

T.W.I.T.T. NEWSLETTER

Gotha P.60

There were three versions of the P.60 all-wing fighter design, each powered by a pair of turbojets mounted one above and one below the central wing section.

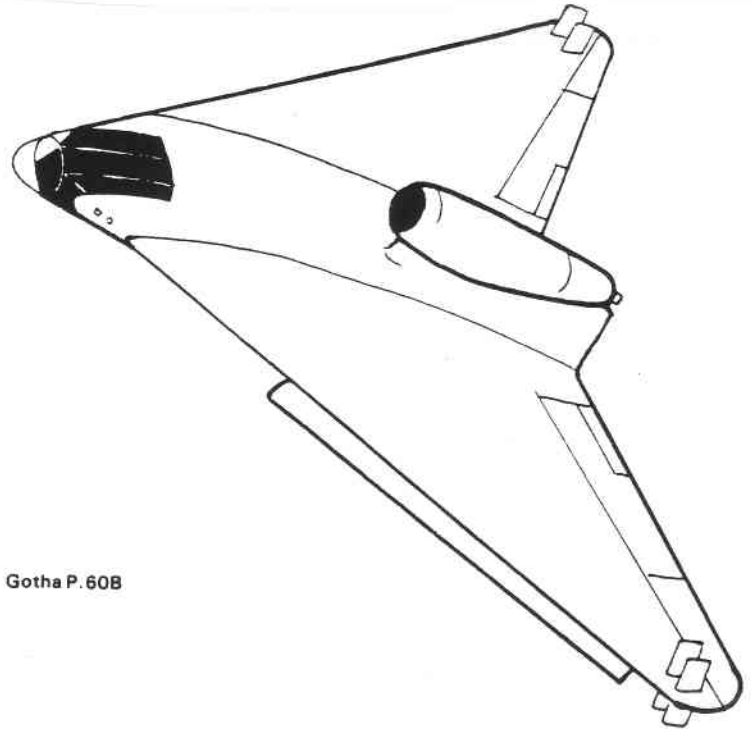
Powered by two BMW 003As, the P.60A was the cleanest of the three designs, with the pilot and observer lying prone behind nose glazing which formed the front of the fuselage. There was no fin and rudder, directional control being provided by aerofoils at each wingtip which could be retracted into the wing when not in use. The leading and trailing edges were swept back, the leading edge at 45°, and long flaps were fitted to improve stalling characteristics.

As the proposed successor to the Go 229, the P.60 was armed with four 30mm cannon and was to be boosted during take-off and climb by a 4,410lb (2,000kg) thrust Walter rocket motor.

The P.60B was larger than the first design and was expected to be significantly heavier. Performance was increased by the use of the more powerful HeS 011 turbojet. With jet engines and rocket operating, the P.60B was expected to attain 29,530ft (9,000m) from sea level in just 2min 36sec.

From David Master's German Jet Genesis.

Contributed by: Kevin Fenshaw.



Gotha P.60B

T.W.I.T.T.

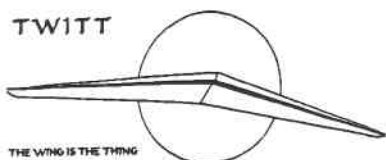
(The Wing Is The Thing)
P. O. Box 20430
El Cajon, CA 92021



The number to the right of your name indicates the last issue of your current subscription, e.g., 9309 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, September 18, 1993, beginning at 1330 hrs at hanger A-4, Gillespie Field, El Cajon, Calif. (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.

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Wt/#Issues	FRG	AUSTRALIA	AFRICA
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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).

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PRESIDENT'S CORNER



First off, I must thank Bob Chase for his continued unwavering support of TWITT. He made a \$100 contribution towards the purchase of new video display equipment. Chris Tuffli also made a \$20 donation after the meeting for this purpose. Richard Avalon's

contribution of play sets for the B-10 and U-2 are also greatly appreciated (see meeting minutes for details). Thanks to all of you.

As you can see from the minutes there was a little business conducted last month, not all of it enjoyable. We do not like raising the membership rate, however, it has become necessary. They have held steady for the last 7 years, but the time has finally arrived where an increase could not be avoided.

Several of the board members have been kicking around the idea of reducing the number of meetings held each year for several months now. The recent attendance has finally shown us that the time has come to go to every other month for meetings. However, we will continue to publish the newsletter each month.

On another subject, it appears the SHA Workshop at Tehachapi was a resounding success. The speakers were very well received and there was a lot of question asking by the audience when it came to construction techniques. Randy Bergum video taped most of the sessions and will be providing us a copy of several that will be of general interest to the membership.

Bernie Gross commented that his was the only flying wing airplane at the workshop again this year (aside from the Swift which is really a hang-glider). From the standpoint of TWITT and the homebuilding aspect, this lack of visible flying wings is somewhat disappointing.

