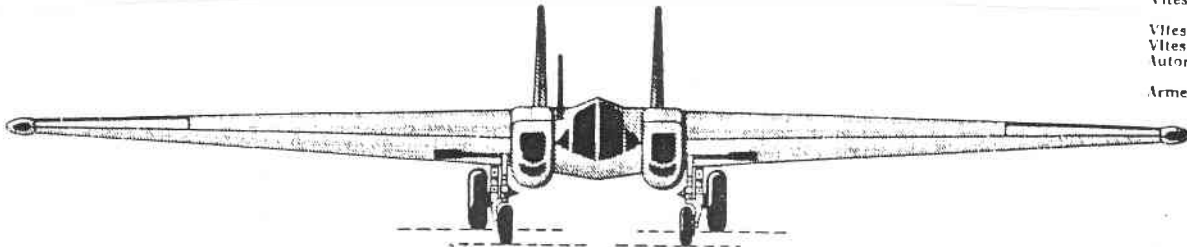
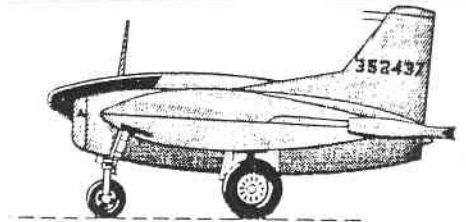
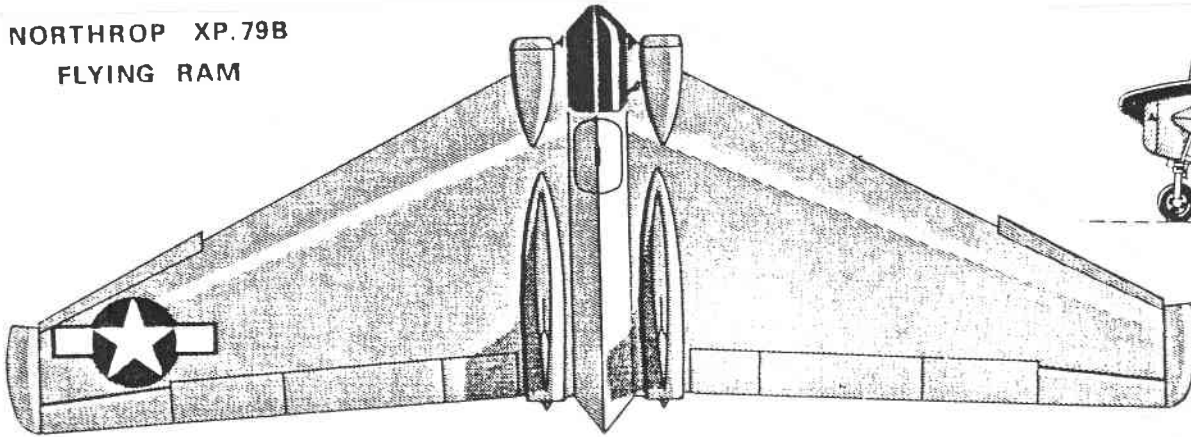


T.W.I.T.T. NEWSLETTER

**NORTHROP XP.79B
FLYING RAM**



Avec deux réacteurs Westinghouse 19 B (J.10)
de 521 kg/p unitaire

Envergure	11,580 m
Longueur	4,267 m
Hauteur	2,286 m
Surface alaire	25,82 m ²
Poids à vide	2,835 kg
Poids en charge	4,354 kg
Vitesse maximale	880 km/h au sol
	815 km/h à 7,500 m
Vitesse de croisière	770 km/h
Vitesse ascensionnelle	7,500 m en 5'10"
Autonomie	1,600 km (sur un seul réacteur)
Armement prévu	4 mit. Browning M 2 de 12,7 mm

Contributed by: Jason Wentworth.

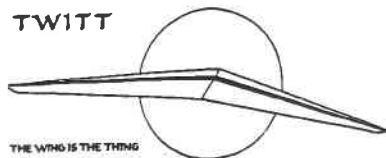
T.W.I.T.T.
(The Wing Is The Thing)
P. O. Box 20430
El Cajon, CA 92021



The number to the right of your name indicates the last issue of your current subscription, e.g., 9307 means this is your last issue unless renewed.

