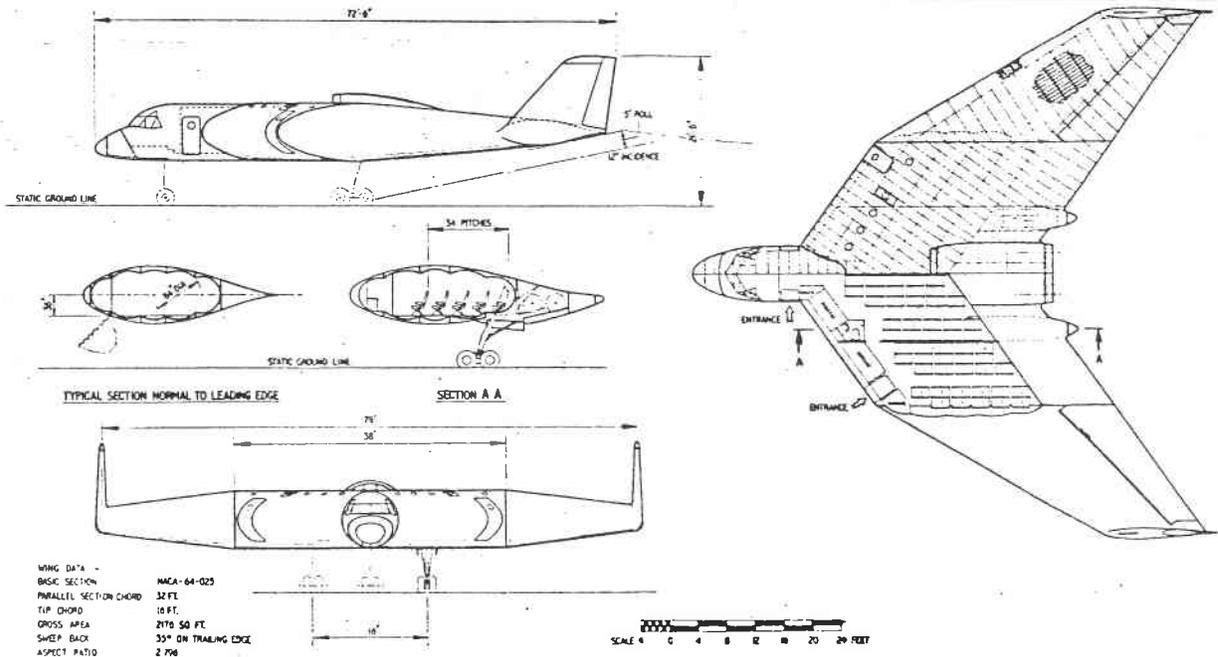


T.W.I.T.T. NEWSLETTER



The HP (Mandley Page) 128 Swept All-Wing Aerobus in the 100 seater version. Passengers were housed in the parallel part of the wing, while a small "fuselage" projecting forward from the front apex contained the crew. Various outer wings were then added to this central unit, their sweep and span being adjusted to maintain the correct relationship between neutral point and centre of gravity. Source: *Journal of the Royal Aeronautical Society, "Possibilities of Cost Reduction with All-Wing Aircraft,"* by G. H. Lee, Vol. 69, November 1963.

T.W.I.T.T.
 (The Wing Is The Thing)
 P. O. Box 20430
 El Cajon, CA 92021

Season's Greetings



The number to the right of your name indicates the last issue of your current subscription, e.g., 9212 means this is your last issue unless renewed.

THERE WILL BE NO DECEMBER MEETING

Next TWITT meeting: Saturday, January 16, 1993, beginning at 1030 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.

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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



Well, another holiday season is already upon us. I hope you have all gotten your Christmas shopping done, and that it includes something for your favorite flying wing project no matter how big or small it might be.

Please don't forget that **WE WILL NOT HAVE A MEETING IN DECEMBER** because of the many holiday commitments everyone has with family and friends. We look forward to seeing all of you back in the new year, ready for more flying wing "stuff".

Since many of our members live in the colder climates, I figure your building time has probably been cut somewhat. If this is the case, can you take some of that time and write us a letter, and send some pictures, of the project. We haven't heard a lot from the modelers out there, but know they are busy working on some type of flying wing or other tailless design (otherwise why would you belong to TWITT).

Don't forget, one purpose for TWITT is the exchange of ideas, both old and new, so that flying wing development and design can progress even further. The organization exists for its members, but it takes the members participation to truly make it work.

If you have something that would go well on the cover, I can also use it. We have published 77 newsletters and it is getting tougher and tougher to find new and exciting material to make an eye-catching cover. I could sure use some help here.

I would like to take this opportunity to thank all of our members who have contributed in their own way throughout 1992. Some have sent material for the library, some information about an upcoming event, and others have included a little extra in their checks when renewing memberships. Each of these has added value to TWITT in its ability to better serve the entire membership. All are greatly appreciated, and we look forward to your continued support in the year ahead.

I wish you all a very joyous holiday season, and hope that the new year brings new successes in the development of your flying wing dream machine.

Andy

TABLE OF CONTENTS

President's Corner	1	Addition to TWITT Library	9
This Month's Program	2	Available Plans/Reference Material	10
Meeting Minutes	2	Model Wings	10
Letters to the Editor	5		

NO PROGRAM FOR DECEMBER

THIS IS OUR OFF MONTH DUE TO THE HOLIDAYS SO THERE WILL BE NO MEETING UNTIL JANUARY 16, 1993

EVERYONE HAVE A SAFE AND HAPPY HOLIDAY SEASON

MINUTES OF THE NOVEMBER 21, 1992 MEETING



Andy opened by welcoming everyone to the last meeting of 1992. Next month will be the usual holiday break, with the next meeting in January 1993.