Phil Burgers just informed us that Dr. Reimar Horten passed away on August 14, 1993 from a heart attack. There were no other details available as of publication time, but we will give you more next month.

That's it for now.

Andy

SEPTEMBER PROGRAM

This month we have another individual who has had experience building a Mitchell wing. **Les King will be our speaker** and his subject will be the **Stealth II** project that he and Dave Swanson are finishing now that Don is gone. There was very little written or drawn information available, since Don had most of the aircraft in his head, and he took all that knowledge with him upon passing away in February of this year. He plans on eventually producing at least a 3-view, but it is not a top priority part of the project at this time.

He did provide the following description of the Stealth II:

Span	40'
L.E. Sweep	15°
Wing Area	148 sq.ft.
Stabilator Area	12 sq.ft.
Aspect Ratio	10:1
Taper Ratio	3.2:1
Airfoil	NACA 0015
with "Culver Twist"	
Trailing edge is slightly swept back about 5°	
Vertical tip rudders are about 2 sq.ft each; also serve as drag rudders	

Some of Les' projects have included: Airframe and wing-flapping mechanism for IMAX film "On The Wing" flying Pterodactyl; Aircraft and vehicle design and development; composite aircraft components; and Elastomeric product design and production. He holds patents for electro-mechanical devices and packaging, and a computer input device, as well as, received the First Place prize for the Harmonic Drive design contest for a variable pitch propeller invention.

The last two month's have produced some spirited conversations about the concepts and mechanics behind Budd Love's HIAM aircraft. This month Budd will introduce a new HIAM area for comment by the group. This is the best of both the theoretical and practical worlds, so be sure to come and help Budd with your input.

MINUTES OF THE AUGUST 21, 1993 MEETING



Andy called the August meeting to order and passed around the sign-in roster. After the usual house-keeping items he asked everyone to introduce themselves to the group so everyone could get to know each

other better (especially since Philip Burgers was able to attend his first meeting in a very long time).

The raffle prize for the day was a

disposable panoramic camera, and the next month's prize will be a book entitled The Eagles High covering the Battle of Britain.

The program for the day consisted of Richard Avalon giving us a little historical look at Don Mitchell and discussing the progress of his last projects. Following that, Budd Love would lead a continuing discussion on one aspect of the HIAM project.

Bruce Carmichael took the floor to give us a run down of what the final program would be for the SHA Workshop at Tehachapi over the Labor Day weekend. Although it is an excellent program, we will not go over it again since the workshop will have been history by the time this newsletter hits the streets.

Bob Chase took the floor (he gave it back a little later) to tell us a little bit about what he saw at this year's Oshkosh gathering. He commented that getting there is supposed to be half the fun, however, his seating companions on the flight were not the most talkative type or fell asleep, so he ended up also sleeping a good deal of the way.

He stayed in the dorms at the University of Wisconsin. True to his craft, Bob bought some index cards, duct tape and scissors, and began building his usual paper gliders. He took some of them outside to test fly, and within five minutes picked up five other TWITT members who gathered around to watch the fun.

Bob noted there was little to no flying wings to be found, except for the Whitaker Center Wing which seems to be a permanent fixture. He did find a Backstrom Plank hanging in the EAA Museum, but didn't see any Mitchell wings.

He did run into an old friend, Steve Marley, who happened to be building an ultra-light derivative of the German ME-163 rocket powered flying wing from WWII. Bob got some video tape of the project and will be showing it at a future meeting.

Andy commented that he had video taped a recent Discovery Channel Wings segment on the ME-163 which he will add to the library.

He covered some business items which included:

1. Raising the annual membership fees to \$18 effective October 1, 1993 for our US members (foreign dues were raised earlier in the year). This increase has been necessitated by the increasing costs in publishing the newsletter, and to help cover some space rental costs now being borne totally by Bob Fronius.

2. Some of the additional funds were supposed to be used to purchase a 20" television and 20" monitor for permanent mounting in the meeting area. This would allow better viewing of videos brought in by the members and guest speakers. If enough money was available, a new VCR would also be purchased.

On this last subject, Andy asked for assistance by anyone who might have a connection with an electronics outfit that could maybe give us a price break. This generated some discussion among the group about

what size equipment was necessary, and it was decided the 20" TVs would suffice.

Bob Fronius indicated he would \$5 a month toward the purchase of the equipment, and Bob Chase suggested starting a special fund for purchasing this equipment. We would like donations, if possible, and to this end Bob Chase contributed \$100 on the spot to get the fund started. (After the meeting Chris Tuffli contributed \$20 to the fund, so we have a start.)

It would be best if future contributions came from those members who would most benefit from the equipment, but obviously no donations would be refused.

Before Richard Avalon began his presentation, he suggested having an auction similar to the one conducted by SHA at the last year's workshop. And to support this type of fund raiser he donated a complete set of construction plans for both the Mitchell B-10 and U-2 aircraft. These would normally sell for \$150 a piece through him.

