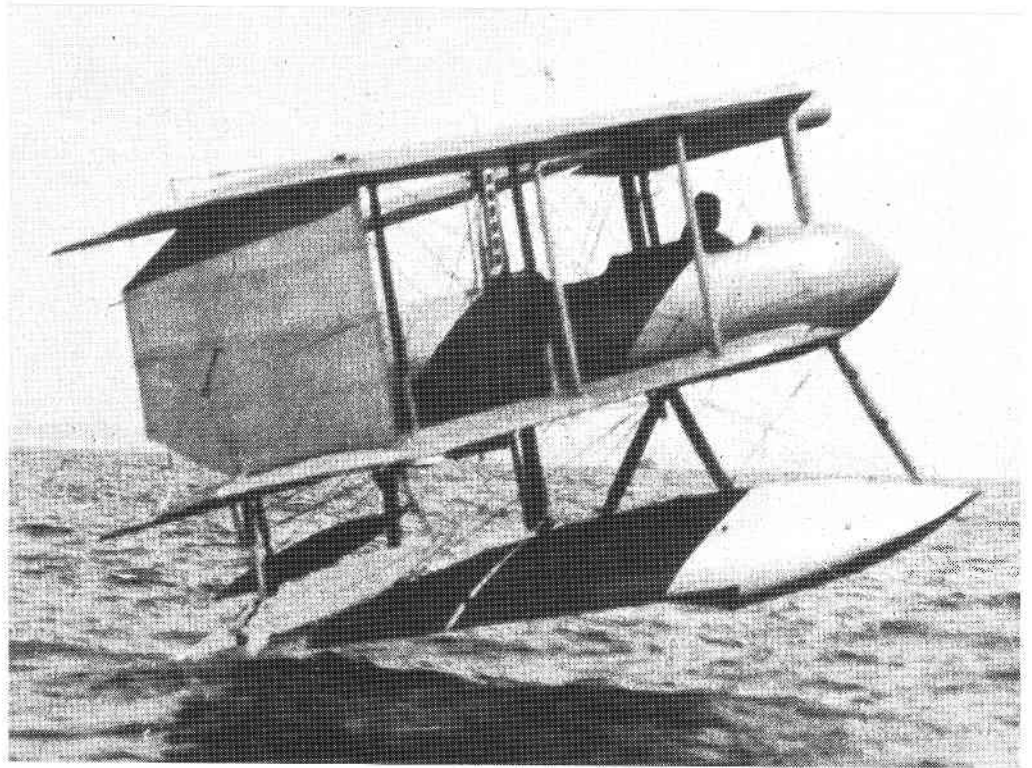


T.W.I.T.T. NEWSLETTER

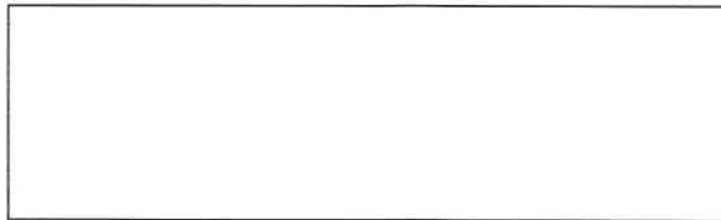
One derivative of the Burgess-Dunne hydroplane. The first in this series was flown by Clifford Webster in March 1914 at Marblehead Harbor, Mass. This generated considerable interest on the part of the Army who bought on December, 1914 and used it in experimental work with the Coast Artillery until October, 1916.

W. Starling Burgess had acquired the licensing rights to build and continue development of John Dunne's tailless design in the US. In partnership with Glenn Curtis they had considerable success in developing seaplanes for both civil and military use beginning around 1913. One hydroaeroplane design even won the 1915 Collier Trophy. (Sources: Picture unknown; information - Winged Wonders by E.T. Wooldridge.)



T.W.I.T.T.

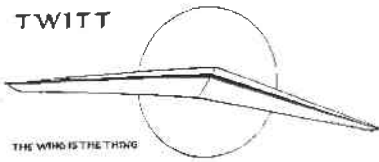
The Wing Is The Thing
P.O. Box 20430
El Cajon, CA 92021



The number to the right of your name indicates the last issue of your current subscription, e.g., **9501** means this is your last issue unless renewed.

Next TWITT meeting: Saturday, January 21, 1995, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, CA (first hanger row on Joe Crosson Drive - East side of Gillespie).

TWITT



**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.

T.W.I.T.T. Officers:

- President: Andy Kecskes (619) 589-1898
- Vice Pres: Bob Chase (818) 336-5485
- Secretary: Phillip Burgers (619) 563-5465
- Treasurer: Bob Fronius (619) 224-1497

Editor: 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**

(619) 596-2518 (10am-5:30pm, PST)
(619) 224-1497 (after 7pm, PST)

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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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PRESIDENTS CORNER



I hope you all had a very happy holiday season, and that the coming of the new year was a joyous event signalling the continuation of past resolutions to complete your dream airplane.

This year I resolved to go a little more high tech, so by the time you receive this you will be able to communicate with TWITT through the Internet/E-Mail system. The address is **nbkp63@prodigy.com**. For those of you who have access to Internet, please drop me a note with your address, and addresses of friends you know are interested in flying wings, so I can start building a network. It will be interesting to see how this all works, since I will be just getting started.

For those of us who attended the John Street Aeronautical Society gathering on New Year's Eve and/or Day, a good time was had by all. The models were great, the flying a little windy, and the music provided by Floyd Fronius (violin) and Dominique Veillard (mandolin) just super.