There will be the normal newsletter in December, and this year we will use the opportunity to publish an up-to-date roster of the membership in January since there won't be any minutes. The roster will be sorted by state/country so members can easily find others who may live within a small region.

The raffle prize for the day was to be a historical stamp book covering WWII during the 1942 era.

Andy showed the group Serge Krauss' latest edition of his tailless bibliography (see a brief review later in the newsletter and the classified ad). Serge has given credit to a lot of people in his preface, including TWITT and a number of TWITT members.

For the meeting, Bob Fronius put together a special edition of the Sailplane Builder newsletter for SHA. It contains all of the recent design contest entries with their three-views and descriptions. If anyone is interested in having a copy, they need to contact Bob directly to arrange payment and delivery. (If you want to talk with him, make sure to call after 8:00 pm PST.)

Andy ask for any comments on Jim Loyd's design he sent in several months ago. Since no one had anything either positive or negative to say about the design, we are assuming that Jim must be on a good development track for his needs.

Andy then introduced Floyd Fronius who took the floor to talk briefly about hang gliding towing systems, especially those used at Tehachapi this year.

The first method he described is called platform towing. The pilot and his craft are held on a platform on the back of the tow truck until it reaches the proper speed. When the pilot and driver are in agreement, the pilot pulls the release and launches into the air. The tow line then begins to unreel at a controlled rate so the glider maintains flying speed, but also begins rising like a kite on the end of a string.

The height that can be attained is dependent

upon how much room the truck has to run and the wind conditions. In most cases the truck has almost come to a stop when the glider has reached the top of the tow. Floyd said there have been cases where the truck was able to turn around and continue the tow to even greater heights by traversing the runway another time.

The towing system is comprised of a drum for the tow line, a disk brake to control the drum's rotation speed, and a brake master cylinder with a manual adjust to maintain constant pressure. The operator watches the glider's performance and adjusts the drum speed to provide the best rate of ascent. Rewinding the winch is done with a truck starter motor turning the drum in a reverse direction, so there is no real manual labor necessary.

The tow cables vary depending on the system you buy. Some use Kevlar line, others a small diameter poly-rope. The weak-link is a single strand of 1/16 dacron cord that gives a 200 lb link.

The winch system, less the platform, has been used to launch aircraft as big as a Schweizer 1-26, but is normally used for things like hang gliders and other types of ultralights.

Floyd spent a little time talking about the problems associated with towing a hang glider. First, it is a very light weight craft that is easy to over stress while on tow. Second, was developing the best method of attaching the tow line. This last was solved by attaching the line to the pilot's body which provides a self correcting situation if the glider deviates from the normal flight path.

Another problem is having the tow line firmly attached to the tow vehicle. This makes it harder to stay within the stress limits of the glider and/or the tow line's weak-link. Using the pay-out drum system, the stresses are greatly reduced since the line tension can be better controlled.

The platform system solved the problem of trying to foot launch behind a tow vehicle. It removes the need for the pilot to run with this awkward, heavy on his back. The glider is attached to the vehicle at a neutral angle of attack until flying speed is attained, and the pilot's feet never touch the ground.

Because the glider already has flying speed, if the weak-link should happen to break right after launch, recovery is made a little easier. The pilot usually has enough control to move off to the side of the truck and land without mishap.

Floyd moved on to talk about aero-towing of hang gliders. The tow planes are usually ultralights, such as the Dragonfly which is produced in Florida. It is powered by a 65 hp Rotax, with large slotted ailerons to provide a very slow tow speed.

A trike ultralight has also been used as a tow plane, but it cannot maintain the lower speeds best suited for the hang glider. The glider pilot has to be careful to keep it down behind the trike, versus letting it climb to

a high tow position due to the higher speed.

Tow hooks vary based on the type of tow plane. One trike ran the tow line out through a hollow propeller shaft, and uses a pair of vise grips as the means of holding the line to the plane.

The Dragonfly uses a bridal system attached to a release hook below the rudder at one end, and to an elevated point above the vertical tail. A ring on the line allows the glider to move up and down without adversely affecting the tow plane's pitch attitude. This also allows it to tow at 20 to 40 mph, which is just right for most hang gliders.

Floyd was asked what he thought about the approach to hang gliding offered by the Swift flying wing. He indicated that many enthusiasts would like to see hang gliders stay within one category for better competitions and more availability. There are others who like to see the change and want the higher performance offered by these newer designs. Another issue is one of complexity and cost that is associated with buying, flying and maintaining something like the Swift.

Ed Lockhart asked Floyd to describe his 100 mile flight. Floyd had flown an out and return starting from Mt. Laguna, with a turn point at Lake Hemet near Mt. San Jacinto. It was done using thermals and lift from the available cloud streets, flying between 7,000' and 13,000'. The flight took just short of six hours to complete, reaching speeds of around 40 mph while under the clouds. He had also made some 50 and 80 mile straight line flights during the same time period.

Everyone had an opportunity to inspect Floyd's glider before the meeting, so Andy asked Budd Love to tell us about his latest news concerning his HIAM project.

Budd gave us a handout showing the direction HIAM is now headed. As can be seen from the three-view, it is a variation of the Horten IX. Budd pointed out it is no longer a flying wing, but rather a low radar cross-section aircraft. He indicated the development group is very serious about getting proposals from several companies to make this a reality.