Further discussion of this option let to the conclusion that it might work very well. We would gather together whatever aviation oriented items people would be willing to donate, and then have a closed bid auction after publishing the list in the newsletter. In this way, every member could participate in one way or another, and perhaps some needed equipment could get into the right hands.

3. One last item of business was a suggestion by Andy that the meetings be reduced to every other month. It is getting harder and harder to find top quality speakers in the Southern California area, and the monthly group has been relatively small compared to a year ago. The members present, who are the usual attendees including 2/3s of the Board members, voted to approve this change. Since December is a non-meeting month, the new schedule would be based on it as a starting point.

The next meeting will be held in September, with the following meeting being in November. Meetings would then be held in the months of January, March, May, July, September and November in future years. The newsletter will continue to be published on a monthly basis, providing more room for material from members and appropriate items from the library.

With all this business concluded, Andy introduced Richard Avalon, our guest speaker for the day.

Richard began his presentation by commenting that this would probably be the last time there would be a historical perspective of Don Mitchell. On the lighter side, he commented that since Don had experience with flutter and the design of wings, God called him up to Heaven to fix the wings of his angels. God needed a good flying wing man to solve the problems.

Richard ended up with most of Don's years of accumulated papers and project notes. It was from these items that he drew to fill in some of the areas that Don touched throughout his career.

From a paper he and Don had written many years ago, Richard read a passage where Don indicated he had two wishes in life; to be nominated and inducted into the SSA Hall of Fame, and; that when his time came he would have a pot of glue in one hand and a piece of plywood in the other ready to go into his new homebuilt sailplane. These two requests did come true in that he is a member of the Hall of Fame, and he was working on the Stealth II when he had his heart attack.

Richard covered some of Don's life using a biographical paper written by the two of them several year's ago. Don had related much of this during his talks at a past SHA workshop and a subsequent TWITT meeting (so it is not being covered again here).

During the years that Mitchell Aircraft was in business, it sold close to 1000 completed aircraft or kits for the U-2 and B-10. This made Don the most successful designer and builder of flying wing aircraft in the world, since most prior wing designs have only been produced in very small quantities.

These designs have won numerous world records and fly in a number of countries throughout the world. They are on display in many museums and have won countless numbers of contests in their categories.

Richard indicated that Les King and Dave Swanson have taken over the finishing of Don's Stealth II and are making good progress toward that end. He has recommended that they try to stay as close as possible to what is know that Don was working towards, rather than try to make a lot of changes just for change sake.

It was in 1976 that Don got the idea for his rigid wing hang glider. It only took him 23 days from concept to the finished airplane. This was a response to Howard Long's request for this type of aircraft so that there would be no tail to drag on takeoff. It was the first hang glider with a 3-axis control system, and after the Los Angeles regional meet Don received an initial 12 orders.

Richard met Don shortly after the Mitchell Aircraft Company was formed at Porterville, CA to produce the B-10. He and a friend purchased a B-10 and became the distributors for Oregon. He used students from a local A&P class to help construct the aircraft for sale to local pilots.

In about 1979, Richard went to work for Jim Mead, owner of Mitchell Aircraft, as a test pilot and general manager. He started the ultra-light competition series up and down the coast of California. Then Mitchell Aircraft switched to construction of the A-10, which was an aluminum version of the B-10. The A-10 was not a Don Mitchell design, but rather was similar to the B-10.

Richard then asked Don to build him a more advance version of the U-2, and Don responded with what became the Victory Wing. The idea was to increase performance, but keep it in the ultra-light category. He did this with slots in the leading edge to keep the stall speed down to 28 mph, and by sweeping the outer tips forward for slow speed yaw control.

The only problem that occurred on the first few test flight was they found the propeller pitch was not correct for the engine. Otherwise, the aircraft was perfectly balanced and performed flawlessly. Not realizing they had a pitch problem, they decided to change engines and go to a reduction unit, but this never got done and the plane didn't fly again.

Don and Richard then decided to go into business producing the Stealth II, which would into both the ultra-light motorglider and hang-glider categories. It would have a higher performance than the B-10 and be easier to build.

They were well along with the project when Don passed away. He didn't leave behind any drawings, which has made completing the project all the harder.

Richard will be making the B-10 and U-2 plans and construction manuals available to flying wing enthusiasts. These are tried and true airplanes and the plans include all the latest upgrades incorporated up until the late 1980s. They are easy to build and do not involve the use of composite skins, spar, etc., but rather use traditional wood.

Right now all the planes and left over parts and equipment have been moved back to Porterville while Richard looks for capital or a partner to go back into business selling the B-10 and U-2. If this comes to past, he does plan on doing some upgrading to each of them to improve performance and safety. He had planned on doing this through Don using a computer and CAD/CAM programs, but had not gotten started before Don passed away.

