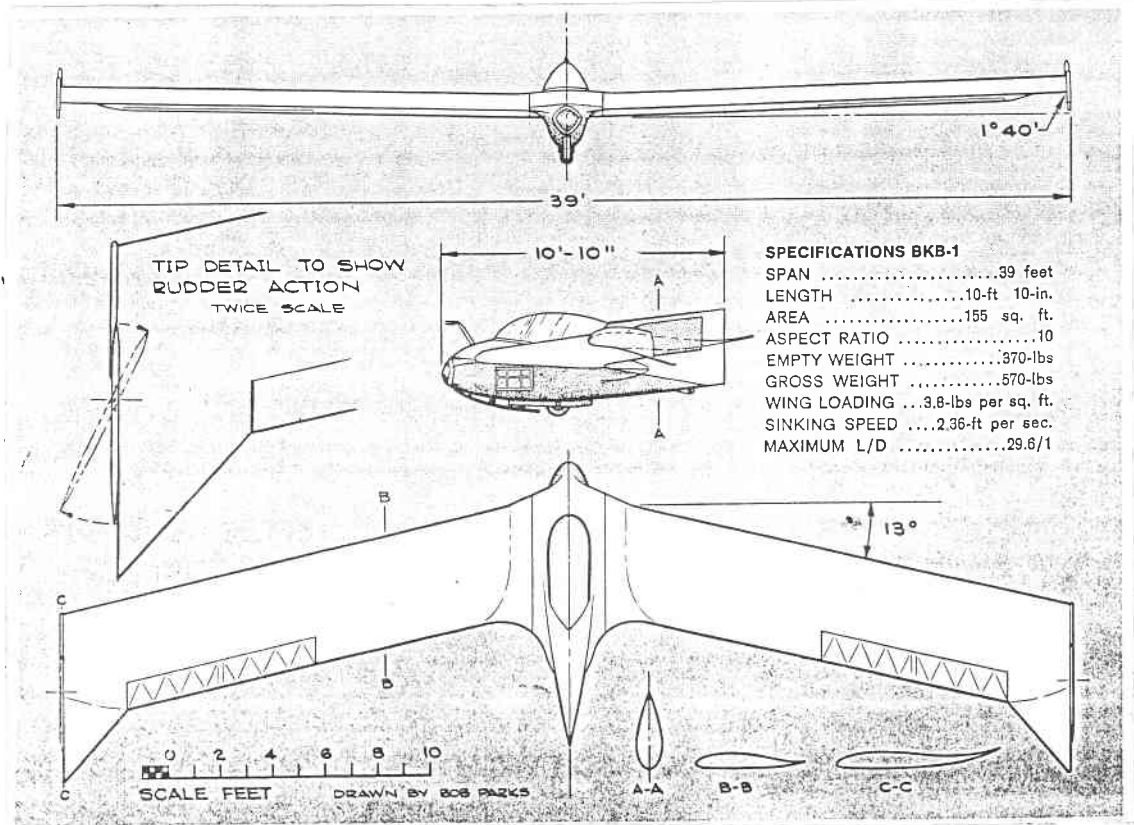


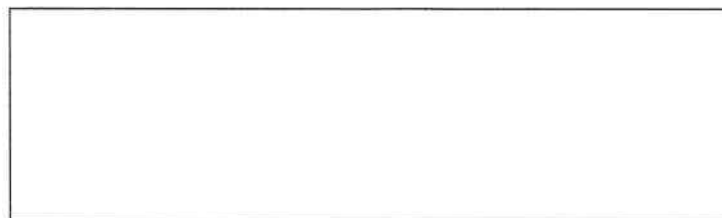
T.W.I.T.T. NEWSLETTER

The Kasper BKB-1 was famous for its demonstrated ability to perform forward or rearward tumbles without total loss of control. Kasper had done at least 3 flips at a rate of one per second. It was first discovered while doing an airshow when an attempt at a tailslide turned into a flip about the pitch axis and the resumption of level flight. That was the last performance Kasper did for the day!!!

Source: Air Progress
HOMEBUILT AIRCRAFT,
 Spring/Summer 1966, p. 63.
 Contributed by Serge Krauss

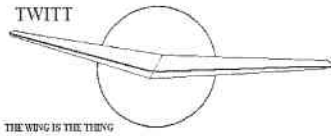


T.W.I.T.T.
 The Wing Is The Thing
 P.O. Box 20430
 El Cajon, CA 92021



The number to the right of your name indicates the last issue of your current subscription, e.g., **9711** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, November 15, 1997, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, CA (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 tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines.

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Meetings are held on the third Saturday of every other month (beginning with January), 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).

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PRESIDENT'S CORNER

As you can see when you start going through this month's newsletter, we have sort of hit on the Kasper wing theory as the favor of the month. It is funny how this stuff runs in cycles, since we will go along for a couple of months on one tangent then all of a sudden something new (or an old idea) surfaces and we move in that direction for a while.

We have received two batches of material from our members and there has been a lot of discussion on the mailing list about this interesting concept.

I have taken some of the material just received from Serge Krauss and put in this month's issue as you have already seen on the cover. He sent along copies of several patent items which have had the most drawings of anything I have seen so far.

You can also see from the abstract material in Kevin Renshaws submissions that additional testing has shown some of the theories may not be all they were thought to be. I am sure this debate will go on for years to come until such time as more aircraft are built using vortex lift augmentation equipment and found to perform as advertised or not.

Michael St. John's model pictures show what can be done with a little imagination, some balsa wood and monokote. I know we have other modellers out there with probably as interesting looking flying wing models as these. I know I've asked before, but it sure would be nice if some of you would send in a picture or two and a short note on construction, performance, etc.