Someone asked what was HIAM, and so Budd briefly explained the High Internal Air Mass concept. A large volume of high pressure air is taken from a compressor, mixed with outside air at high atrainment ratios and then blown out the rear of the wing. This version has six duct panels per side. There are also slotted doors at the leading edge through which the outside air is pulled, while also controlling airflow separation.

Ralph Wilcox asked about what problems they anticipate with pitching moments due to the GA(W)-1 airfoil. Bruce indicated that airfoil would cause some trim problems that will definitely need to be worked out. (Bob has indicated the airfoil should have a zero pitching moment, be symmetrical or reflex, and have the flap hinged near the main spar to avoid control reversal.) Note: There is a Horten IX at Silver Hill in Washington, D.C.

that has not been restored by the Smithsonian yet.

In keeping with the days activity, Billy Gray, President of the local ultralight group, invited any members of TWITT to join them at their monthly meeting. They meet the first Thursday of each month at 7:30 PM in the San Diego Aerospace Museum. He would also like to have someone from TWITT as a guest speaker. He mentioned one benefit of attending is the opportunity to see some of the exhibits in the museum.

Bob mentioned that Skeets Coleman, one of the old timers who is know by many, had attended a recent EAA chapter meeting. He was a pilot on Convair's flying Pogo Stick, as well as working for Fairchild on the F-27.

Andy then introduced Bruce Carmichael who was going to tell us about the SHA Workshop held at Tehachapi, CA, in September, along with discussing some of the homebuilder design entries.

Bruce began by explaining what SHA is all about. Its purpose is to foster design and construction improvements, and maximizing performance for the given outlay of time and dollars by the builder. If you would like to join, see the classified ad in this issue.

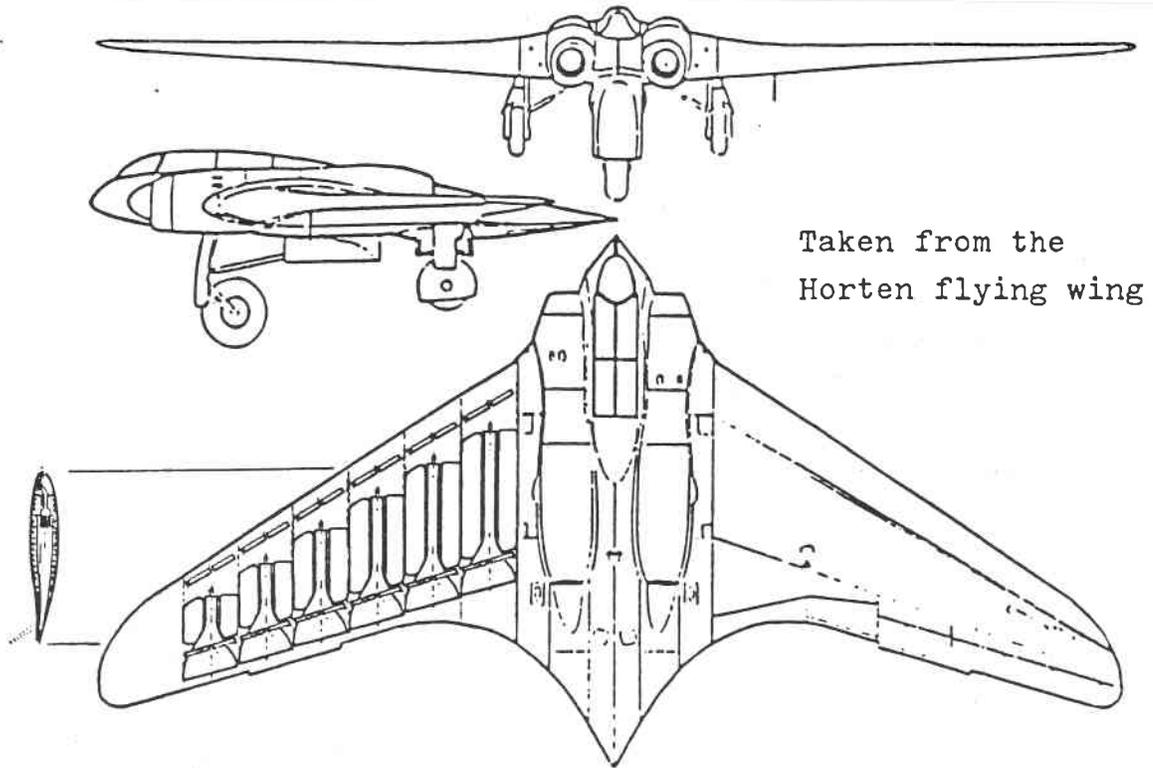
There is a common thread between SHA, VSA, hang glider groups and TWITT, and many people belong to all or some of them. This is because these people have a diversity of interests within the flying arena. Membership is comprised of designers, builders, flyers, technology experts and just general aviation nuts.

SHA came into existence in 1979, to help soaring enthusiasts finds ways to remain in soaring without spending lots of money for the newer high performance sailplanes coming out at that time. Then in 1981, a group of engineers got together to come up with the rules for the sailplane design contest. This first contest required that entries be ready for a fly-off by 1982, which was met by two aircraft. One was Burt Rutan's Solitaire, and the other was Marty Holman's twin boom pusher light plane.

The monthly newsletter, Sailplane Builder, is their means of keeping the east and west coast groups informed about current events and designs. It also provides the mid-west members a means of participating in the design contest, since many of them cannot get to the east or west workshops.