Richard shared some information from some of the written material Don left behind, including a article titled "The Mitchell Flying Wing Sailplane" dated in April 1943. The things that present day TWITT members are indicating they want in a flying wing, Don was designing back as far as the early 1940s.

Also in 1943, Don predicted that air freight would be a big business in the future. He felt that large cargo gliders could be used for this purpose following WWII. These gliders would have wing spans of 320', aspect ratio of 12, average chord of 26.6', chord root 47.2', tip chord 6', taper ratio 7.067:1, depth of root 14.11', and a wing area of 8,512' yielding 15 #/sq.ft. wing loading. The empty weight would be 25,436 lbs. with a useful load of 102,244 lbs. including the crew. It would have a glide ratio of about 20:1 and be more efficient than the equivalent capabilities of 6 DC-3s.

Don had also made a proposal for a Goodyear racer. The design was presented as a nucleus for a cheap, safe, high performance light aircraft, military pilotless target drones, and practical roadable airplane. It would have a top speed of 245 mph, landing speed of 55 mph, an 85 hp engine, 18' span, 72 sq.ft. of area, 40° sweep-back, total length 9', empty weight of 400 lbs, tandem landing gear with Goodyear tires, no dihedral, and no wing twist. Materials would be spruce spars and ribs, 3 ply plastic bonded mahogany plywood skins, molded plastic bonded mahogany semi-monoque

pod, and a plexiglass molded canopy.

Don left behind a 50' span, foot launchable wing that Richard feels could be adapted into an excellent solar powered sailplane. He thinks the solar cells would produce at least 8 hp, which would be enough to fly it all day without the use of thermals to gain altitude.

The last thing that Richard presented was a drawing of a 5 place flying wing amphibian. Don had left a concept drawing, which you can see on pages 5 and 6.

The question was asked whether there was a lot of drag produced by the elevons being placed below and aft of the trailing edge. The answer is that they produce less total drag than the fuselage and tail surfaces of a conventional design, while still giving the desired controllability.

Andy conducted the raffle drawing in between speakers. Bob Fronius won the camera, donated it back for a redrawing, and it was eventually won by one of our guests.

Budd Love indicated he will be giving a paper to the AIAA International Powered Lift Conference on December 2, 1993, titled "HIAM - A Compressed Air Powered Lift System.

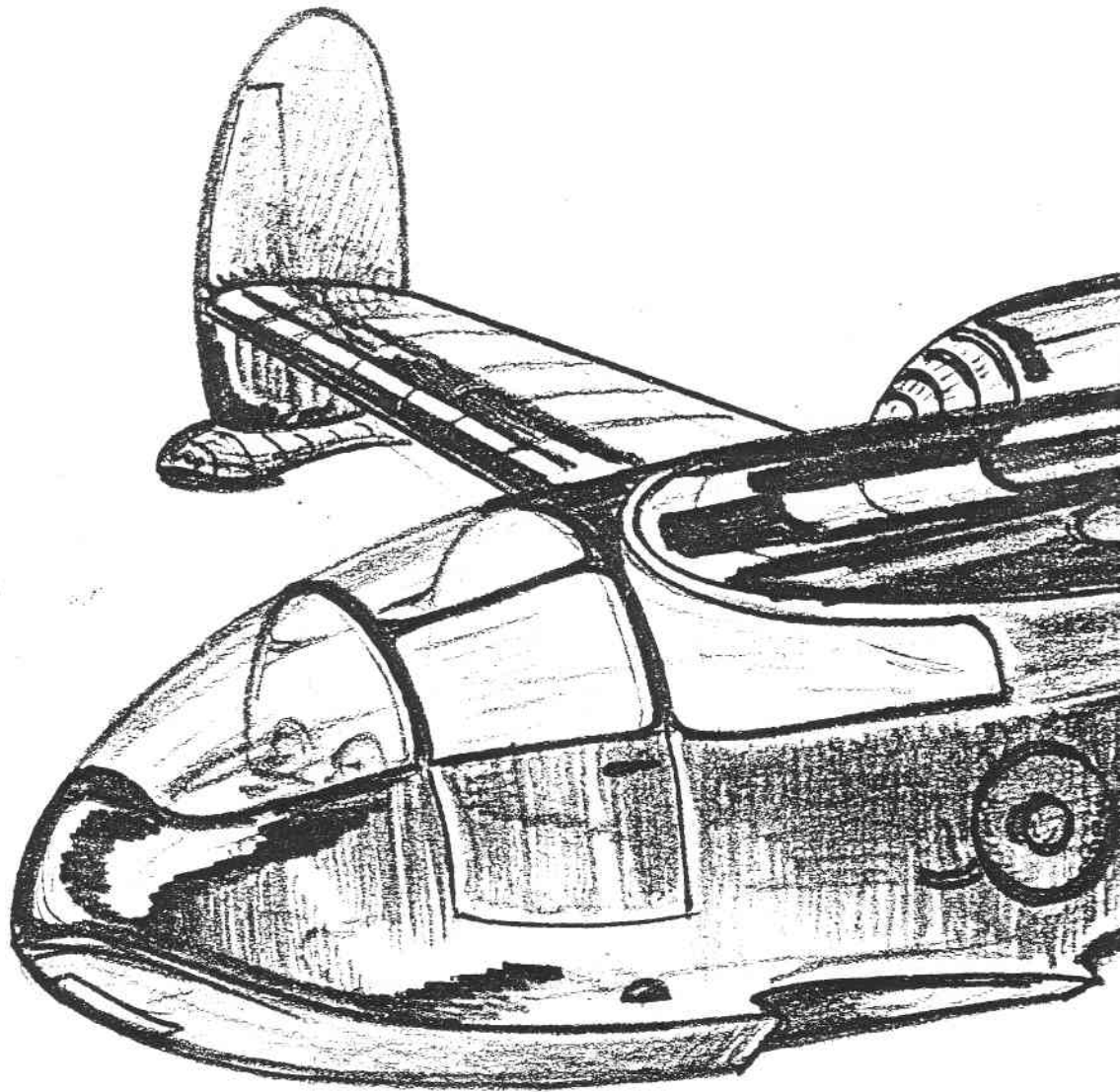
He has received a call from another TWITT member from Colorado who commented that the project contained too much math, which probably scared some people from participating. However, Budd feels that much of what is used in his airplane, and in other aerodynamics, is not that complicated and should not be feared as a means to get to the end.