A small group of us went out to the local bird haunt and examined the wonder of how they manage to keep complete control their flying wings (even though they do have a small tail surface). They also ate about 5 loaves of bread while we studied their antics of hovering, diving for tossed pieces, and generally running into each other trying to be the first to the food.

I think we have some interesting material for you this month. Please look over the plans submitted by Barney Vincelette and give us some feedback we can publish that will help him and others out there who are contemplating similar projects.

It was suggested we look into sending our out-of-town mail second class since it was not meeting sensitive. We don't have enough volume to warrant purchasing a second class permit, but we are continuing to look into other ways to keep mailing costs, and dues under control so they won't have to go up in the future.

Well, that's about all I have for this month. Please pass our E-mail address around so we can get more of the flying wing nuts into the organization.

Andy

JANUARY 21, 1995 PROGRAM

The program this month is sort of continuation of two different past programs. **Pat Oliver**, will be our guest speaker telling us about how he has designed a new line of paper flying wings and what the future holds for this project. (ed. - Most of you remember Bob Chase's fascination with design testing through paper models, and Don Westergren who uses paper and cardboard to test out scale model theories.)

Pat is developing a program for young students using the flying wings as a means of teaching aerodynamic design and the theories of flight. It appears that he will be given an opportunity to start the program at a school in Coronado, CA in the near future.

He is also working on obtaining a manufacturer to produce these designs for mass selling. They are printed on heavy paper stock using a laser printer run by a program in his MacIntosh.

evening or Saturday morning to see which program we will have and make your plans accordingly.

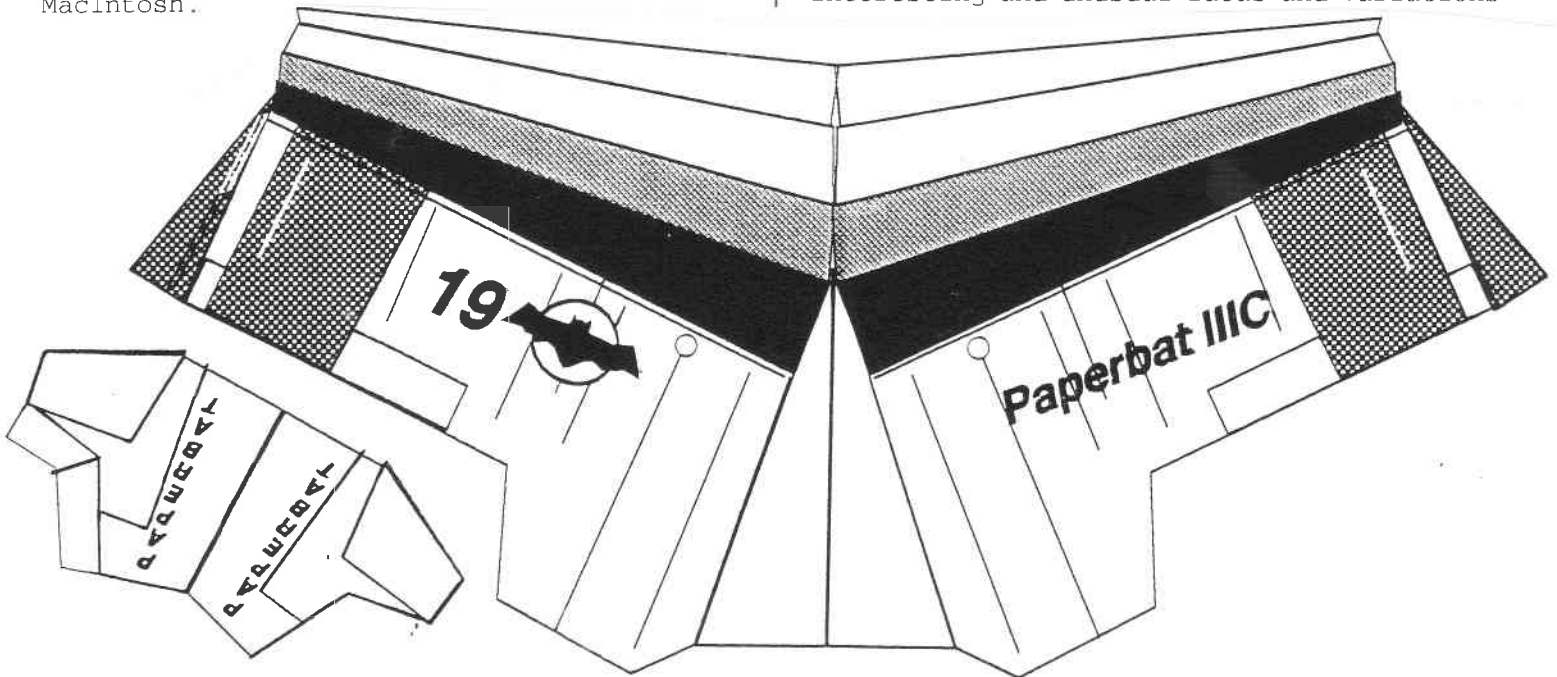
LETTERS TO THE EDITOR

10/29/94

TWITT:



First of all, I would like to congratulate and thank Andy on the occasion of the 100th issue of the TWITT newsletter. The newsletter has served as the backbone of this organization, since many of us are not able to attend the regular meetings. Looking back over the first 100 issues, there are a lot of interesting and unusual ideas and variations



ABOVE: Pat's PAPERBAT IIIC flying wing. The shadings and lines are also carried on the reverse side so as you fold them to create a rigid structure the appearance remains constant.