Bruce talked briefly about how the original idea of finding an inexpensive, homebuilt self-launching sailplane has since been overshadowed by the complexity of such a project. It now appears more feasible to come up with one, or several, light sailplanes that will allow people to get back to the grass roots type of soaring the sport was founded on. Projects like the Swift seem to be moving in the right direction, but a lot more design work is still needed.

(Continued on page 5.)



Taken from the
Horten flying wing

FIGURE 1 3-VIEW OF A FLYING WING WITH A HIAM LIFT SYSTEM

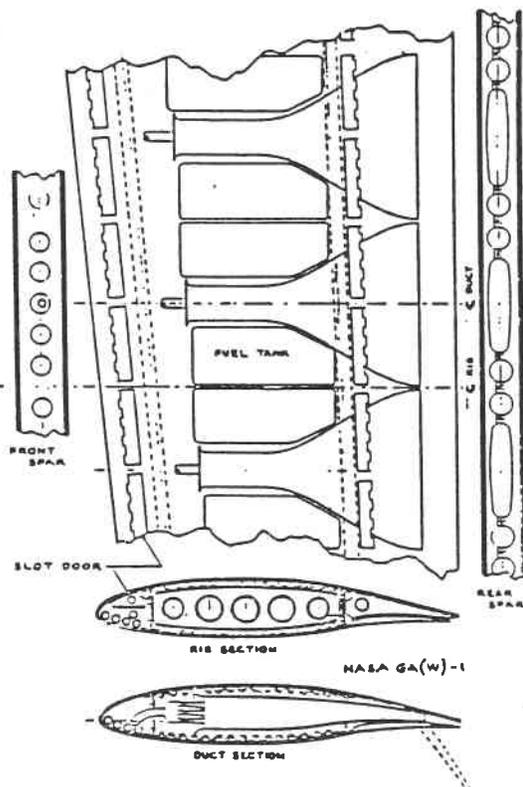


FIGURE 2 HIAM WING DUCTS
INSTALLED IN AN AIRPLANE WING

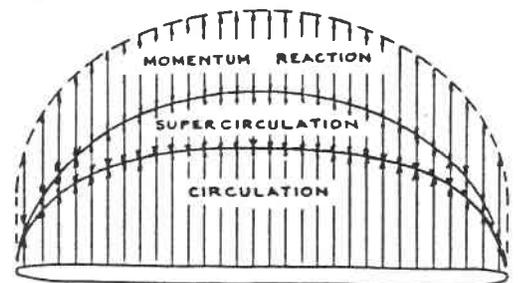
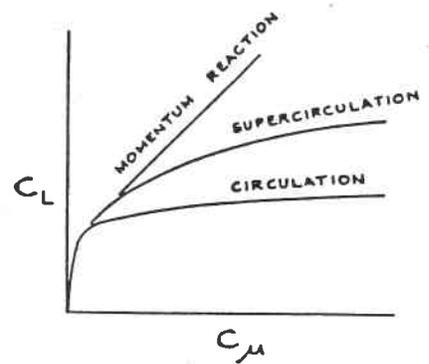


FIGURE 3 JET FLAP LIFT FORCES

Angel Matos spoke at the workshop about how the future might evolve. He recommends using a two place, powered ultralight to teach new glider pilots landing techniques. By throttling back to zero thrust the ultralight becomes a glider, but one that can go around and do multiple patterns without a towing glider. Once proficient the pilot could move over the a light sailplane, reducing the risk of landing mishaps.

Bruce went on to talk about various designs that have had some limited success over the years, like the Windrose, Eaglet, Mini-Bat, and Woodstock. Unfortunately, most of these ran into some type of problem, either financial or with materials or construction complexity, that destined them to very few examples.

Jim Marske, another SHA member and designer, puts out the Monarch which has found good acceptance, and it is a tailless sailplane. He sells full kits or partially completed kits.

At Tehachapi, Don Mitchell demonstrated hot-wire foaming cutting techniques, followed by the group of Mitchell, Ralph Wise and Les King discussing the pros and cons of wood, metal and composite construction.

Fellow TWITT member Harald Buettnner gave a demonstration on how to build fiberglass molds. Dave Martin talked about being an editor and test pilot, Danny Pierson related the history of the Diamant sailplane, and his plans to build a modified Diamant with a 95' span.

Roy Balitts gave a presentation on resin systems, and Dave Gustuffsen talked about developing his DGM-1. This latter is like a Stojnik S-2 but a litter larger and with a T-tail. It was entered in the design contest and a prototype has been built. Howie Burr told about his days at the Schweizer aircraft plant in Elmira. Steve Lawrence was there to talk about the Swift and some of the latest developments with the design. The Swift uses inboard flaps which work well since they are forward of the CG and have positive pitching effect while providing additional lift.

Bruce moved on to talk about this year's design contest, which was won by Reg Todhunter from Australia. Reg and his brother had submitted the Blue Wren in an earlier contest, but it did not win. The design is still flying today, and Reg comments on it now and then whenever he writes to TWITT about what's happening down under.

The remaining time was spent going through a series of slides that Bob had taken during the workshop. Bruce made some very brief comments about the various designs from the contest. He wrapped up with another invitation to everyone to join SHA and benefit from the sharing of information.

The raffle prize was won by yours truly, with the accusations of the raffle being "fixed", and the meeting was adjourned with a wish for a happy holiday season, and a joyous new year.

LETTERS TO THE EDITOR

11/12/92

TWITT



Thanks a lot for the German article on the Horten tailless as well as for the three Mitchell tapes, which arrived here

safely in these days.

My letter to TWITT dated 7/12 and containing one \$10 banknote most probably went lost: I have been so dumb as to send it as a simple letter.