Budd's primary subject for the day was to cover the performance chart of how pressure affects air flow. The data Budd was going over was that presented in an earlier newsletter, and included a proposed flying wing derivative of a Horten design. This generated some brief discussion of the pitching moment.

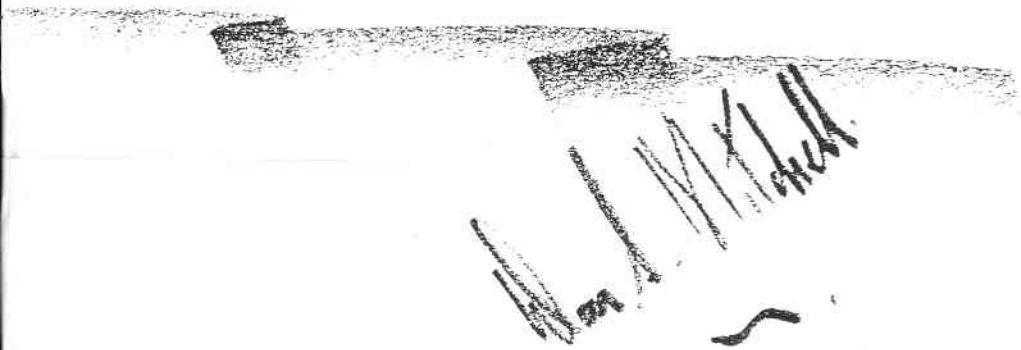
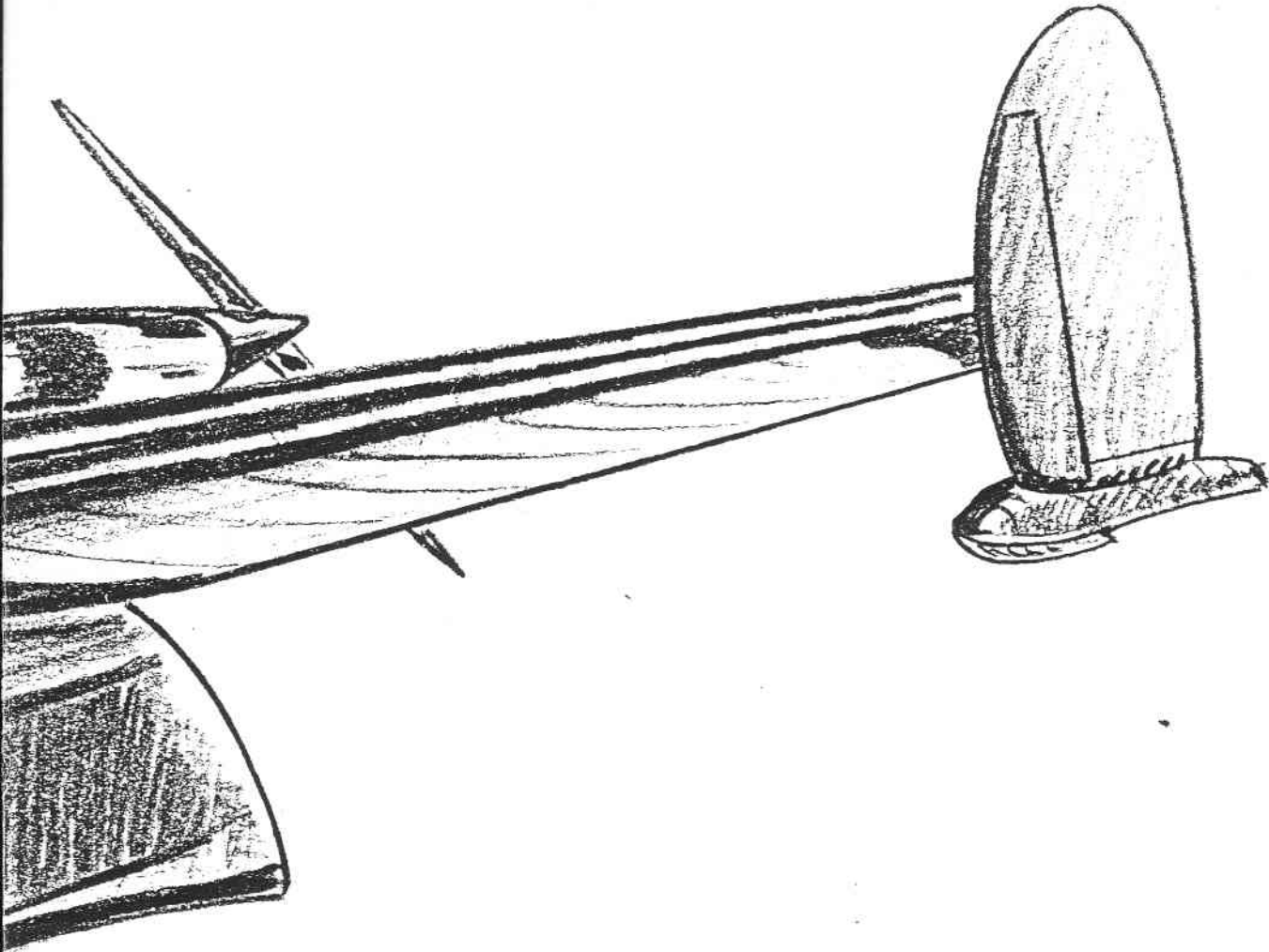
The question of specific fuel consumption came up from the engine manufacturer, Allison, due to the supposed inefficiency of jet pumps. Budd indicated his analysis shows that jet pumps can be just as good as any other means of aircraft propulsion. His calculations seem to show that the jet pump can give specific fuel consumption equal to that of today's jet engine aircraft.