Next TWITT meeting: Saturday, July 17, 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.

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

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 Vice Pres., Dave Pio (619) 789-1650
 Secretary, Phillip Burgers (619) 563-5465
 Treasurer, Bob Fronius (619) 224-1497

Editor (Acting), Andy Kecskes

The **T.W.I.T.T.** office is located at Hanger A-4, Gillespie Field, El Cajon, California.

**Mailing address: P.O. Box 20430
 El Cajon, CA 92021
 (619) 224-1497**

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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



For those of you who were not at last month's meeting, you missed an interesting presentation by Larry Edgar, only a small part of which is represented in the minutes.

You also missed some good cake and ice cream and an opportunity to experiment with a new concept model brought in by Bob Chase.

So you can see that more usually happens then we have announced for the program, because there are almost always some last minute additions or new material we weren't aware of. The meetings are for you, so we hope more of you will start attending again and keep the ball rolling.

The mail was just super this month, as you can see from the Editor's column. Please keep it up and let us hear about your pet projects. As you can see, the way members present them varies tremendously, because we have such a wide spectrum of abilities, but a common desire - to see a wing fly.

I must apologize for the type of print used in last month's newsletter. The store where I get the master printed decided not to rent self-service computer time anymore, and the backup store's system just wasn't taking the data file. Hopefully, this has been solved in the future through the use of the Hunsaker Foundation's computer and printer (or better file compatibility with the other system).

We would like to know if any of you on the west coast work for a television or appliance store, and whether any type of discount could be obtained on a 19" TV and monitor. We want to mount at least one on the overhead in the hanger for use during the meetings so members can see the videos better. Please let us know if you can be of any help.

By the time you get this there will only be a month and a half until the SHA Western Workshop over Labor Day at Tehachapi. If you plan on attending for more than a day, you better get your reservations into one of the few motels in Tehachapi right away.

That's it for now. Hope your summer flying is going great.

Andy

JULY 17, 1993 PROGRAM

The program this month sort of fell apart at the last minute. The speaker we had originally planned called and informed us he could not come after all. Bob is now attempting to get a backup speaker, but as of publication time we were not sure who that might be. We will have a flying wing video that was originally aired on TV on the First Flight program earlier this year.

We will have a 10-15 minute discussion of the material provided by Budd Love on the HIAM wing duct performance (see page 3). As you will see in the minutes below, the discussion should lead towards how to incorporate this propulsion system into a flying wing design.

MINUTES OF THE JUNE 19, 1993 MEETING



Andy opened the meeting by welcoming everyone to what would prove to be an interesting afternoon. He reminded the group that this was our 7th Anniversary/Birthday party and thanked

everyone for their support over the years.

After the usual house-keeping items, and an introduction of visitors, Andy announced the raffle prize would be a ride in either the Stearman Mail Plane or the 450 Stearman, courtesy of Addison Pemberton.

Andy then introduced Bruce Carmichael, who gave us a run-down of the program for the upcoming SHA Western Workshop at Tehachapi. Bruce has finalized the program with the following speakers: Eric Raymond talking about his solar powered sailplane; Bryan Robbins on the production methods for the Swift light, tailless, foot-launched sailplane; Irv Culver will talk about light, simple, less expensive sailplanes as long as they don't have to look pretty; Dan Armstrong on ultra-light contributions to recreational soaring; Alex Strojnic on the design and flight test of his 30' span motorglider; and Bob Noble on the design and construction of a simple composite airplane.

There will be demonstrations on Saturday and Sunday mornings. They will be: Jeff Byard on fabric covering techniques; Harald Buettner on composite construction tips; Vic Saudec on his surface wave detection device; and Les King on the progress of Don Mitchell's Stealth II. The banquet speaker will be Dr. Peter Lisserman who has had a most interesting career teaching at Cal Tech, and working for Northrop and MacCready.