Although we haven't received any requests so far, I am sure someone out there is going to want an audio tape and copies of Al Bowers presentation slides. It will take two cassettes and there are 38 slides which include the material by David Lednicer. Based on the number of pages and the cassettes this package will cost \$7 for US delivery (book rate) and \$9.00 for overseas surface shipment. Allow a little extra time for delivery, since we will want to have several orders before going to the printer in order to get the best rate on the copies.

We hope everyone has a happy Thanksgiving Holiday with family and friends. Don't forget, Christmas is just around the corner, so get that shopping done early.



**NOVEMBER 15, 1997
PROGRAM**

In the right column you will find **Phil Barnes'** calculations of the twist, lift loading, and vortex drag of the Horten IX flying wing for bell-shaped loading. As part of his presentation at our **November Meeting**, Phil will discuss the Horten design in greater detail by also showing the untwisted lift loading, and the twist required to support elliptical loading. The lift-to-drag ratios for the various twist options will be compared.

Another German jet, one which reached only the conceptual stage, was the Blohm & Voss P.210. Phil will show calculations for this interesting design. On a more contemporary note, an unswept, blended-wing tailless concept will also be presented along with a discussion of how that design emulates a soaring bird.

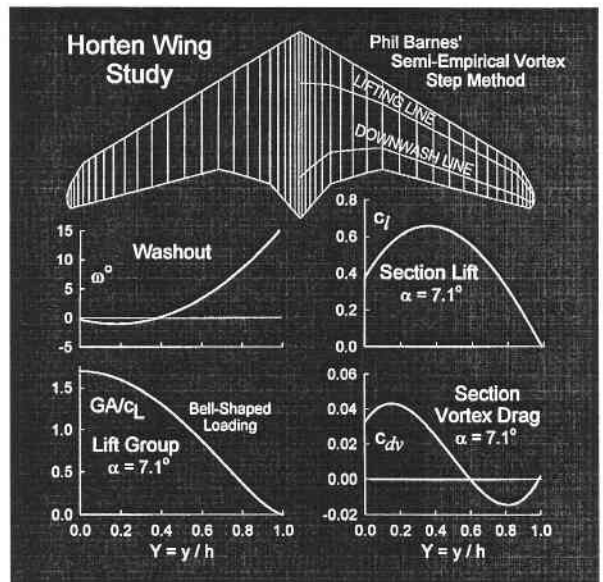
Phil's presentation is centered around his recently published technical paper which, according to SAE, was a best seller at the World Aviation Congress. "*Semi-Empirical Vortex Step Method for the Lift and Induced Drag Loading of 2D and 3D Wings*" demonstrates the versatility and accuracy of a new, semi-empirical lifting line method for calculating the aerodynamic properties of subsonic wings with arbitrary variations of chord, flaps, sweep, twist, and dihedral, including winglet and joined-wing configurations.

As you might expect, the first half of Phil's presentation will be highly technical. However, in the second half, TWITT members will probably have no trouble following a discussion of some successful and unsuccessful tailless aircraft, including the Vought F7U, Douglas F4D, Avro Vulcan, and A-12.

Phil will have copies of his charts available to TWITT members for \$10 to cover reproduction and color transparency costs. Also, since Phil owns the copy-right to his technical paper (SAE/AIAA 975559), copies will be available at the meeting for the SAE price of \$10, less handling fees. Overseas members can order post-paid copies of the paper and/or charts by writing to:

Phil Barnes, President
Pelican Aero Group
982 W. 11th Street #5
San Pedro, CA 90731

There always seems to be a lot discussion about Horten's lift distribution theories. So now is your chance to see another analytical perspective and compare it so some other designs all at the same time. **MARK YOUR CALENDAR NOW SO YOU DON'T FORGET.**



**MINUTES OF THE
SEPTEMBER 20, 1997
MEETING**

PART TWO

After a break for ice cream and cookies, the group gathered back together for the second part of the day's program which would be an open forum of questions for Bruce Carmichael, Bob Chase and Al Bowers concerning the Flying Wing Symposium at Harris Hill in July of this year. Bruce was there as President of the Sailplane Homebuilders Association (SHA), Bob went as a participant and promoter of TWITT, and Al was one of the featured speakers.

Andy asked how many people they thought had attended the symposium. Bruce thinks there were about 45 enthusiasts there with more showing up for the remainder of the SHA workshop.

Bob Chase told us about Woody Jones's Mitchell A-10 and Woody's philosophy about flying. He kind of goes with the flow in that if the hang glider folks are out he might join them by throttling back and cruising along, and if the big glass birds are out he might join them in a thermal and out climb'm by using a smaller circle. Then there are those days when he just goes out and flies around the local area enjoying the scenery.

Bob also told us about some of the modifications Woody has made to the A-10 to make it easier to setup with just one person. The tip rudders are folded onto the wing by removing a pin and then using it to secure the tip to a bracket. The wing is then folded removing the joint pins and then using them to secure the outer, folded portion to a

bracket. The tips aren't a problem since they are already attached to the surface. As you could see from the picture in last month's newsletter, he just rolls it up the ramps onto the trailer and away he goes. It really impressed Bob since it only takes about 15 minutes to complete the setup, including a pre-flight.

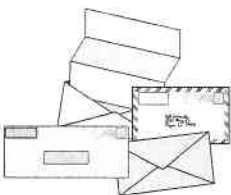
Bruce reported that one of the Monarch wings presented at the symposium had later been involved in a crash. It had completed several low altitude truck tows with no apparent problems and had moved on to a higher tow. At the top the aircraft got very slow, entered a spin which was recovered from only to spin in the other direction before hitting the ground. The pilot was injured, but survived. Jim Marske was going to look into the accident since the Monarch should not have spun, so something may have been wrong with the CG or other portion of the rigging. We may know more in the future as to what caused this accident.