There was some discussion about whether there was enough room in the wing for storing the fuel. Budd has calculations and schematics that show you can carry a useful fuel load for the type of proposed aircraft for the job it is designed to do.

Andy thanked Richard Avalon for his time and presentation, and the donation of the B-10 and U-2 plans for a future auction. Chris asked how we were doing with the chair situation, and Andy mentioned that we still need donations of folding chairs to replace some of the more bulky chairs that take more storage room. This would also help reduce the amount of rent we would need to pay to Bob for the space, as well as make meeting setup and tear-down easier.



FIVE-PLACE .AM



AMPHIBIOUS.

**BACK ISSUES -
LIMITED SPECIAL OFFER**

Since the membership fees will be going up in October, we have decided to make the following special offer using our existing stock of newsletter back issues:

For a limited time, 12 months of back issues will be available for the price of \$6 postage paid. This is a limited offer since there is only enough back issues for about 5-6 full sets of all seven years, or yearly portions.

If you are interested in a specific range of issues you will have to purchase a minimum of 12 months at this price. Anything less will remain at the prices stated on page 1.

This is a good price if you are missing some of the earlier issues and have been putting off filling in your collection. Act fast, since the supply is limited.

FINANCIAL DATA

BALANCE SHEET (6/30/93)

Current Assets	
Cash	\$ 1,089.79
Acct. Recvble.	199.00
Inventory	210.79
Total Current Assets	<u>1,499.58</u>
Fixed Assets	
Material & Equip.	1,667.25
TOTAL ASSETS	<u>\$ 3,166.83</u>
Liabilities	
Acct. Payable	\$ 1,020.75
Equity	<u>2,146.08</u>
TOTAL LIABILITIES & EQUITY	<u>\$ 3,166.83</u>

INCOME STATEMENT (6/30/93)

Membership Dues	\$ 956.96
Raffle Tickets	88.00
Back Issues	107.25
Information Packs	18.00
Donations	38.25
Miscellaneous	38.35
TOTAL INCOME	<u>1,245.46</u>
Less:	
Newsletter Expense	701.26
Mailing Expense	441.56
Raffle Expense	77.46
Miscellaneous Expense	70.77
TOTAL EXPENSES	<u>(1,291.05)</u>
NET INCOME (LOSS)	\$ (<u>44.59</u>)

**LETTERS TO THE
EDITOR**

8/17/93



TWITT:

Please renew my subscription to the newsletter for 2 years.