The floor was then given to Budd Love who had some comments about his High Internal Air Mass (HIAM) project and where it is going.

Budd showed his wing section model that includes the ducting layout used to route compressed air through the wing to produce high lift coefficients.

Although the Mission Research Corporation has taken Budd's concepts and made proposals to the Air Force, there have been no contracts awarded. This has been somewhat disappointing, but at least the concept is coming to the forefront.

Budd has been asked to present his design to the Powered Lift Conference later this year, and that is what HIAM is all about; powered lift.

He indicated he was a little disappointed in the response he has received from TWITT members over the past several years. He tried to emphasize that this is not just his airplane, but a shared effort within the aviation community.

Andy asked if there has been any more consideration given to the further development of the HIAM flying wing concept published several months ago. Budd indicated there is no serious interest right now, but it could happen in the future. Andy offered the thought that in the past the concept has centered around a conventional planform, and that perhaps more TWITT member interest could be generated by concentrating on the flying wing design.

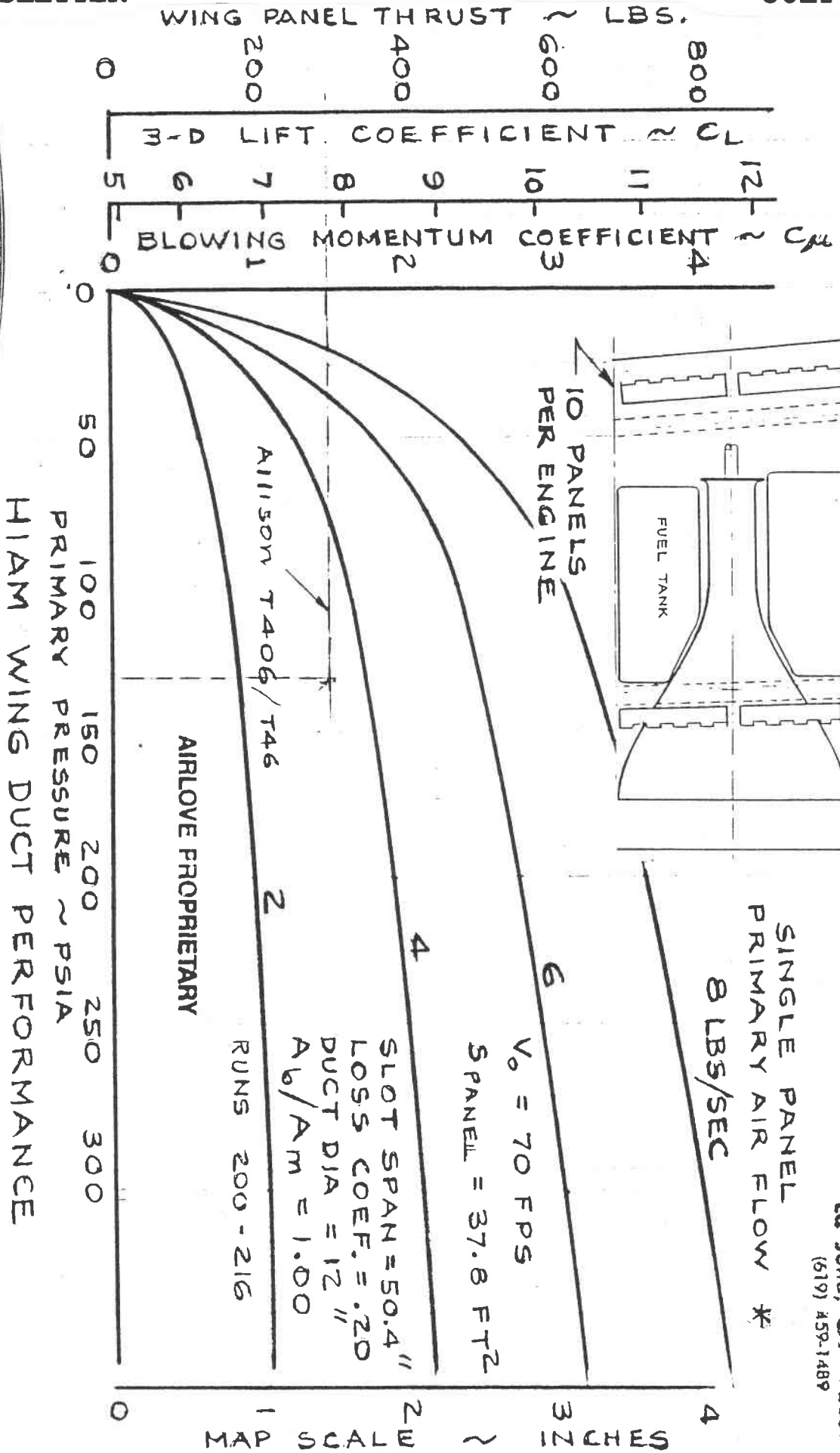
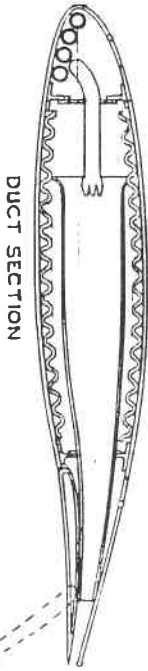
Based on Budd's remarks, Andy challenged him to spark member interest through the development of a homebuilt, flying wing using HIAM. This would put it into the memberships field of interest, while providing a proof of concept airframe, in either scale model or sport plane form.