Someone asked what Rudy Optiz had talked about. Bruce indicated Rudy had talked mainly about flying the Horten IV in the United States especially at the Nationals where he placed 2nd or 3rd that year. Optiz was a little more complimentary of the Horten design than Ray Parker had been after testing flying it at Mississippi State. One of the things Bruce noted about the H IV was that its high aspect ratio wing created a lot of flexing which caused some interesting moments for Optiz.

Bob Chase said that he had talked with Richard Avalon, who has the plan rights for the Mitchell B-10 and U-2 aircraft, will have his prototype B-10 completed in time for the Merced Fly-in this year.

There was some other unrelated bantering about various subjects of general interest to those present, after which Andy adjourned the meeting for this month.

(ed. - There were four raffle prize winners, but I forgot to write down who won what. I think everyone was generally happy with what they got, though.)



LETTERS TO THE EDITOR

9/29/97

TWITT:

Sorry I haven't submitted anything in a while, but I have been busy traveling (mostly work) and trying to get a sailplane recovered and repainted (my trusty old 1-26 is just about airworthy again!).

I have noted several folks asking about Kaper Wings, so I dug through my files and found an old brochure and several articles that analyzed the aerodynamics of the Kasper vortex lift airfoils. I have included them for the library or possible use in the newsletter. While digging through old issues of Soaring magazine, I came across several articles

from the early '70s about various flying wings, mostly from Jim Marske. I have also included them in this package.

Regards,

Kevin Renshaw
Fort Worth, Texas

(ed. - Thanks a lot for all the material. I will include a listing of it just below this section. Glad to see you are about ready to get back in the air.)

"Some Ideas of Vortex Lift", Witold A. Kasper, Engineering Consultant; Society of Automotive Engineers, Inc., Warrendale, PA, year unknown, 11 pages with illustrations. Abstract: In tests on a glider designed for experimenting with vortex generated lift, the author experienced an unknown phenomenon which kept the glider afloat at half the usual sink rate and stalling speed. After study it was realized that a huge vortex had been formed after the stall which explained the presence of additional lift at high angles of attack and low speeds. The implications that this discovery has in terms of improving the slow speed characteristics of airplanes are explained in the paper in addition to a detailed study of the characteristics of the vortex.

"Wind Tunnel Investigation of the Kaper Vortex Concept", Edward W. Kruppa, University of Washington; American Institute of Aeronautics and Astronautics, Inc., 1977, 10 pages with illustrations and charts. Abstract: A model of the Kasper vortex lift wing was constructed and tested in a small scale wind tunnel in an effort to verify the inventor's high lift and low drag predictions. Not one of the vortex configurations tested performed as well as a conventional clean airfoil. Flow visualization studies using tufts indicated fundamental differences from Kasper's predictions, including both the direction of vorticity and the number of vortices present. The model from a former wind tunnel investigation was obtained in order to confirm the promising results reported. Retesting, however, showed drastically inferior performances to that originally published. This investigation, though not matching full scale Reynolds numbers, indicates that significant vortex lift cannot be obtained without some means of external energy addition.

"A Brief Wind Tunnel Test of the Kasper Airfoil", Daniel Walton; Soaring; November 1974, pp. 26-27. Short article including pictures, charts and illustrations.

"Flying the Pioneer II", Rick Apgar with commentary by Paul Bikle; Soaring; July 1974, pp. 22-25.

"The Monarch", Jim Marske; Soaring; issue unknown, p. 28

10/28/97

Dear TWITT:

I recently received the TWITT sample newsletter that I requested. It was well worth the wait and I may be subscribing soon.

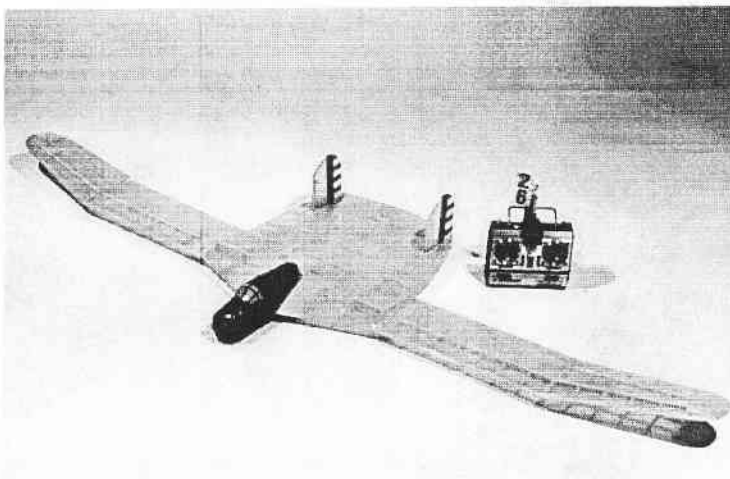
As I was reading the newsletter I came across your request for information on the Kasperwing. You may be interested to know that J-Bird, a company in Wisconsin, is marketing an aircraft called the K-Bird. The K-Bird is remarkably similar to the Kasperwing in performance and has identical proportions. It is noted in the literature I have about the K-Bird that the aircraft is capable of vertical descents and has a very short take-off roll. I have placed J-Bird's address and phone number below and I hope it will be of use to you. Please feel free to e-mail me if you have any questions.

Sincerely yours,

Samuel Wilson

J-Bird
Box 438
210 Main St.
Kewesum, WI 53040
Phone 1-414-626-2611

(ed. - Samuel hasn't even joined yet and he is already contributing information on flying wings. We hope he decides to subscribe.)