If Pat can't make it we will have an alternate program which will include videos of several of the more interesting sessions from the 1993 SHA Western Workshop. Many of our Southern California members didn't get a chance to attend, so this would be a perfect opportunity to learn something new about building or designing techniques.

NOTE: For those travelling some distance, you might want to give us a call on Friday

on the idea of flying wings. Thanks, Andy, for pulling all of this together and publishing it in a clear, readable format. Our little group of "wingnuts" has lasted a lot longer than many other organizations I have belonged to.

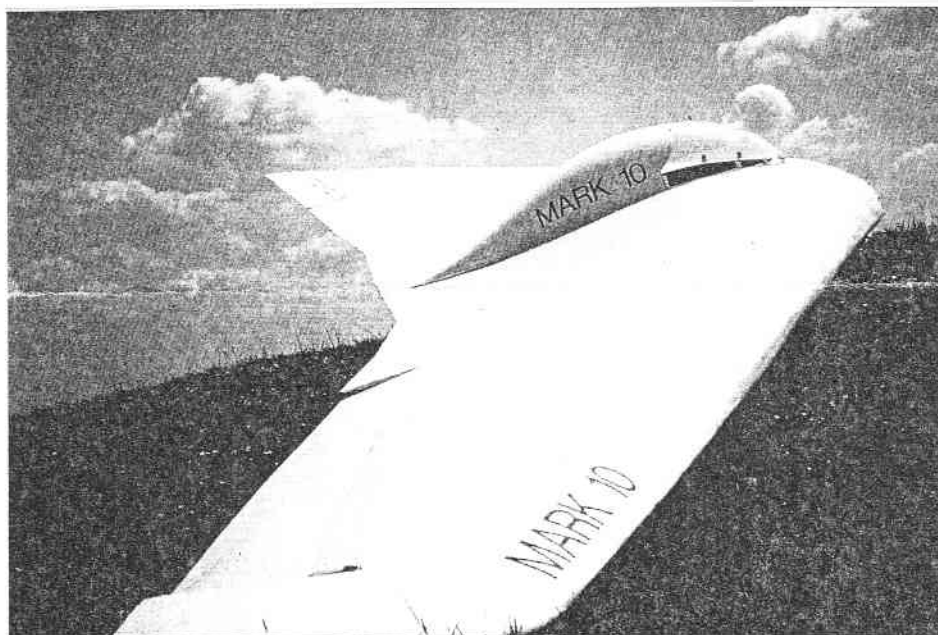
Enclosed is an article from Air Sports International, which is the official publication of the Federation Aeronautique Internationale (FAI), the international sanctioning body for all aviation records. It is an unusual magazine in that the organization is headquartered in Paris, but the magazine is published in New Delhi, India. The article describes the rigid wing hang glider that Rolf Markman has built. Unfortunately, the article does not give an address

for Mr. Markmann. Have any TWITTS ever heard of him?

Regards,
Kevin Renshaw

(ed. - Thank you for the compliments, but I must say it couldn't have been done without the great contributions made every month by people like you. Your willingness to spread the word and share your information and experiences are what keep this thing going. I was recently going through the back issues and couldn't hardly believe I had been editing the newsletter since sometime in 1989 (time does go fast when you are busy).)

I have presented some of the material from the article in the section below, so others can get an idea of what Markmann is doing. With such a widely diverse membership, perhaps someone knows him or has contact with Bill Moyes and could find Markmann's address.)



MARKMANN'S MARK 10

(Source: Air Sports International, June 1994, p. 37).

Rolf Markmann, a dental mechanic and hang glider pilot, became interested in rigid wing hang gliders and had built several test models. After much research he homed in on Dr. Reimar Horten, the inventor and constructor of these rigid wing gliders. From Dr. Horten he gained an insight into the secrets of this plane.

Years later Markmann flew to Australia to meet Bill Moyes, a hang gliding instructor, with the idea and dream of building a glider with a 15 meter span. Moyes was excited by the project, and within a few weeks they had

built a wing and tested it in flights along the Australian coast.

Markmann was finally able to meet with Dr. Horten, and through this meeting developed a 10 meter span rigid wing. It was foot-launchable and its performance considerably better than a hang glider.

After surmounting the legal barriers, the calculated flight data for the Mark 10 was confirmed on the test car of the Ringen Technical High School. (ed. - From the picture this rig was a moveable wind tunnel mounted on a van type vehicle. It looks quite elaborate and capable of putting the aircraft in any number of attitudes while moving.) After several positive tests, the wing passed it first flight test, in style.

The Mark 10 reaches a maximum glide ratio of 20:1, with a speed of 120 Km/h, and a sink rate of 3.50 m/sec. Despite its high performance, it maintains its safe flight characteristics at every flight speed.

The Mark 10 will be put into production some time in the near future. The wings will break down into three segments for ease of transport. The cockpit and pilot covering will be made adjustable as per personal preferences of the owner.

(ed. - The design looks like a cross between some of the Horten designs, and the Gilbert wing we featured last month. If the performance figures are accurate, this wing might give the SWIFT some competition and perhaps help the Ultralight Soaring Association with another avenue for their members to explore.)