Another \$10 banknote is attached to this registered letter, which should reach you safely: should my previous letter ever show up, please keep the \$10 for future purchases.

As soon as you have available the catalog of the TWITT library, I would appreciate very much in receiving a copy.

I wish I could attend your monthly meetings!!

My book, TAILLESS TALE, which is intended for model builders, has obtained quite an acceptance also among amateur builders in the US and Italy too: it is gratifying for me to learn that you enjoy it.

Best regards,

Ferdinando Gale'

(Ed. Note: We thank you for the \$10 and are pleased you received the tapes in good condition. I always worry about shipping packages like those overseas.)

For our other foreign members, Ferdinando wrapped a piece of black carbon paper around the banknote (a US \$10 bill) so that it would not be easy for someone to tell there was money inside the envelope. With this type of precaution, it may not be necessary to send it registered, which I know can be expensive.

As for the library catalog, it will be a very long time before it is ready for publishing. We have not had any volunteers to help with entering the data into the computer, and I have not had the time to work on it. It is one of those projects we must get started and finished so the members can benefit from it.

We are glad to hear that your book is doing so well all over the world. This obviously makes it well worth the time and effort you took to put it together. Congratulations.)

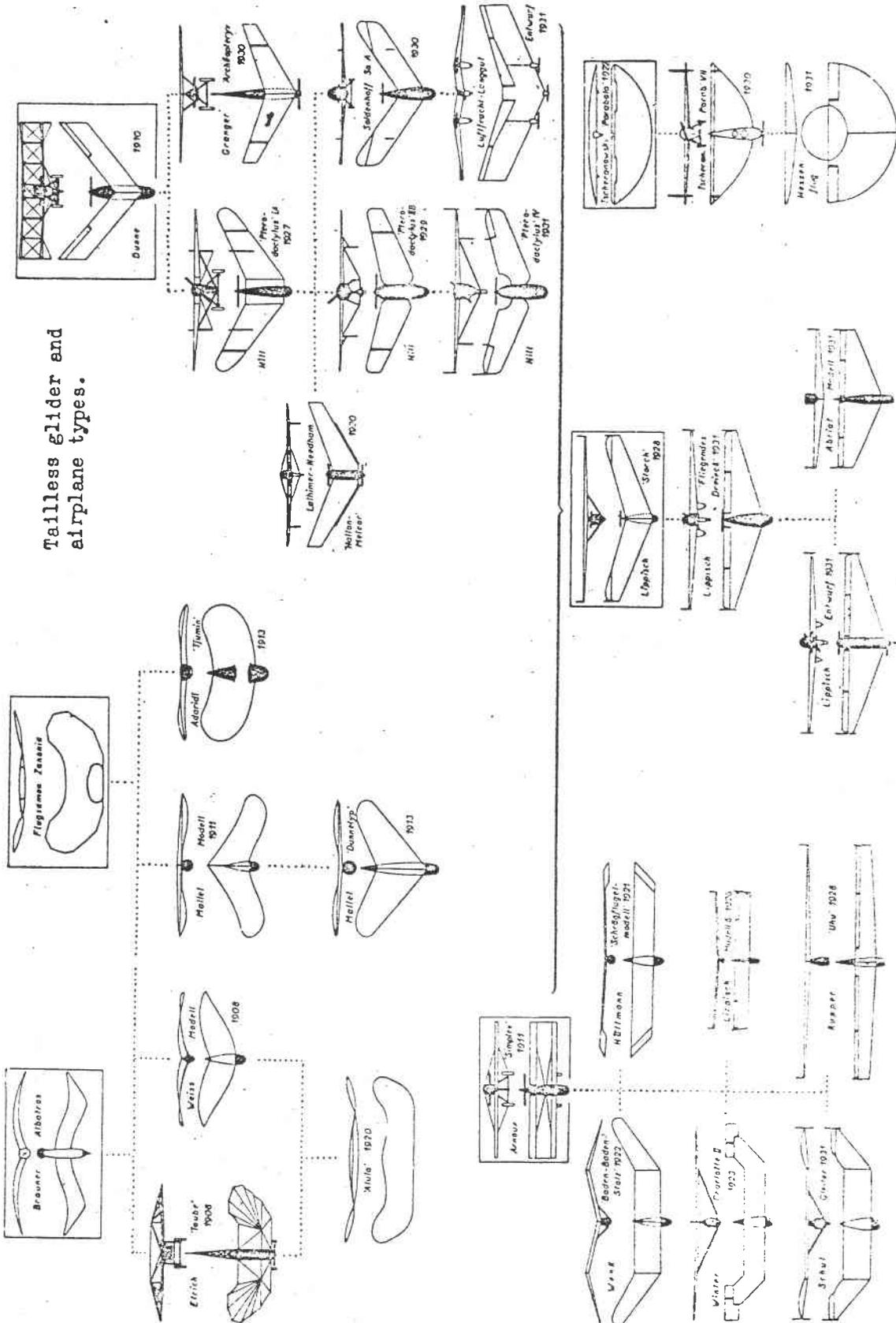
(Continued on page 7.)

Merry Christmas

This reproduction is from NACA Technical Memorandum No. 666, which is a translation of an article by Robert W.E. Lanemann,

"Development of Tailless And All-Wing Gliders And Airplanes", Schwanzlose und Nurflugler, Die Luftwacht, February 1932, pp. 62-69.

Tailless glider and airplane types.



10/27/92

TWITT

Enclosed is my check for all the back issues of TWITT.

Here are some of the specs on the "My Mitchell Wing."