10/25/97

T.W.I.T.T.:

Months back you featured the sketch of my 1939 German experiential flying wing aircraft. Here is a photo of my five month long project. The entire structure was constructed out of stick balsa &

spruce. The fuselage was over 12 inches tall, & the entire structure was covered with transparent green Monokote. This was one of my finest works to date.

How did it fly? For the first fifteen minutes, it flew fantastic - then the wing broke in half while performing a loop. I do realize the added stresses due to the forward swept design, but I should have paid more attention in joining the two wing halves together. (See picture on following page.)

After twenty years of building experimental one-off designs, I think I will revisit the basics of model building techniques in joining wing halves together.

Attached is a jpeg file of this wing.

Sincerely,

Michael St. John
Email: msj239@aol.com

(ed. - I e-mailed Michael to try and determine what aircraft was his since I couldn't readily identify anything in the last 8-9 issues that didn't have a source and title. Below is the response to that e-mail.)

10/28/97

I cannot find the issue that you featured my design, but it was on the cover.

Here is a wing (sort of) that is still flying. (Opposite column)

Michael St. John

(ed. - Thank you for the information and pictures of your models. I did a test run to see how well they would come out with a laser printer and I think everyone will be able to get a good idea of what you have done.

If you have any other stories on construction and flying characteristics on these or other models we would like to hear about them if you have the time. E-mail makes an excellent way since I can electronically transfer the material directly into the newsletter without all the typing necessary with a regular letter.

Over the past months I have used drawings from David Master's German Jet Genesis collection on the cover. They have included the DFS 194 which was dated 1939, the ARADO E.581-4 with no date, the ARADO Ar 1 with no date, the BMW Strahlbomber 1 with no date and, the DFS 39 with a date of 1937. Therefore, I must assume you did at least one of these illustrations for the book. If so, it was very well done. If you have any other renditions of proposed or actual flying wings you think would be of interest to the group, we would like to see them.)

10/27/97

TWITT:

Please find enclosed my check for another year's membership renewal.

I enjoy the newsletter each month and wish that I lived close enough to attend the meetings! An item that I

would like to see included in the newsletter would be a review each month of an airfoil for tailless aircraft. The article could include the coordinates for plotting the airfoil and items such as Max CL, CP travel, etc., and the pros and cons of each airfoil.

Another item that I would like some help on, is any and all information (drawings, pictures, etc.) for the Snyder ARUP S-2. I would really appreciate it if you could put me in contact with Richard Snyder from your July '97 meeting, address and telephone number if possible.

In the October newsletter, Andy asked for information on the Kasper Wing. I have a small book, 80 pages, by Witold A. Kasper that was published in the late 70's by Meheen Corporation, Denver, CO. It covers the theory behind and to some extent the design of the BKB-1 wing. This is an enclosed glider and not the powered ultra-light on the cover of the newsletter. I am not interested in giving up the book, but would be willing to make a copy and send if you are interested, maybe trade for something from the TWITT archives.

Thanks,

Robert Higgins
24996 S. 638 Road
Grove, OK 74344
(918) 786-3872

(ed. - Thanks for the renewal and the comments on things to present in the newsletter. We will have to go through the library and see how much we have on airfoils and coordinates that could be used as you suggest. We don't have a large amount of material on ARUP but will send you some of it along with Richard's address and phone number. I am sure he would be glad to talk your ear off if you are interested in the design.

We will probably take you up on the offer to copy your Kasper book, but we need to find some things in the library you might want to exchange. If you have some other subjects of interest let us know and we will take a look and see how we can match copying an 80 page book.)

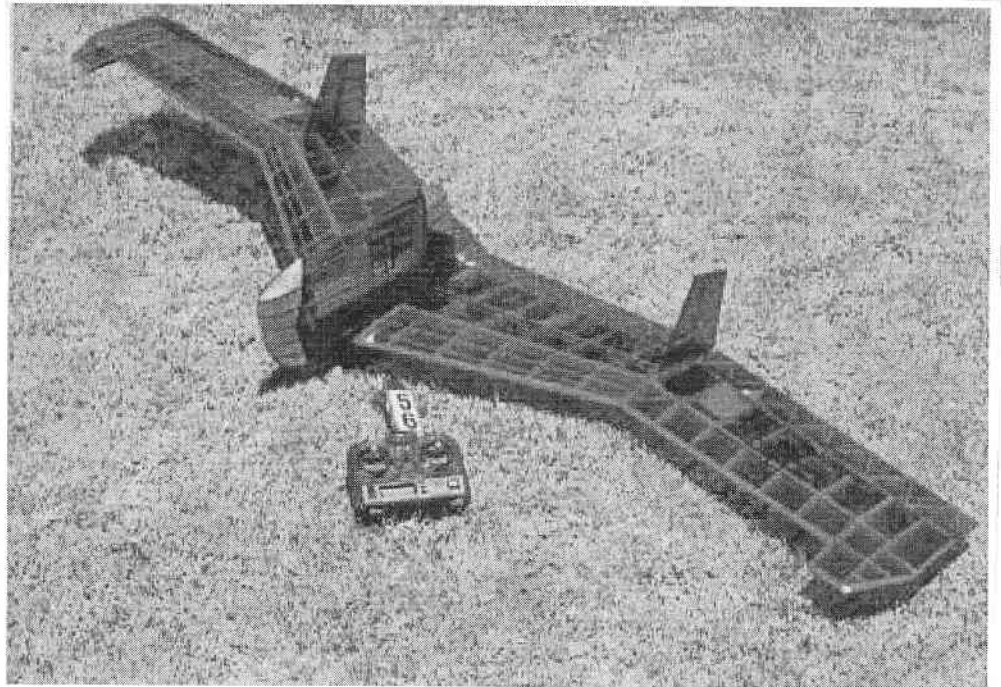
10/25/97

TWITT:

I continue to enjoy the newsletter and am happy to read of successful recent meetings. It's great that TWITT has found Mr. Snyder and rekindled enthusiasm for the ARUP design. Al Bower's presentation was another I'd like to have heard, since his talk at Harris Hill demonstrated a gift for well-conceived and crafted

presentations on his subject; he should do a book. Phil Barnes' forthcoming talk appears well worth the effort. 'looks like you're on a roll!