12/23/94

TWITT:

The enclosed issue of the National Soaring Museum's Journal

includes a couple of articles of interest to TWITT. It covers the induction of Rudy Optiz into the Soaring Hall of Fame. Mr. Optiz first gained fame as a test pilot on the ME 163 rocket powered flying wing, and since the war has been a major contributor to the sport of soaring in this country. He rebuilt a Horten IV all wing sailplane and competed in soaring competitions with it in the early 1950's (as seen on the TWITT video tapes!). (ed. - *The short piece of footage on the video shows the IV at the Texas Soaring Association's field in Grand Prairie, TX. Rudy is the smiling gentlemen at the beginning of the piece.*)

The other article in the Journal covers the history of this particular Horten aircraft and includes some nice three views and data on the Horten designs. This particular Horten IV is

now part of the Planes of Fame collection at Chino, CA.

Best wishes for the New Year.

Regards,
Kevin Renshaw

(ed. - Thanks for the material. Most of the three-views have been printed at one time or another in the TWITT Newsletter, so I won't repeat them here. However, I will put in the list of references included in the article on the IV, since it contains publications that some of our members may have, and perhaps could send us copies of the pertinent material for the library.)

HORTEN IV REFERENCES

(As presented in The National Soaring Museum's Historical Journal, Vol. 16, No. 2, 1994, p. 12.)

Bungee Cord, Newsletter of the Vintage Sailplane Association, Vol. V, No. 3, Sept 1979, p. 7.

"The Modified Horten IV of the AHQ-BAFO Club", by Bertrand Handwork, SOARING, Nov-Dec, 1950, p. 9-10.

"The Horten IV, Another Sailplane Catalog Item", by Dr. August Raspert, SOARING, Nov-Dec 1950, p. 8.

"Interesting Gliders", by Peter S. Bowers, SOARING, Jan-Feb 1959, p. 23.

"Flying Wing Pilot Position and Design Options", by Dr. Reimar Horten, translated by Jan Scott, SOARING, aug 1980, pp. 22-25.

"Lift Distribution On Flying Wing Aircraft", by Dr. Reimar Horten, translated by Jan Scott, SOARING, June 1981, pp. 40-42.

NURFLUGEL, Die Geschichte der Horten-Flugzeuge 1933-1060, von Reimer Horten/Peter F. Selinger, H. Weishaupt Verlag Graz.

"The Horten Flying Wings", The World Vintage Sailplanes 1908-1945, by Morton Simons, pp. 126-129.

"The Horten X Foot-Launched Wing", SOARING, June 1980, p. 24.

11/15/94

TWITT:

Here's \$2 for a copy of the A-12 Avenger article mentioned in the last issue.

Did you know that Future Flight, makers of the Klingberg Wings, has an Radio Controlled

Rocket Glider (RCRG) kit that's a flying wing? Adaptable to slope or electric.

The group book purchasing sounds like a good idea if it doesn't take too long. How about setting up a particular order deadline, and if enough folks order, do it, or send checks back if not? How about if TWITT keeps 10% to pay someone to do the shipping and handling? I would order 3 or 4 books, probably.

Great Newsletter,
Jim Fackert

(ed. - Thanks for the material on the Future Flights models. For those of you who might be interested, the price appears to be \$37, plus \$5 handling and 7.25% tax for CA residents. It is based on the 2 meter wing and uses an "E" size motor for launches of up to 600' and speeds of nearly 100 mph. I have reduced the schematic you included to give everyone a better idea of the wings flexible uses.)

As for the book ordering, you are the only one who responded to the offer, so I would have to say it is a dead issue unless I hear from a significantly more number of members. Sorry about that, but it seemed like a good idea at the time.

10/18/94

TWITT:

Thank you very much for your package of TWITT information, which was very interesting. I heard about you from Mr. Selinger in Stuttgart, Germany.

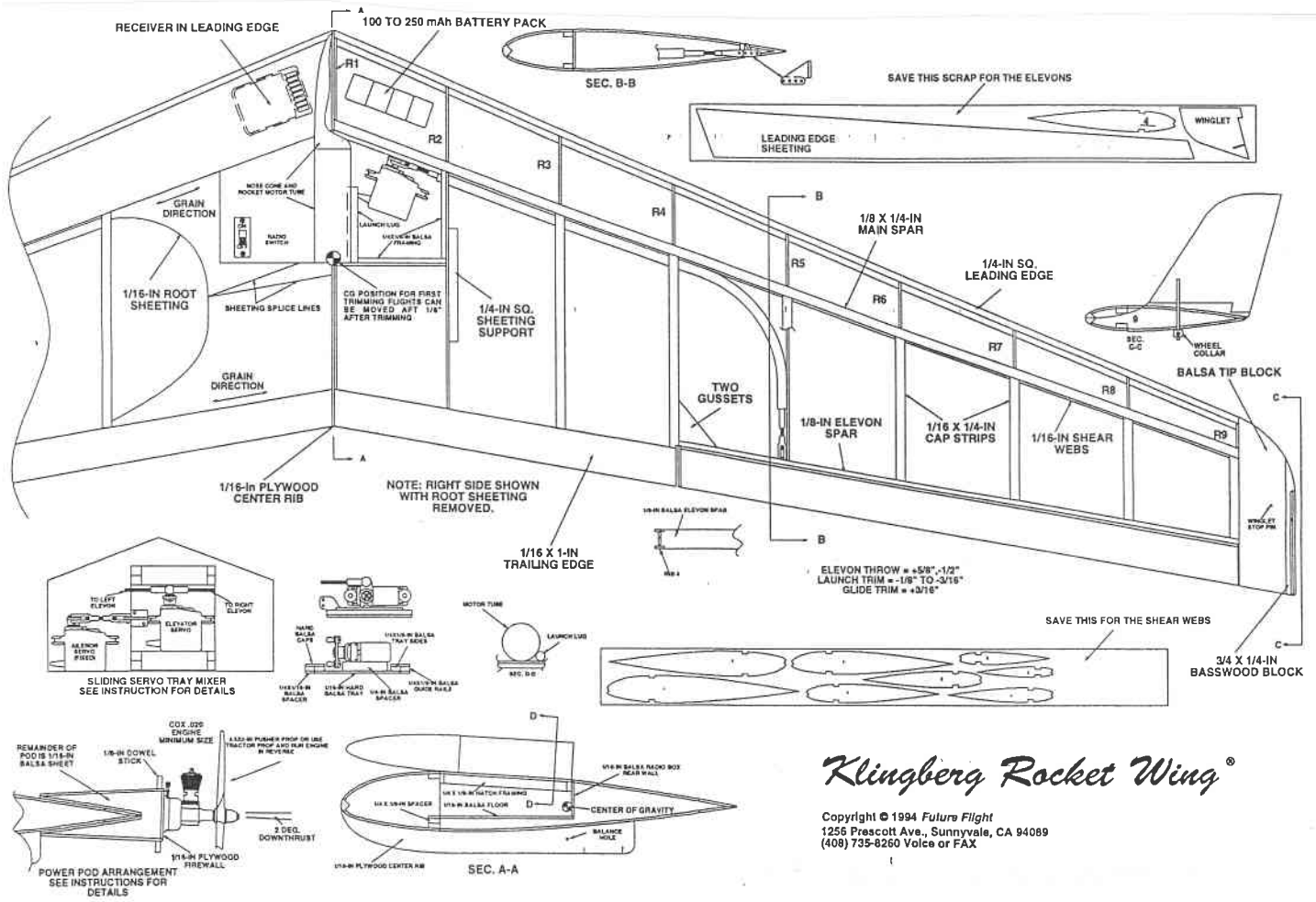
From Mr. Krauss, I have received his fine bibliography of tailless aircraft, which is a great work in this area.