Span	36'6"	(11.2m)
AR	8.75	
Wingloading	1.9 lb/ft ²	
Area	152 sq ft	
Empty Weight	125 lbs	
Gross Weight	300 lbs	
Stall	22 mph	

If you take a Horten III planform and reduce it to 12 meters, your come up with very similar numbers which means a foot launched 12 meter Horten, using similar construction as the Mitchell wing, is possible.

12 Meter Horten III

Span	39'	(12m)
AR	10	
Wingloading	2.0 lb/ft ²	
Area	152.5 sq ft	
Stall	22 mph	

I hope to see you and those Horten III plans soon.

Thank you,

Mike Grisham
 P.O. Box 807
 Big Bear City, CA 92314

(Ed. Note: By this time you should have received your package of back issues. We hope you enjoy going through them. You will find a wide variation in the style from one period to the next, but this was due to changes in editors and the availability of computer equipment. As you can see from the recent ones we are now maintaining more consistency in the appearance of the newsletter.

The specs on your design will probably interest some of our members, so I included your address so they could correspond directly for more information.

We hope you will be able to attend some of our meetings in the future, and perhaps brief us on the progress of your project.)

10/14/92

TWITT

I just realized that my subscription is about to run out. Don't stop it, please!!

Have you ever seen a Marske Monarch ultralight or experimental sailplane?

Thanks,

Peter King
 4200 Loch Highland Pkwy
 Roswell, GA 30075

(Ed. Note: Bob has indicated the Howie Burr has a Monarch kit at Tehachapi, CA, but this doesn't do you much good. I included your address so if one of our members in the southeast has come across one he can get in touch with you.

This is a good opportunity to remind everyone about how your subscription deadlines work. For two months before your due date, it is circled in red to remind you it is due. We will usually send two additional issues past the due date before terminating delivery.

We do this as a service to you, since our experience shows most members will renew if prodded enough. If your payment is a little late, we also will usually set you up for your original due date and send any back issues you might have missed.)

11/21/92

Dear Mr. TWITT

I am a 14 year old student glider pilot and member of SHA. I saw you ad in the SHA classified. Since \$15 is three weeks allowance, could you please send me one issue of your newsletter so that I could decide whether or not to join.

Thanks,

Josh Sebson

(Ed. Note: We sent Josh an issue that will hopefully wet his appetite. It is refreshing to see younger people getting interested in gliding and its various aspects.)

11/30/92

TWITT

Please find enclosed my check for dues and an extra \$8 for the Don Mitchell tapes. If you need more for them, let me know and I'll send more money.

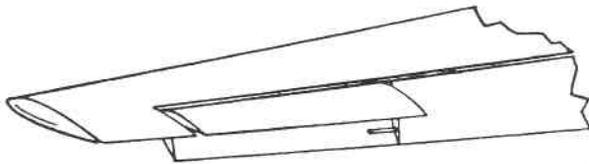
Do you have the tape on the B-49 that was not shown on "The Wing Will Fly"... or perhaps Mr. Stanley or General Cardenas. I commend your looking ahead and having so many of the real pioneers come and speak to the group.

We have a few good books on our flying wings, but a lot of information is still out there, and I am hopeful that we can get as much as we can FROM THOSE THAT DID THE DEEDS, while we still have them around!

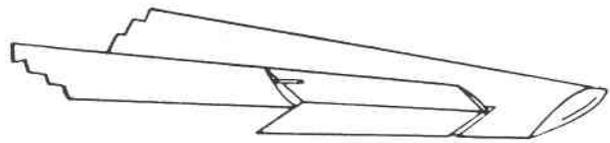
(Continued on page 9.)

Elevon and rudder arrangement used to obtain additional aileron effectiveness.
Source: NACA ACR No. L5A13, "Determination of the Stability and Control Characteristics

of a Tailless All-Wing Airplane Model with Sweepback in the Langley Free-Flight Tunnel", by John P. Campbell and Charles L. Seacord, Jr., date unknown.

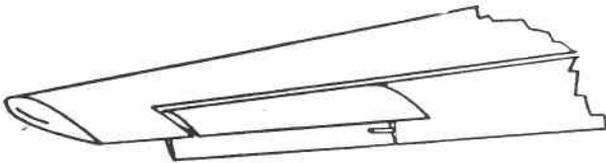


Left lower rudder surface adds to elevon area

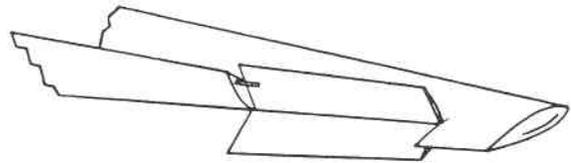


Right upper rudder surface adds to elevon area

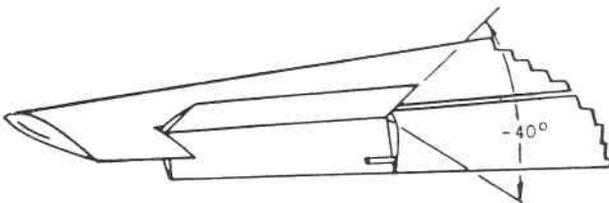
Right aileron control (longitudinal trim flaps 0°)



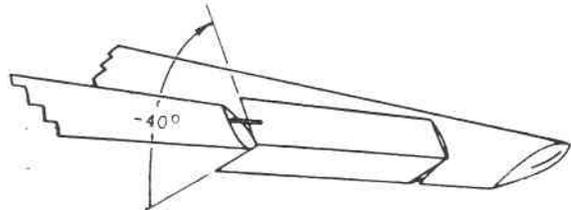
Right aileron and rudder control (longitudinal trim flaps 0°)