Enclosed are an appreciable part of my file material on Witold Kasper in response to your request in the October "President's Corner". The patents did not all print well, due to poor microfilm reproduction. If you or anyone else could furnish me with a copy of Kasper's booklet(s) I'd appreciate it.



ABOVE: Michael St. John's unnamed, swept-forward, radio controlled flying wing. The tall, narrow fuselage probably acts as another vertical surface to augment the outer wing fins. Also note the forward protruding wing tips.

To expand on your and Ed Sward's comments, I believe that Charles Zimmerman's famous NACA TR 431 and his ensuing designs and Patents - V-173, XF5U-1, etc., - were inspired by patent applications by Dr. Snyder (9/8/30) and Richard Burton Johnson (8/12/31). I understand that such patents were screened by NACA and thus might have been reviewed by Charles Zimmerman. Regardless, I view each of these three as an important pioneer who made remarkable progress during a difficult economic time and in the face of expected intellectual intolerance. Each sacrificed to earn his place in aviation history. Certainly the ARUPs hundreds of hours of safe flying attest its merits. Johnson's "Uniplane" (for A/R = 1) was also a success, though of a different sort. Numerous forced landings, frequently precipitated during low-altitude climb out and always due to failure of an underachieving and unreliable engine, proved the unique low-speed controllability of the low-A/R concept.

Incidentally, Charles Zimmerman passed on only a few months back, and R.B. Johnson was one of my first Bibliography purchasers. If he is still alive, he too might make an entertaining and informative speaker (last address: Mr. Richard B. Johnson, 182 Pas Pajaros Calle, Sonoma, CA 95476-7307).

Tailless Aircraft Bibliography progress is slow but somewhat sure. I have set up the cross-reference section, which takes up ten pages of categories even without the listings themselves. I will condense after all entries have been made, but the labeling of 4-6,000 items with several categories each will consume time. SO...Would you please inform the readers that I plan a "NOT FOR PUBLICATION" interim document of some 300 pages that may fill their needs until I can finally "finish" the 5th Edition. I am going to print a very limited number for friends who have helped me greatly with the project. I will determine how many to print and bind solely based on my personal needs and the number of \$30.00 (\$40.00 overseas) checks I receive from readers before December. This will be a complete listing with only the new appendices to augment my normal internal (hidden) cross-referencing. No extra copies will be printed/bound.

I too enjoyed the Flying Wing Symposium greatly. What a thrill to talk with living history and such a repository of knowledge! Everyone was most kind and sharing, even with such a peripheral player as myself. Great people! Thanks to all.

Sincerely,

Serge Krauss

(ed. - Thanks for the great letter and all the material you sent along on Kasper. I will list it at the end of this piece I did with Kevin's stuff. All of this has made for a great newsletter what with all the interchanging of information for the membership. I know people are going to want copies of some of this stuff so now we will have to come up with what can be adequately copied and its cost.

It sounds like Richard Snyder may have received a call from an attorney who might be interested in helping him get a new patent on his father's vision for the future of ARUP aircraft. Hopefully, if this happens he will let us know and we will be able to release a drawing of what Dr. Snyder envisioned for us.

Sonoma is a little far for someone to travel for a program, but I will send him a letter about TWITT and see if he might be down this way sometime and could give a talk. It is worth a try.

Your letter has now let everyone know about your plans for the 5th Edition. Would the interim material be in such a format it would be useful to someone who didn't have one of the earlier editions? I ask, since if you do make a profit from the publishing, would you be interested in putting the word out on the Nurflugel mailing-list to see if it generates some extra orders? Let me know, along with what you would like some type of notice to say about the material, if you are interested.)

"Flight Testing the Bekas N", Witold Kasper, Soaring, November 1969, pp. 12-14.

"Remarkable L/D Achieved by Short-Spary Tailless Sailplane", Peter Bowers, Air Progress HOMEBUILT AIRCRAFT, Spring/Summer 1966, pp. 62-98.

United States Patent Office, 3,438,597, April 15, 1969, Witold Kasper, 1853 132nd SE, Bellevue, WA 98004. Abstract: These aerodynamic controls which are all mounted essentially on the trailing edges at and near the wing tips are: horizontal stabilizers serving optionally in emergencies as elevators; elevons acting as elevators and/or ailerons; vertical stabilizers extending above and below the wing tips and optionally positioned inwardly to increase directionally stability and at all times serving as end plates; rudders essentially aligned with the vertical stabilizers to continue the end plate functions when aligned and then to operate independently of one another for directional control, and each rudder having portions positioned forward of their mounting which are pivotable over the wing ahead of the stabilizers to act independently of one another as spoilers also creating an aileron effect and to act together also serving as air brakes.

United States Patent, 3,831,885, August 17, 1974, Witold Kasper, Aircraft Wing with Vortex Generation. Abstract: Tailless airplanes, such as disclosed in US Pat. No. 3,438,597 as a stall occurs or is about to occur, may be flown at very high angles of attack to generate favorable spanwise vortex flows which augment the swept wing profiles creating resultant wing profiles having better lift characteristics, i.e., the vortexes created are lift generating.