I should like to be a member of TWITT and next month I will be staying in Florida. I will arrange for payment of the membership from there.

I am preparing a publication about "Tailless Aircraft in the World", which is a collection of the development of tailless aircraft in 16 countries of the world. The documentation of 360 main types of this shape will have a short description, photos, and drawings, but it will not be possible to publish all the types included in Mr. Krauss' work. In adding to the types, I have the promise from a lot of German tailless aircraft specialists for a report on their work and I am looking for some persons to write about aircraft from France, Russia, Great Britain and the USA. I think the right person in the USA is Mr. E.T. Wooldridge, author from the book Winged Wonders, a report about J. Northrop. For the address I have faxed to Mr. Lee at the NASM in Washington, who I know from earlier letters.

Or do you have another person for a short report on the development in the USA on approximately two or more typed sheets?

I have some questions about tailless



Klingberg Rocket Wing®

Copyright © 1994 Future Flight
 1256 Prescott Ave., Sunnyvale, CA 94089
 (408) 735-8260 Voice or FAX

aircraft types, and I would like to know who from the TWITT members can I get answers in these matters?

Best wishes and once more, thank you very much.

Rudolf Storck
 Bruckmierweg 2
 82041 Deisenhofen B. München

(NOTE: I am sending you copies from unknown tailless aircraft, that perhaps you may have more information about.)

(ed. - Thanks for the letter, and welcome to TWITT. I am sorry I didn't get to your letter while you were in the US. As you will see, there are a lot of people within the TWITT organization that can provide answers to specific questions you might have about certain types of tailless aircraft. If you would present these in another letter, I will publish them, along with your address, asking for members to respond to you directly with any help they might be able to provide.

As for your question on back issues, you need to let us know how many you want, and send along a money order in USD for the amount shown in the table on page 1 of the newsletter. We are currently working on a table of contents

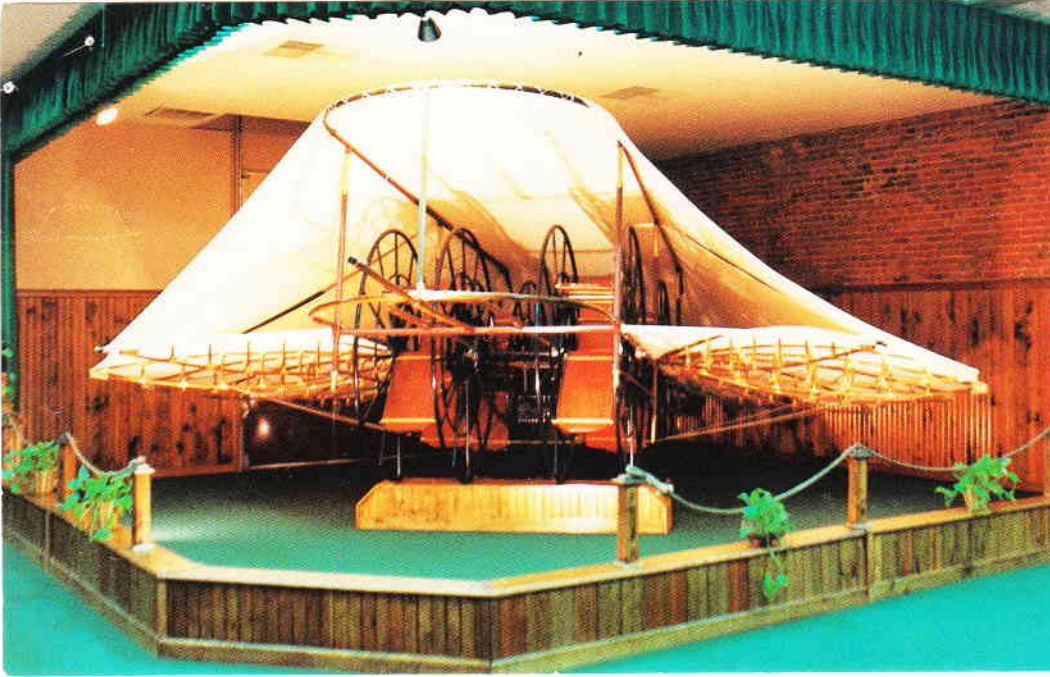
covering all past issues, so you may want to wait before ordering so you can get specific issues.