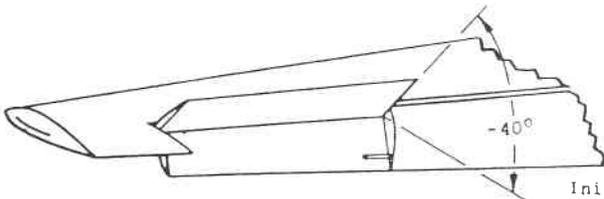
If rudder deflection is greater than elevon deflection, deflected rudder surfaces are not moved by elevons



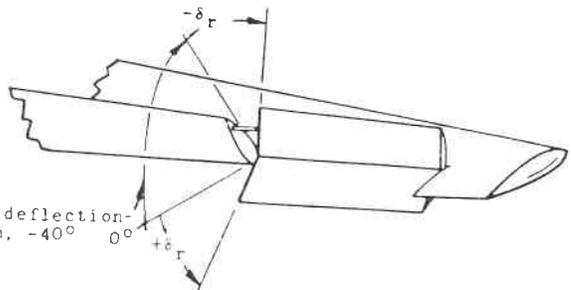
Right aileron control (longitudinal trim flaps -40°)



Upper rudder surfaces deflect with elevons only for elevon deflections greater than -40°



Right aileron and rudder control (longitudinal trim flaps -40°)



For rudder deflection, upper rudder surface deflects from -40° trim flap position

When elevons are used as elevators, the upper rudder surfaces deflect with the elevons



Obviously, I'm not wishing bad fortune upon anybody, but we do have a history (here) of not gleaning the gold until it's too late. Many questions still remain and the only real way to find the true answers or clues, are from those that were involved. Fine men that have flown some of the Northrop wings have given quite "different" accounts about flying them and their characteristics. This is just one example of the many areas that could be run down and put to bed.

Few groups have the technical, and engineering talent that TWITT enjoys, hence, our people are not going to be "snowed" or put off by generalizations. Who would give more "cogent" questions about flying wings, or would be able to find the real history than TWITT?

Please understand that I do not mean that all of the history, Etc., should be taken on. But some of the grey areas of the flight and engineering myths do fit our talents! I have an idea that as an individual or a panel, those that were truly involved would be happy to have more of the facts brought forth.

I appreciate your time and effort Andy! It takes a lot of work to get out the issues every month. I hope that you have a nice holiday season, and best wishes for '93.

Thanks,

Dave Laney

(Ed. Note: Thanks for the renewal, and your tapes should be on the way shortly. The Mitchell tapes have been the most requested item, and we are happy that people seem to be enjoying them.)

General Cardenas left us an unedited version of "The Wing Will Fly", so we it available if anyone wants a copy. The best way is to send us a blank VHS cassette and money for return postage.

Getting speakers for the monthly meetings has become harder and harder. If anyone has contact with the type of people Dave mentioned, and that live in the San Diego or Los Angeles area, it would be most helpful if they could try to arrange a possible speaking engagement. Unfortunately, we do not have funds to defray the cost of transportation, etc., but could possibly provide it through our members in Los Angeles.

Thanks for the comments on publishing the newsletter. The biggest problem of late has been trying to get pertinent material that would be of interest. If any of our members have three-views, articles (especially with diagrams or pictures), or other material on flying wings, we would appreciate them sending us a copy. If publishing it would require getting permission due to copyrights, please make sure there is enough information included so we can write the publisher.)

ADDITION TO TWITT LIBRARY

The following letter was received from Serge Krauss:

Here is a copy of the third edition of my Tailless Aircraft Bibliography for the TWITT library. After a lot of work and some technical delays, I was finally able to release it this past summer. You'll note that it is a considerable increase in size over the previous editions - now over 170 pages, with more than 2900 entries, some multiple. There is of course no end in sight, and it will soon have its own supplement, after I increase the hard disk capacity of my PC. This thing has been a real challenge to my hardware, but a breakthrough IS in the works.

I continue to enjoy the newsletter and information on the activities of other members; 'wish I lived closer so that I could attend the meetings. Thanks much for including in the newsletter bibliographical information on TWITT's other acquisitions, frequently not already among my own. This helps me greatly to preserve the information in my own bibliography. If there's anything in my collection (marked '*' in bibliography) that you can use for the newsletter or library, please let me know. I'll send it along. Keep up the good work - I know it isn't easy.

Sincerely,

Serge Krauss

TAILLESS AIRCRAFT - An Extensive Bibliography for Subsonic Types, has been compiled and annotated by Serge Krauss, beginning with his first edition in 1989. The following are a few excerpts from the Preface and Introduction of this edition.

"Tailless aircraft activities during the past two years have been interesting and promising, if somewhat ironic."

"Concurrent with these activities has been the appearance of ambitious new publications concerning tailless aircraft technique. Joining the Unverferth compilation of 1990 have been the monumental (600 page) Schwanzlose Flugzeuge by Nickel and Wohlfahrt, currently being translated into English by members of TWITT, and Dr. Gale's Tailless Tale, due for publication in English at about the same time.

(Ed: Translation is still in progress for the Nickel/Wohlfahrt work, however, Tailless Tale is currently available in English. See the classified ad later in this issue.) A new British magazine, Silent Flight, has featured full-size and model tailless aircraft in its first issues, underscoring apparently healthy European interest in tailless flight."