United States Patent 4,781,341, November 1, 1988, Witold Kasper, Flying Wing Aircraft. Abstract: An ultralight aircraft having a generally rectangular, swept-back, single-surface wing. The wing, which is formed by fabric mounted on exposed spars and ribs, has a reflex profile to provide pitch stability which is further augmented by horizontal stabilizers projecting rearwardly from the wing adjacent the tips. Roll and yaw control are provided by a pair of rudders pivotally mounted at each wing tip. The forward ends of the rudders pivot inwardly to alter the magnitude of the wing's lift. The rudders pivoted simultaneously act as spoilers and speed brakes controlling the rate of descent. Pivoting one of the rudders individually moves the center of lift for one wing inwardly and increases the drag of that wing to roll the aircraft into that wing. The rudders tilt upwardly and outwardly in a dihedral configuration to provide roll stability. Stationary end plates mounted at each wing tip adjacent the rudders provide yaw stability.

FOLLOWING PAGE: Page 7 is a collage of drawings from Kasper's 1974 Patent 3,831,885. The airframe views show the leading edges in the up position and a diagram of the air flow pattern. The airfoil sections show the progression of vortex lift as the various devices on the wing are extended into the airstream.



FIG 4



FIG 5

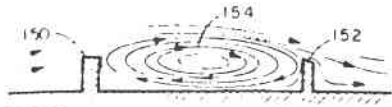


FIG 6

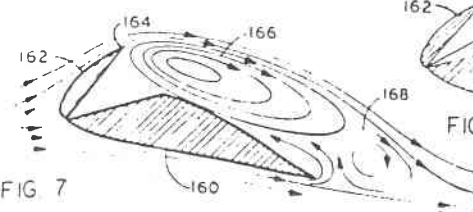
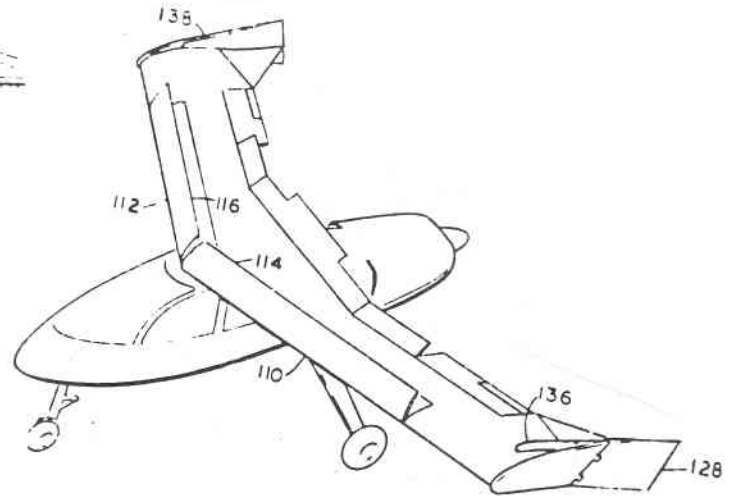