Bob Chase noted that blowing air out the trailing edge of a flying wing over the flaps will cause a severe pitching moment. Bob then volunteered to build a flying wing model, using a ducted fan to push exhaust through a flap at the 50% chord line to simulate the HIAM conditions.

Andy went on to say that we would ask other members who might be interested in this type of project, to get a hold of Bob and maybe work together in producing a workable solution.

Budd has a preliminary design task list which covers some of the numerous projects that need to be worked on to eventually reach a final solution. He has asked for some time during TWITT meetings to briefly discuss these issues. *(Subsequent to the meeting Budd provided the thrust curve chart (see page 3) as a lead-in to start these discussions with the July meeting. He said he will try to make these discussions fun and very interesting, and the flying wing will be in the limelight.)*

We had a late visitor, Dave Sterling who flies an ASW-20 and likes to use waves whenever possible, so he just had to come when he learned Larry Edgar would be talking about the Sierra Wave Project. He also flies another type of aircraft with a glide ratio of 18:1, but it takes a level six thunderstorm to



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BUDD LOVE
 5 Nov. '89

thermal successfully. Of course this is a Boeing 747. He told us of one experience in a 727 where he was able to achieve zero sink at idle power in a Rocky Mountain wave.

Andy then introduced Larry Edgar, our main speaker for the day.

Larry began by equating TWITT to "The Wave Is The Thing", which was his topic for the group. In terms of history, wave flying is a relatively new phenomenon, having started in the 1940s after early pioneers ventured off the ridges and into thermals. One of these early wave fliers was Harlan Ross flying out of Bishop, CA. He bought a TG-3 and rigged it up for high altitude flight, and around 1949 set a new record of over 35,000'. In the quiet air they heard some wood cracking so decided to get back on the ground. What they found was the aileron bellcrank was being pulled loose since the cables had contracted due to the very low temperatures.



Above: Larry Edgar pointing out the parts of a lenticular formation.

It was that experience that led Larry and his group to later rig their Pratt-Reads so the controls were loose and sloppy when on the ground, but once at altitude they were snug and responsive. They also used special high altitude grease, provided by Vic Saudec, on the pulleys to keep them from becoming sluggish as the temperature dropped.

Some of the early wave fliers reads like a book of who's who in soaring. Names like Johnny Robinson, Bill Ivans, Lyle Maxey and Lew Prue. The latter two came up with the double pane of plexiglass for the inside of the canopies to prevent frost from forming and blocking vision.

Ray Parker took two Pratt-Reads and re-built them so they were much stronger to withstand

the heavy turbulence, and also insulated them against the extreme cold temperatures. The bottom sill of the entry doors were lowered about a foot or so to make it easier to get in once the pilots had on all the heavy clothing and oxygen equipment necessary for the flights.