"The evident increase in this bibliography's volume - to over 2000 tailless and 600 related-interest entries - reflects expansion of both content and scope. In addition to recent publications, valuable listings have been added throughout, some suggested by an informed and

generous readership."

"The diminishing availability of old documents must again be remarked. Since original publication of this bibliography, even more research reports and old periodicals of prime interest to tailless aircraft researchers and enthusiasts have vanished from the stacks of my favorite haunts, only some to reappear on microfilm. It cannot be over emphasized that those who value these resources should use this bibliography NOW as your guide to find and copy this precious literature while it is available to you."

"This bibliography lists research and design efforts involved in the development of tailless and related aircraft. Its material also chronicles the lives and adventures of the special people - ranging from naively enthusiastic amateurs to some of the most able and resourceful aeronautical researchers ever - who carried the tailless idea forward against heavy resistance."

The bibliography contains two pages of other bibliographies, sources of rare material/periodicals, and over 150 pages of references listed by their chronological origins dating back to 1870 (right, that's 1870).

Feedback from members who have ordered previous editions has been very positive. So if you are interested in expanding your library, or trying to find some information on a particular design or designer, this may be the thing for you. See the classified ad for price and ordering address. Serge did not indicate the price had gone up for the new edition, but realize it could be slightly more than the \$20 now shown.

We would like to thank Serge for the TWITT copy. We will get Bob to go through it and see what would be of most value to the library and for the newsletter, so hopefully, in some future issue you will see some little known facts on tailless aircraft.

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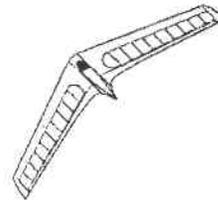
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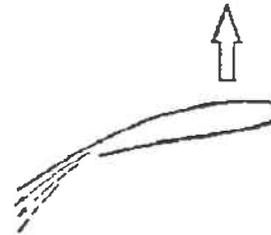


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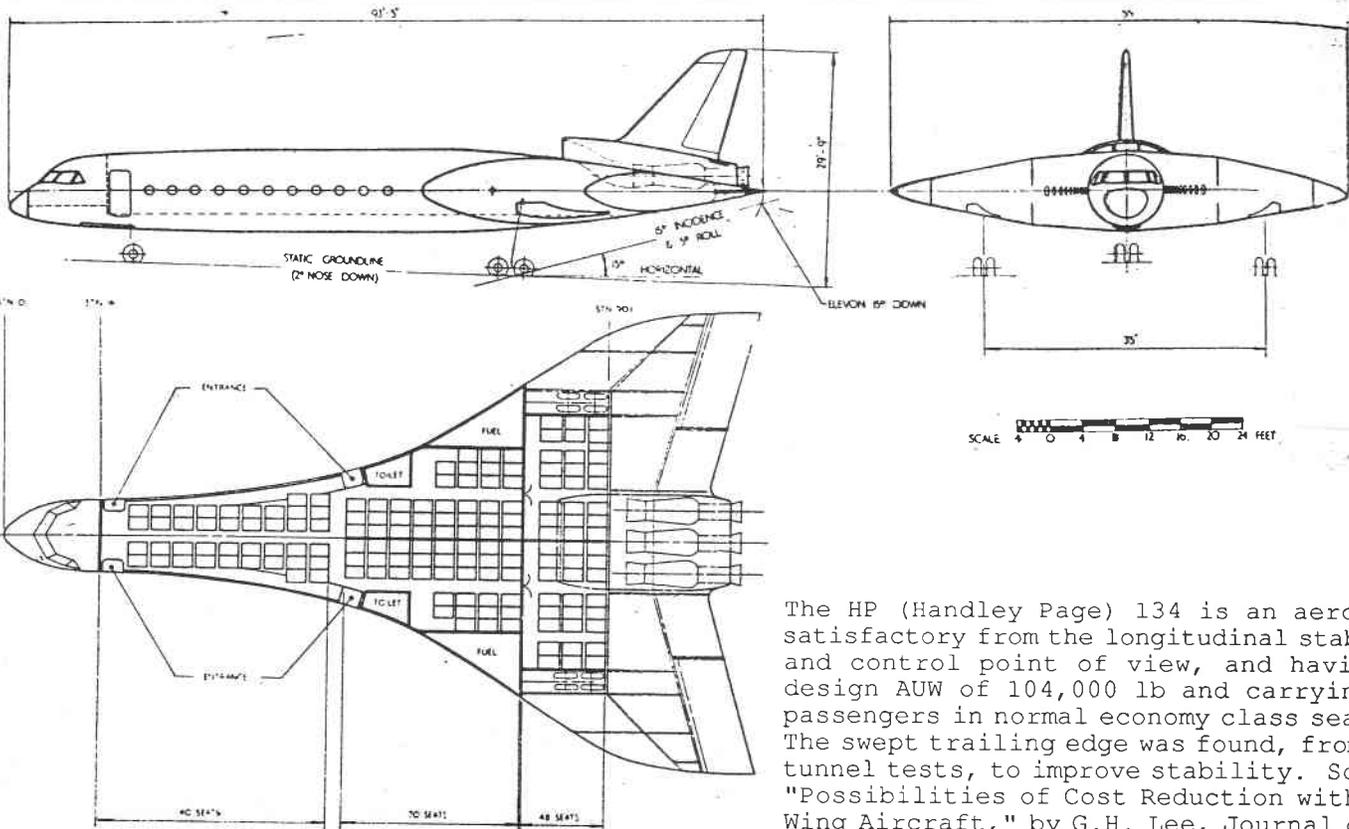
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