FIG 7

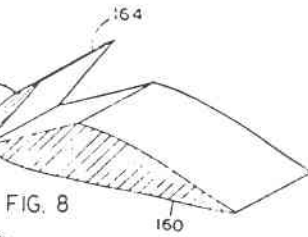


FIG 8

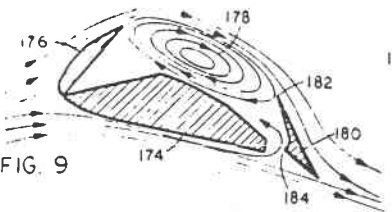


FIG 9

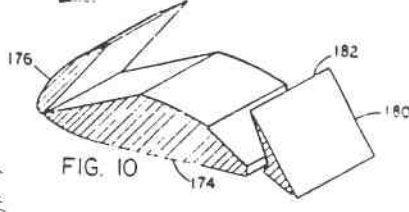


FIG 10

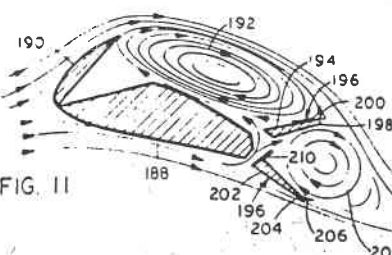


FIG 11

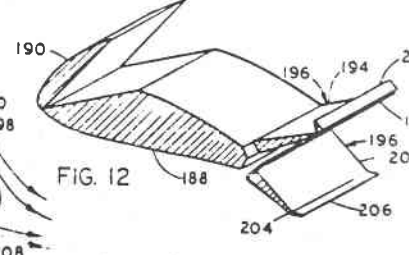


FIG 12

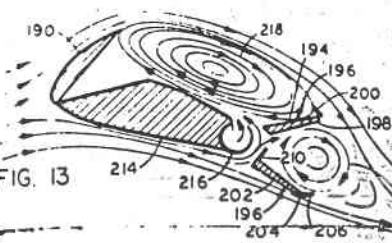


FIG 13

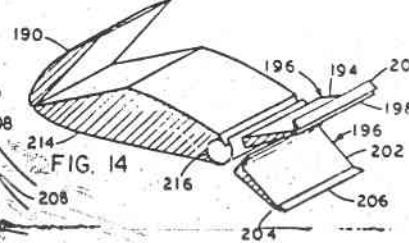


FIG 14

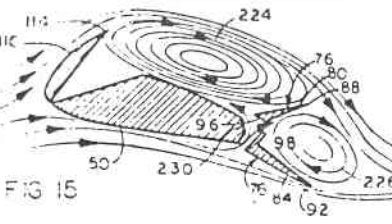


FIG 15

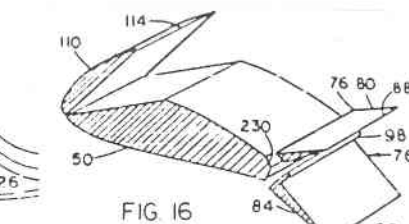


FIG 16

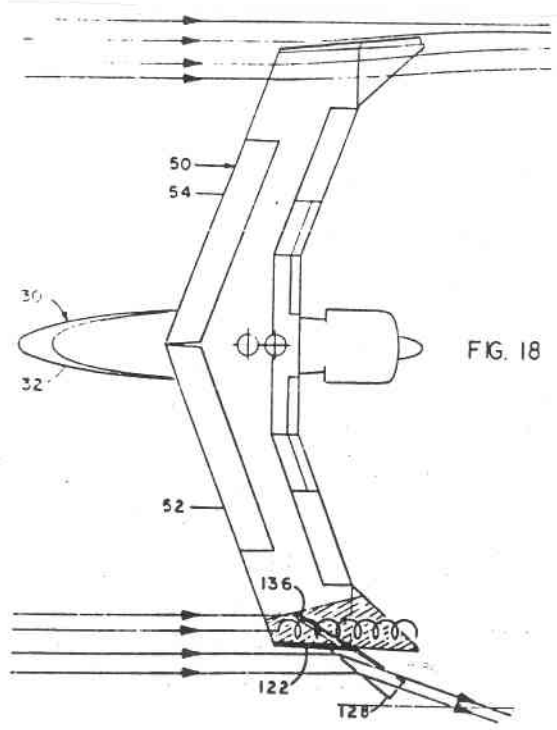
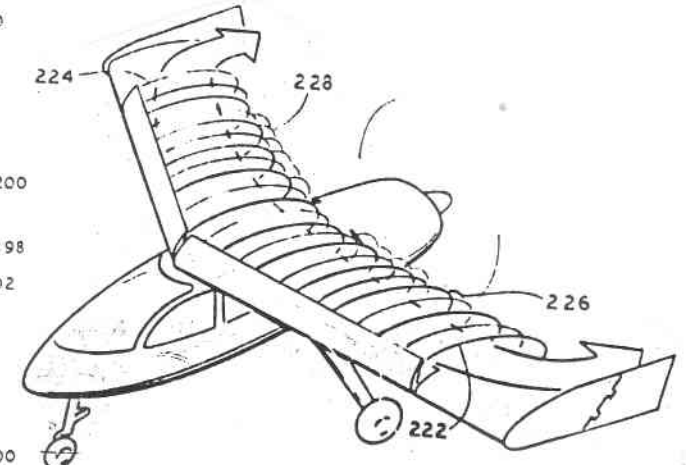


FIG 18

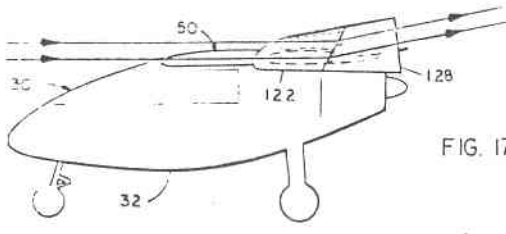
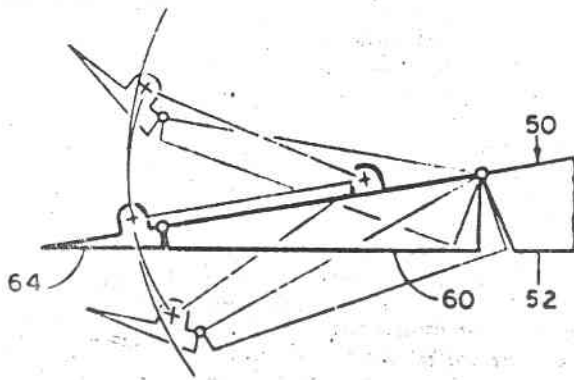
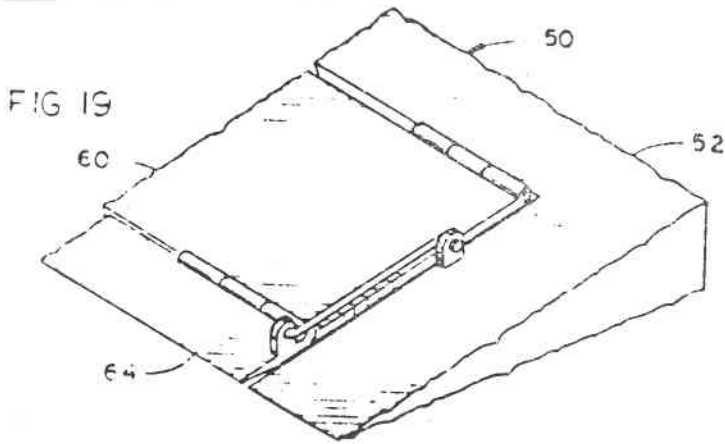


FIG 17



ABOVE AND TOP OF NEXT COLUMN: From Patent 3,831,885. Illustrate how a control surface such as the elevon is equipped with a unidirectional tab and its linkages to make the feedback sensitivity and the effective control comparable for like arcuate deflections of the elevon either above or below the normal cruising contour of the wing

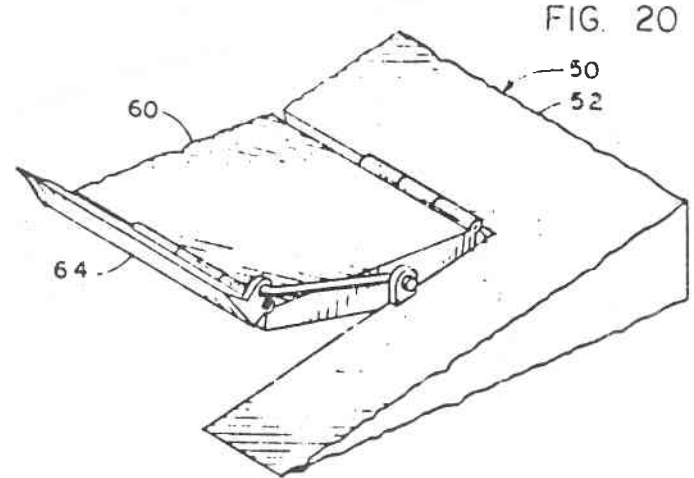
Cascade Ultralites Kasperwing 1-80 (Hybrid) information page (#174) from an unknown source.