The Sierra Wave Project came about when the Navy decided to do some high altitude research using a couple of German open cockpit gliders. Vic Saudec and Dr. Klemperer heard about the plans and went to look at the gliders, which they found were less than desirable. They told the Navy there was a glider club that could provide the gliders and crews to do the research, and that's how the Project got started.

At this point Larry started through a series of slides on waves and the equipment used for the flights. The flights were initially started from Manzanar after towing the gliders in from Inyokern, which had the only hangers in the area at the time. These tows were often very turbulent, and it was later determined they had been flying through the roll cloud.

When hangers were finally built at Bishop, the operation was moved. This allowed them to enter the areas of lift without going through a roll cloud and made for much shorter tows behind the BT-3.

Their flight equipment provided by the Navy included thermal flight suits, bailout bottles, automatic deploying parachutes, and warm boots. The large canopy area of the Pratt-Reads helped keep the pilots warm by providing a greenhouse affect. Modifications had to be made to the seatbelt latch after Ray Parker had a sleeve cuff unlock one and he got thrown around enough to hurt his back. They also had to put stirrups on the rudder peddles to prevent their feet from flying off and causing injuries.

The Pratt-Reads were very well instrumented with barographs, time lapse cameras and dual oxygen systems. Both pilots could use one oxygen system in the case of a malfunction. The panel was full IFR equipped, since some of the flight time would be spent in the clouds. The barographs would freeze up at high altitudes, so the cameras provided the best records of the flight.

One of the most important things to remember is to have enough oxygen for these flights. One pilot, a visitor from Sweden, who went on a solo flight, got so enthused with the wave he let his oxygen run out (pictures from his own cameras verified it). They found him several days later, still in the cockpit of the Pratt-Read just outside of Independence. It looked like the glider just came apart from an apparent spiral and high speed flutter.

One flight was going so well they decided to keep climbing. It was decided to stop it at 44,000', which was a new altitude record. This was done before the Air Force offered high altitude training in their altitude chambers, so Larry and the others were experiencing the effects of altitude without any previous knowledge of what to expect. This makes the

record flight even more remarkable.

Larry described his inflight breakup when flying the Pratt-Read during a later project to evaluate the jet stream. He blacked out right away, so doesn't know exactly what the sequence was for how the glider came apart. He was fortunate that the cockpit area broke away from the rest of the fuselage and that the canopy shattered. His feet were caught in the rudder stirrups, but when he pulled his ripcord his feet pulled out and he was forced away from the wreckage.

When one eye cleared up a little, he found himself in the roll cloud going back up again. He was able to dump some of the air from the chute and get out of the cloud, but it took him over a half hour to reach the ground.

He landed with only minor injuries, including fuzzy eyesight for a while since the blood vessels in his eyes ruptured due to the large negative g load. But he did hit hard enough due to the high winds that he was knocked unconscious. The first thing he recalls is someone saying something about wrapping him up in the parachute.

The FAA investigation thought that the left wing failed up about 7' from the tip, then broke off at the fuselage in a down mode. The tail boom probably let go at that point and the center section left with the right wing. One interesting thing was the clean shear breaks in the steel tubing, not jagged edges one would expect.

Larry went on to explain some of the techniques they used to fly various portions of the waves. At times they would actually fly backwards to accomplish several tracks through the same area of lift.

Larry related a story about Bob Simmons, who was flying a P-38 that was involved in a cloud seeding project when the airport got socked in by blowing dust. Bob was short on fuel, with nowhere to go, but was in good wave lift so he shut down one engine to conserve fuel. The lift was so good he decided to shut down the other engine, after which he soared in the wave for some time until he could finally get into Bishop.

Larry showed and narrated a short video of the time lapse photos taken during some of the wave flights. He concluded with a short question and answer period.

After Larry's excellent presentation, Andy had raffle ticket drawing. The winner was Bob Chase, which was appropriate since he bought the most tickets (there's power in numbers).