I have published your list of aircraft you are looking for information on, and we will go through the library to see what we have on each of these. If we have any, we will let you know what they are and how much it will cost to reproduce the material and mail it to you.

I will also publish the two 3-views of the stealth aircraft supposedly seen over the North Sea, and the Northrop TR-3A, since I don't believe we have seen any of these in the past. Thanks for the material.)

Rudolf would like information on the following aircraft:

- | | |
|--------------|-------------------------------------|
| Avro, Canada | Avrocar, 1955 |
| Backstrom | EPB-1, WPB-1 Planks |
| Borchers | Double Delta, Delta Sting Ray, 1980 |
| Dean | Delta Pusher, Starship Gemini, 1987 |
| Rouge | Ekroplane, 1934-38 |
| Dewart | DAW-1, 1988-89 |



ABOVE: A postcard showing a reproduction of the Ezekiel Airship on display at Warrwicks Restaurant, Pittsburg, TX.

12/27/94

TWITT:

After much reflecting upon the matter, I have resolved to take up the design of the flying wing where Davis - and, of course, the great maestro Northrop - left off. My "design" will follow the Davis example in a set of plans that will not require a factory for premolded parts and the like. It will use, as much as possible, things that already exist and it will be kept as simple to build and maintain as possible.

It will have a wing span of 35' and seat two people side-by-side. It will use a Lycoming O-320 engine with a fixed pitch wooden propeller pushing it. It will probably use Cherokee main landing gear with a freely casting nose gear so that on the ground it can be steered with brakes. I might use a small nose wheel steering wheel, however. It will be made from composites, mostly S-Glass and epoxy with foam.

Because the maestro and his physicists have done all the work to optimize all the aerodynamics - and the beauty of its form - I will strictly follow the design of the XB-35 in airfoil selection, washout angle, taper, sweepback, aspect ratio, control size, deflection, and landing gear position. It would be arrogant to assume that we would reinvent the wing that the maestro has brought so close to perfection (much as it is arrogant to assume that there is any advantage to "modernizing" the music of Mozart or Beethoven). All I am doing is akin to

listening to a recording of it rather than going back in time to the live performance.

For references I am using Appendix B of Wooldridge's book Winged Wonders, The Flying Wings of Jack Northrop, and Northrop Flying Wings. To design the structure I am using simple statics, not needing to take recourse to stress tensors or deformation equations - some to eschew doing something stupid like having layers of differing Young's modulus materials carrying the same stress. I shall use some rather pessimistic assumptions to calculate such things as spar cap stress and motor mount forces upon a bulkhead spar combination.

My physics training (I converted my graduate major to physics after I was expelled from an aeronautical engineering graduate program for wearing a fuchsia gorilla suit on campus to protest fraternity threatened imposed dress codes) gives me more than enough background to calculate these things. I will use FAR Part 23 as a guide in designing it to exceed aerobatic strength even though I am not so jockocratic to use the wing for acrobatic flight (but someone else might want to try it with one they build). I am signing up for the Alexander Aeroplane Company course on working with composites and I have read Marshall's book on Composite Basics to get started. I hope those who worked with designing composites will suggest and other things to read and charts to use.

Having worked as an aircraft mechanic, earning my A&P license a year after finishing some post doctorate study in introduction to solid state physics (including some of Theodore Von Karmm's models of Von der Walls forces between molecules of liquid; his style of approximating things is as sublime as his influences upon the maestro's flying wings) I think I know how to design the 35' wing so that it will be much easier to work on than the general aviation aeronautical muzak produced by the likes of Cessna, Beech and Piper.

I have almost finished rebuilding a Lycoming O-320 engine for my project and I am collecting catalogs for parts. I have also put together some rather heavy flight instruments (to help keep the nose weight in balance against the engine in back).

I am submitting my sketches and some spar design calculations to solicit any comments. I will also be communicating with Gilbert Davis on this.