I am interested in possibly building a Mitchell B-10. Do you know of someone who has building and flying experience with one that I could correspond with?

Keep up the good work.

Sincerely,

Michael Alexander
140 McHenry Ave., Ste 9
Modesto, CA 95354

(Ed. Note: There are at least two people who might be able to help with your request. One is Richard Avalon (August's speaker) who can be reached at 892 Jenevein Ave., San Bruno, CA 94066. The other is Randy Bergum who should be finishing up a B-10 in the near future. He can be reached at P.O. Box 6831, Fullerton, CA 92634.

If you haven't already read the minutes, please do so now and see about how to get a set of B-10 plans, assuming you don't already have them.)

9/1/93

TWITT:

Thank you for the sample of the TWITT Newsletter (July 1993) and the timely response to my first letter.

I was pleased to find the article on Bob Chase's diffuser tip glider on the back page. I would like to use the model in the text book. (Enclosed please find the page it will be presented on.) We will use the model for a sample experiment with thermals generated by a propane devise I developed for my Hot Air Balloon project. It develops a really good thermal column in an air conditioned gym, and the model gains altitude quickly when entering the thermal. A good "demonstration" for students at the start of the unit.

I would like permission to use the model either from TWITT or from Bob if that is possible. If you can provide the permission to reprint that would be OK, or if you can provide me with Bob's address I would ask directly.

If it is OK with you, I will list TWITT in the resource section of the book. This might mean more requests for information and perhaps expanded membership. Please let me know if this is OK.

Sincerely,

Steve Bachmeyer
Technology Concepts
Research & Development in
Technology Education
1804 Runners Way
N. Lauderdale, FL 33068

(Ed. Note: I responded to Steve's request for information concerning TWITT which he learned about through RC Soaring Digest. Fortunately, I sent him the issue with Bob's paper glider, which obviously caught his attention. They have published a series of text books on a variety of topics for use by the students in the technology related classes.

I talked with Bob and he has given permission for them to use the glider. In fact, he said he would also send some other versions (pure flying wing, etc.) that he felt might work even better in the thermal generator. I will forward this information to Steve and ask if we can get a complementary copy of the book for your library, and a copy for Bob.

Our congratulations to Bob for coming up with an avenue for expanding the knowledge and exposure of flying wings to many people (students) who might not otherwise have experienced a flying wing.)

ADDITIONS TO TWITT LIBRARY

Last month we indicated Karl Sanders was attempting to get a copy of a paper on wing-body configurations and the flying wing. Through his son's efforts, we now have an original of the paper which will reproduce very well for those of you who might want be interested.

Karl also included another item - AIAA Paper #83-2536, "Subsonic Airplane Configurations For Maximum Range and Endurance," by Thomas S. Schreiber, Consultant; 3 pages, with 3 references (reproducibility of some parts may not be very good). The following is the abstract from the paper:

"A family of airplanes is considered all having a specified gross weight and usable interior volume, which is apportioned between the wing and fuselage; and the wings and fuselage of all airplanes in the family are regarded as geometrically similar. Then, assuming that an airplane flies at subsonic speeds such that the lift and drag coefficients are independent of speed, and that the entire lift is provided by the wing, the apportionment of usable volume between the wing and fuselage is determined so as to maximize the range or endurance for both propeller driven and jet propelled airplanes. The analysis shows that for propeller driven airplanes the flying wing configuration is optimal to maximize range or endurance. For jet propelled airplanes the flying wing is optimal to maximize endurance; but to maximize range either a wing-body

configuration or the flying wing may be optimal, depending on certain aerodynamic and geometric design characteristics. For values of these characteristics corresponding to modern design practice, however, the wing-body configuration is optimal, providing substantially greater range than the flying wing; and in fact the performance of the latter in this case differs little from the configuration which minimizes range."

We would like to thank Karl for his never ending efforts in getting us these papers.

Another addition comes from Orval Moore, our TWITT member in Branson, MO. It is an article from the August 1993, VINTAGE AIRPLANE, titled "Vintage Literature - Project for a Low Priced Airplane - Part III," by Dennis Parks, Library/Archives Director; Vol. 21, No. 8, pp. 5-8 (published by the EAA Antique/Classic Division).

The article covers the history of Waldo Waterman's designs, the Whatsit? and the Arrowplane, both tailless aircraft entered into a competition with several other types for a contract from the Bureau of Air Commerce in 1934-35. Reproduction of the material should be okay, but the pictures included with the article probably will not come out very well. If you would like a good copy, you should either find the magazine or request a copy from the EAA.

AVAILABLE PLANS & REFERENCE MATERIAL



Tailless Aircraft Bibliography

by Serge Krauss

3rd Edition: An extensive collection of books, articles and other items related to the development of flying wing (tailless) aircraft design and construction.