Letters To The Editor, Soaring; February 1974, p. 3; March 1974, p. 3; April 1974, p. 3, and; March 1975, p. 5.

"Kasper Vindicated?", Sport Aviation, July 1991, p. 59. Short piece relating to an earlier article in 1973.

"The Revolutionary Kasper Wing", Jack Cox, Sport Aviation, July 1973, pp. 10-16. Extensive article on the Kasper Wing including drawings, diagrams and pictures.

"What Happened To The Kasper Wing?", L.D. Sunderland, Sport Aviation, January 1976, pp. 30-35. Extensive article on the prototype Kasper Wing after it was modified and "flown" for the first time. It goes into the theory of vortex lift generation and some model and wind tunnel testing. Includes pictures and diagrams.



Witold Kasper's Obituary, Sport Aviation, date unknown.

"An Antique - Grand Champion Ultralight", Mary Jones, Sport Aviation, January 1996, pp. 81-84. Article on Steve Pinkham's restoration of a Kasperwing ultralight and being named Grand Champion Ultralight at EAA Oshkosh '95.

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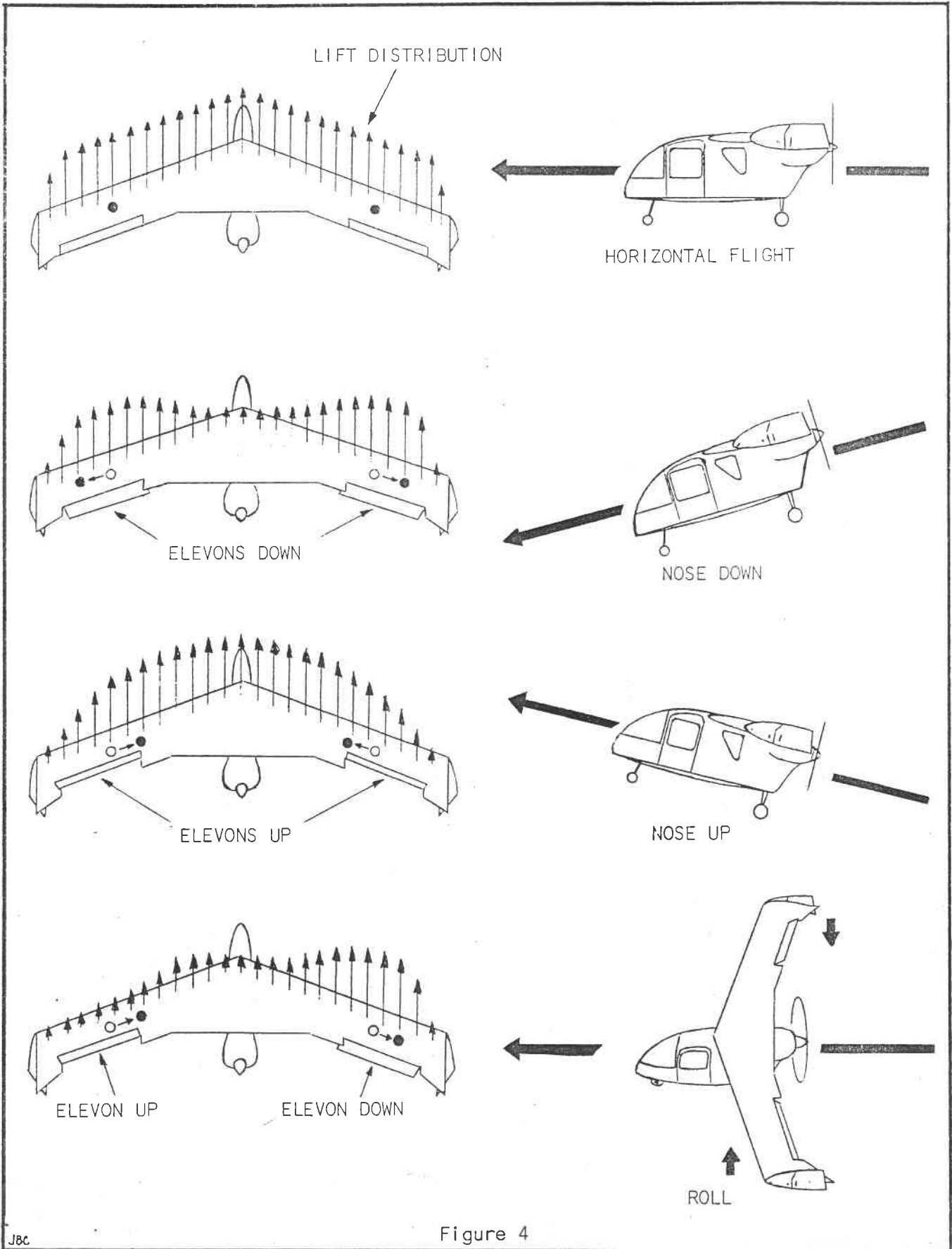
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BELOW: Lift distribution diagrams for the original 2-place Kaper Wing. Source: Sport Aviation, July 14, 1973, p. 14. Contributed by Serge Krauss.



J8c

Figure 4