Respectfully yours,
Barney Vincelette

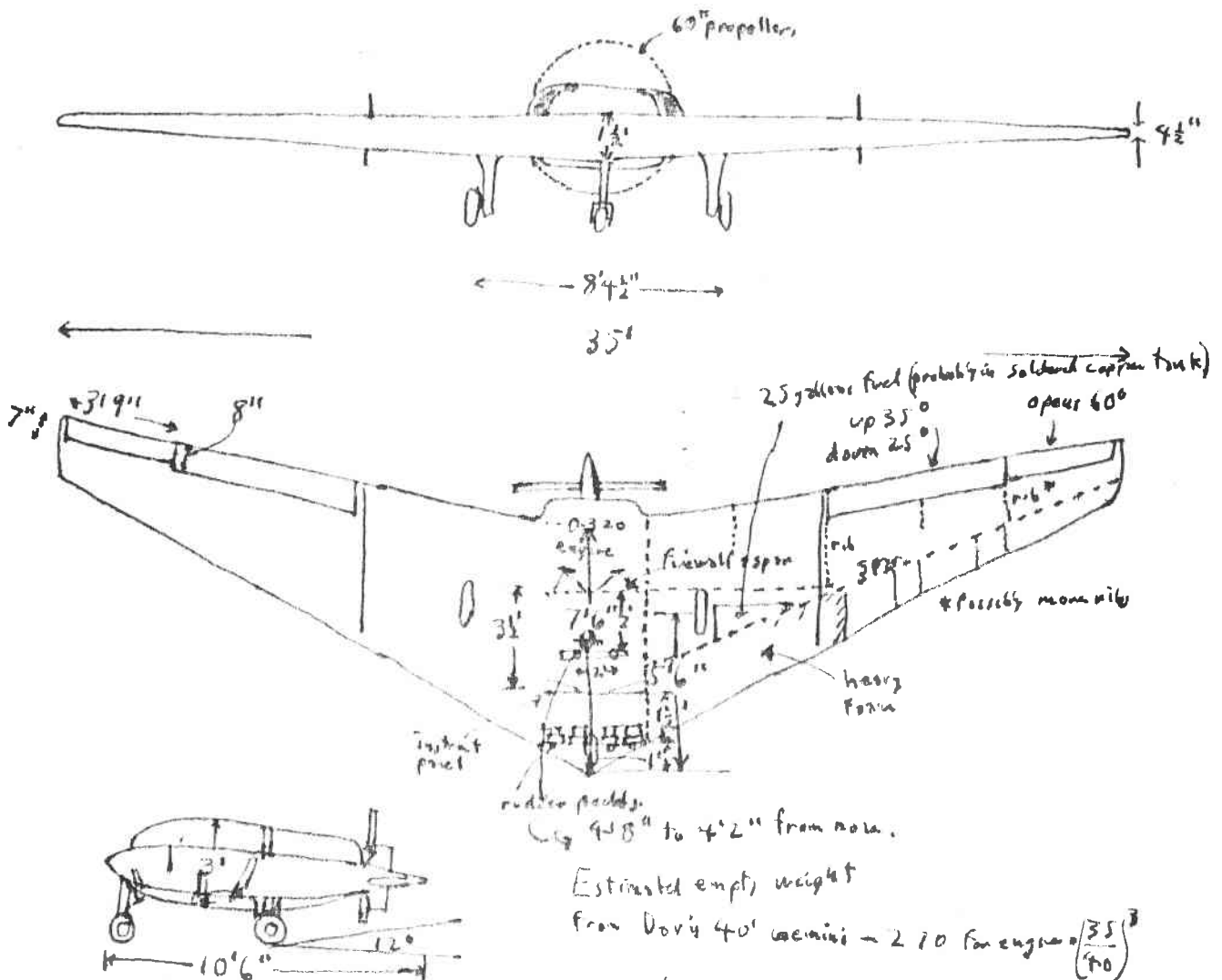
(ed. - You weren't kidding when you called me the other night about putting together a plan.

We have had very good response in the past from our members when asked for comments on a proposed design. I hope that this time will be no different. The sketches you included were a little hard to reproduce, but I think everyone should be able to get the idea of what you are planning.

If you do not already have it (I lost track of who has ordered this), I suggest you get a copy of Alex Kozloff's paper on "Composite Design Properties" with an accompanying tape of his talk presenting this material at the March 1994 TWITT meeting (cost \$5 from TWITT).

Other members, like Harold Buettner, might be of help with the proper selection of materials for various sections of the plane. I am sure there are others out there besides Alex and Harold who can also provide you this information.

We wish you lots of luck with your venture and please keep us informed of your progress. You will probably have many more questions as you go along, so don't hesitate to send them in so the other can have a opportunity to help you resolve them.)



Estimated empty weight

from Davy 40' Gemini - 270 for engine $\left(\frac{35}{90}\right)^3$

= 530# + 270 for engine = 800# empty

300# for fuel 500# for two people and luggage

(But the designer and his wife are certainly not such human blimps as to weigh 500# together)

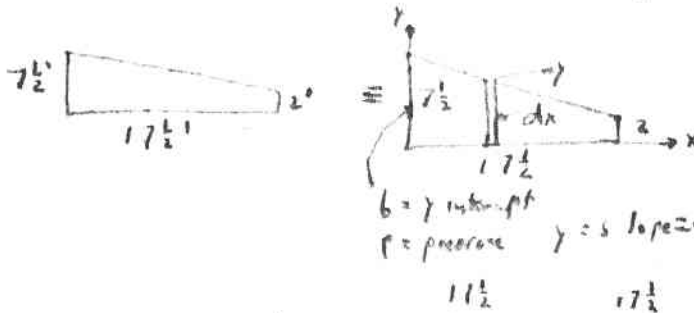
for strength calculations I'm using 1500# and 10 G load for more than 1.5 safety factor times 6 G aerobatic strength.

BOTTOM PAGE 8 & BELOW: These are the drawings and calculations provided by Barney. Hopefully, you will be able to see enough to make

some comments on the design. If there appears to be enough interest, I am sure Barney could provide some better schematics in the future.

Spar strength calculations:

Assumptions: uniform loading pressure of wing surface
 uniform density of 8000 structural substance (even though fuel is outboard of wheels).
 This estimates that 1000# is concentrated in the centre: a pessimistic assumption.