Cost: \$20

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

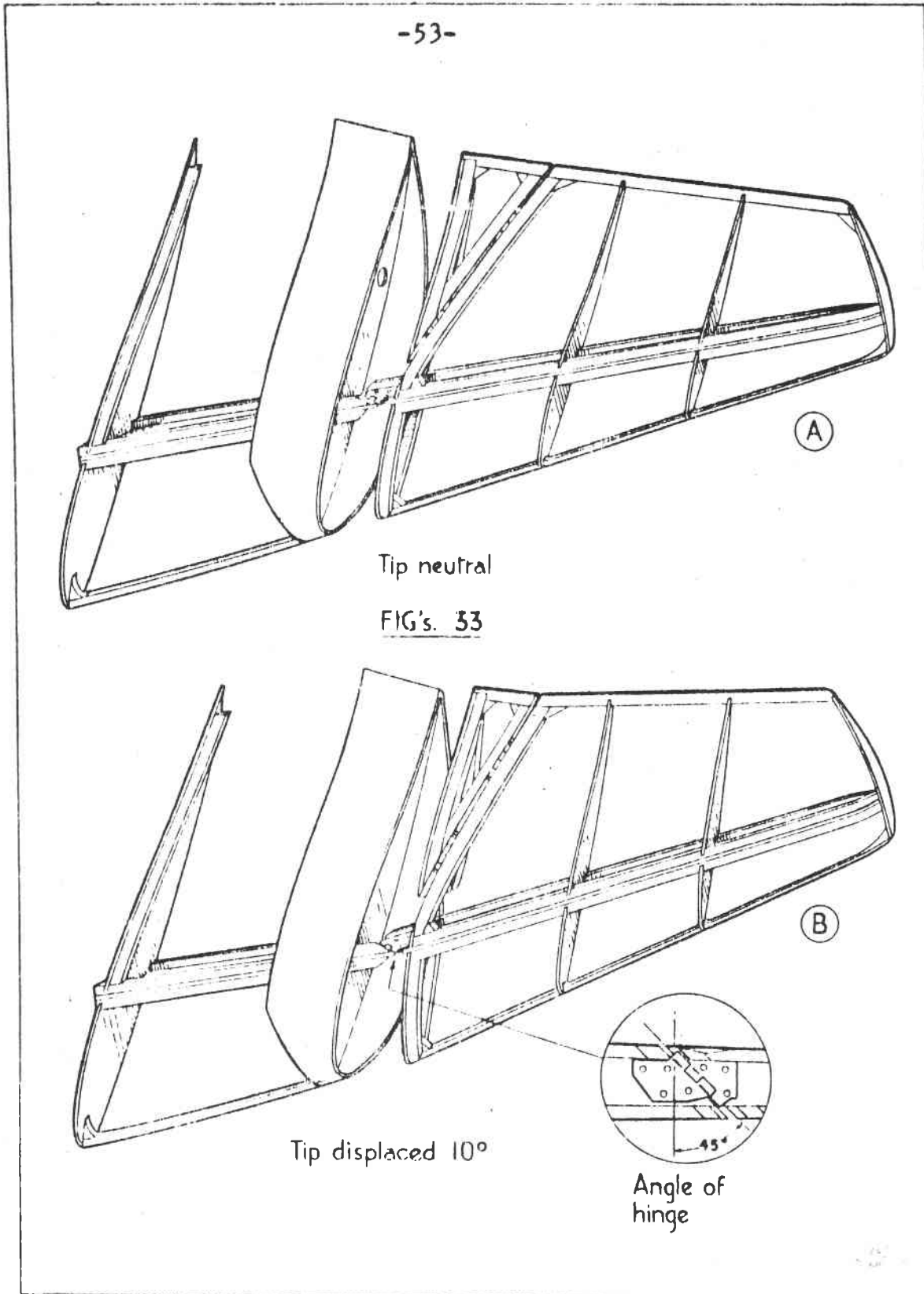
Tailless Tale, by Dr. Ing. Ferdinando Gale'

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.

Published by B² Streamlines, P.O. Box 976, Olalla, WA 98359-0976, or (206) 857-7249 after 4pm Pacific Time. Price is \$38, postage and handling included (also applies to Canada and Mexico). Orders shipped elsewhere will be sent surface mail unless an additional \$10 is

BELOW: Moveable wing-tip control surface showing one means of constructing the hinge

point. Source: Document unknown; from the extensive notebook of Bruce Carmichael.



MOVABLE WING-TIP CONTROL (DIAGRAM BASED) ON MODEL DRG. CD.44370

1993 TWITT NEWSLETTER

BELOW: Three-view of the Horten V (?).
Source: Document unknown; from the extensive
notebook of Bruce Carmichael.