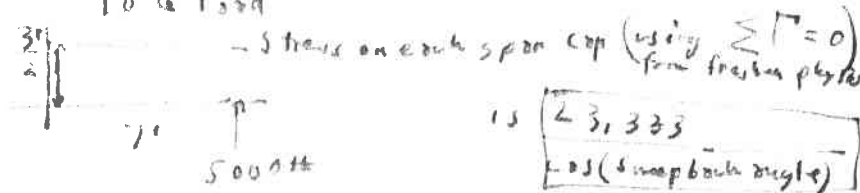
$b = y$ height of slice
 $p = \text{pressure}$
 $y = \text{slope} = \frac{(7\frac{1}{2} - 17\frac{1}{2})}{17\frac{1}{2}} = -\frac{11}{35}$

bending moment
 $\cos(\text{snap back angle of spar}) = p \int_0^{17\frac{1}{2}} y \, dx = \int_0^{17\frac{1}{2}} [-\frac{11}{35}x + \frac{15}{2}] \, dx = 9587 \text{ ft}\cdot\text{#}$

force = pressure \times area = $p \int_0^{17\frac{1}{2}} y \, dx = p \int_0^{17\frac{1}{2}} [-\frac{11}{35}x + \frac{15}{2}] \, dx = p \frac{665}{8} \text{ #}$

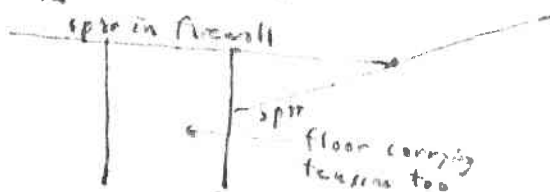
distance to centroid of bending moment = $\frac{\text{moment}}{\text{force}} = \frac{9587}{p \frac{665}{8}} = 7 \text{ ft}$

under a 10 lb load each wing supports 1000# as though it were 7ft out with a spar thickness of 1 1/2 ft at centre. This is equal to 10 lb load



is $\frac{23,333}{\cos(\text{snap back angle})}$

The use of the double spar with caps with 25000# strength is even stronger.



Such strength of a spar cap is easy to obtain according to Marshall text.

For a drop test, more load gear that can hold 4000# will be good.

ADDITIONS TO THE LIBRARY

Contributed by Karl Sanders (through the John Street Aeronautical Society).

"Aerodynamic Investigations On Tail Effects In Birds", by Prof. Dr.-Ing. D. Hummel (Institut für Strömungsmechanik, Technische Universität Braunschweig), Flugwissenschaften und Weltraumforschung (ZFW), Spring 1992, pp. 159-168, with 9 references.

An extensive article (in English) on the use of tail surfaces, similar to those of a bird, on aircraft. Contains formulas, graphs and diagrams showing the results of various tail configurations on an A=5 rectangular wing in a 1.3 meter low-speed wing tunnel.

Contributed by Doug Fronius.

"The Joined Wing: An Overview", by Julian Volkovitch (ACA Industries, Torrance, CA), Journal of Aircraft, Vol. 23, No. 3, American Institute of Aeronautics and Astronautics, March 1986, pp. 161-178, with 41 references.

This paper outlines the structural principles of the joined wing, looks at stability and control aspects, and the interaction of structural and aerodynamic characteristics of the novel problems with this configuration. Specific designs, projects, and concepts employing joined wings are presented, together with a brief assessment of the performance benefits of the joined wing.

The article contains numerous charts, graphs, diagrams and formulas, along with many different design concepts using joined wings.

AVAILABLE PLANS & REFERENCE MATERIAL



Tailless Aircraft Bibliography

by Serge Krauss

4th Edition: An extensive collection of about 2600 tailless and over 750 related-interest

listings. Over 15 pages of tailless design dates, listing works of over 250 creators of tailless aircraft, and the location of thousands of works and technical drawings for the Ho 229 (IX), Me 163, & Me 262.

Cost: \$23 (Domestic)
 \$32 (European destinations)
 \$35 (Asia/Australia destinations)

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

Tailless Tale, by Dr. Ing. Ferdinando Gale'

Consists of 268 pages filled with line drawings, tables and a corresponding English text. It is directed towards modelers, but contains information suitable for amateur full size builders. Price is \$38, postage and handling included (also applies to Canada and Mexico).

You might also want to purchase his new book **Structural Dimensioning of Radioguided Aeromodels**, priced at \$18.00.

On The Wing...the book, by Bill and Bunny Kuhlman (B²) is a compilation of their monthly column that appears in RCSD. Many of the areas have been expanded and it includes coding for several computer programs to determine twist and stability. Priced at US\$28.00.

All these are available from B² Streamlines, P.O. Box 976, Olalla, WA 98359-0976, or (206) 857-7249 after 4pm Pacific Time. Orders shipped elsewhere will be sent surface mail unless an additional \$10 is included to cover air mail postage. Washington residents must add 7.5% sales tax.

VHS VIDEOS AND AUDIO TAPES

VHS tape containing First Flights "Flying Wings," Discovery Channel's The Wing Will Fly, and ME-163, SWIFT flight footage, Paragliding, and other miscellaneous items (approximately 3½+ hours of material).

Priced at: \$8.00 (postage paid)

An Overview of Composite Design Properties, by Alex Kozloff, as presented at the TWITT Meeting 3/19/94. Includes pamphlet of charts and graphs on composite characteristics, and audio tape of Alex's presentation explaining the material.

Priced at: \$5.00 (postage paid)
 \$6.50 foreign (postage paid)

Audio tapes of presentations by Don Mitchell at the September 1991 SHA Western Workshop, Tehachapi, CA (1 cassette), and his March 1992 presentation at a regular TWITT meeting (2 cassettes).

Priced at: \$3.50 (1 cass.)
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