Then Bob Chase shared a new little concept model he has using diffuser tips ala Richard Miller. Bob has come up with a tip configuration that enhances stability in all axis', gives additional lift at slow speeds, reduces tip drag by eliminating the vortices at design speeds, and he only had to come in one chord length from the tip. The wing became elliptical in the leading edge sweep, with elliptical dihedral, and no reflex in the airfoil.

The results can be seen in the outline

drawing on the following page. The tips are curved and shaped downward, and duct tape used to provide the required nose weight for the proper CG. Bob used Marco Colored Cloth tape for his demonstration models and cut the glider out of 5X8 file card stock.

Bruce commented that you don't want to get rid of the tip vortices completely since you would lose lift and essentially fall from the sky. Bob was designing it for lower speed flight for thermalling. Bruce went on to say that the diffuser tips allows for trimming a flying wing for sway and pitch but it will have a higher induced drag than a conventional aircraft.



Above: The TWITT logo on this year's birthday cake. It was delicious.

Andy then adjourned the meeting so everyone could enjoy the cake and ice cream celebrating our 7th Anniversary as an organization.

LETTERS TO THE EDITOR

6/6/93

TWITT:



I was recently contacted by John Fitzpatrick with a request for information that seems right up TWITT's alley. John is a retired Convair test pilot (one of the founding members of the Society of Experimental Test Pilots) who now works as a docent for the National Air and Space Museum.

He is currently doing research to assemble data for the restoration of several Horten III gliders in the museum's holdings.

The NASM has parts of 3 Horten IIIs in storage at Silver Hill. A museum in Germany (Deutsches Luft Museum?) has agreed to do the work of restoring all three if they can keep one of them. John is trying to collect drawings and data to help in the restoration. The aircraft they have are in pretty sad shape, and the restoration will be closer to a total rebuild.

He has already collected all the easy sources. What he is looking for is anyone who may have old photos, drawings or documents relating to the Horten aircraft. His address is: John Fitzpatrick
1811 Priar Ridge Ct.
McLean, VA 22101

Any TWITT members who can help should contact John.

Sincerely,

Kevin Renshaw

(Ed. Note: I hope all of you Horten fans out there will dig into your memorabilia and see what you can find for John. I hope that John keeps in touch with Kevin so we can find out how well the restoration project is going.)

6/25/93

TWITT:

I would like to contribute something to your newsletter. I have taken so much good information out in the past, it is time I put something back in.



Above: Hopefully you will see the Beta I laying in a grassy field.

I am enclosing a photo and sketch of an R/C slope glider that I designed, built and have been flying for the past year or so. This is a pure (sort of anyway) flying wing along the Northrop lines. It uses a symmetrical airfoil (basically a NACA 63-021 scaled for the desired thickness) with large elevons (25% of the chord). The thick center section was to allow a mechanical mixer inside.

It is made from solid white foam (1 lb/ft³) cut with a hot wire using the rib patterns shown (the elevons are separate and made from balsa structure, hinged with clear packing tape). The sections are glued together with epoxy. The center is then hollowed out to make room for the servos, mixer, receiver and batteries. Balsa is glued to all edges and sanded to shape. Filament tape was added for strength and the whole surface is covered with silver gift wrapping paper (wall paper paste is used for the adhesive although thinned white glue would work too). A canopy was carved from a foam block, painted and glued on top to give it some shape. Elevon deflection was at $\pm 20^\circ$.

The plane flies well in a 10 mph breeze but can handle up to 20 mph if the CG is moved forward a little and down trim is added. Normally the elevons are deflected up about 5° for level flight which bothered me at first. I tried moving the CG farther back but all I got was a slower flying plane that was very hard to control (would spin easily) and elevon deflection was not changed!

The first flying wing I flew was a 1/12 scale model of Gilbert E. Davis' ALPHA. Powered by a 40 watt electric motor; I would get 6 to 7 minute flights. This proved to be very hard to control but I got 10-12 flights before it got banged up so much it wasn't worth fixing. The BETA was designed to correct those aspects I didn't like about the ALPHA and it has turned into a most enjoyable airplane.

Best regards,

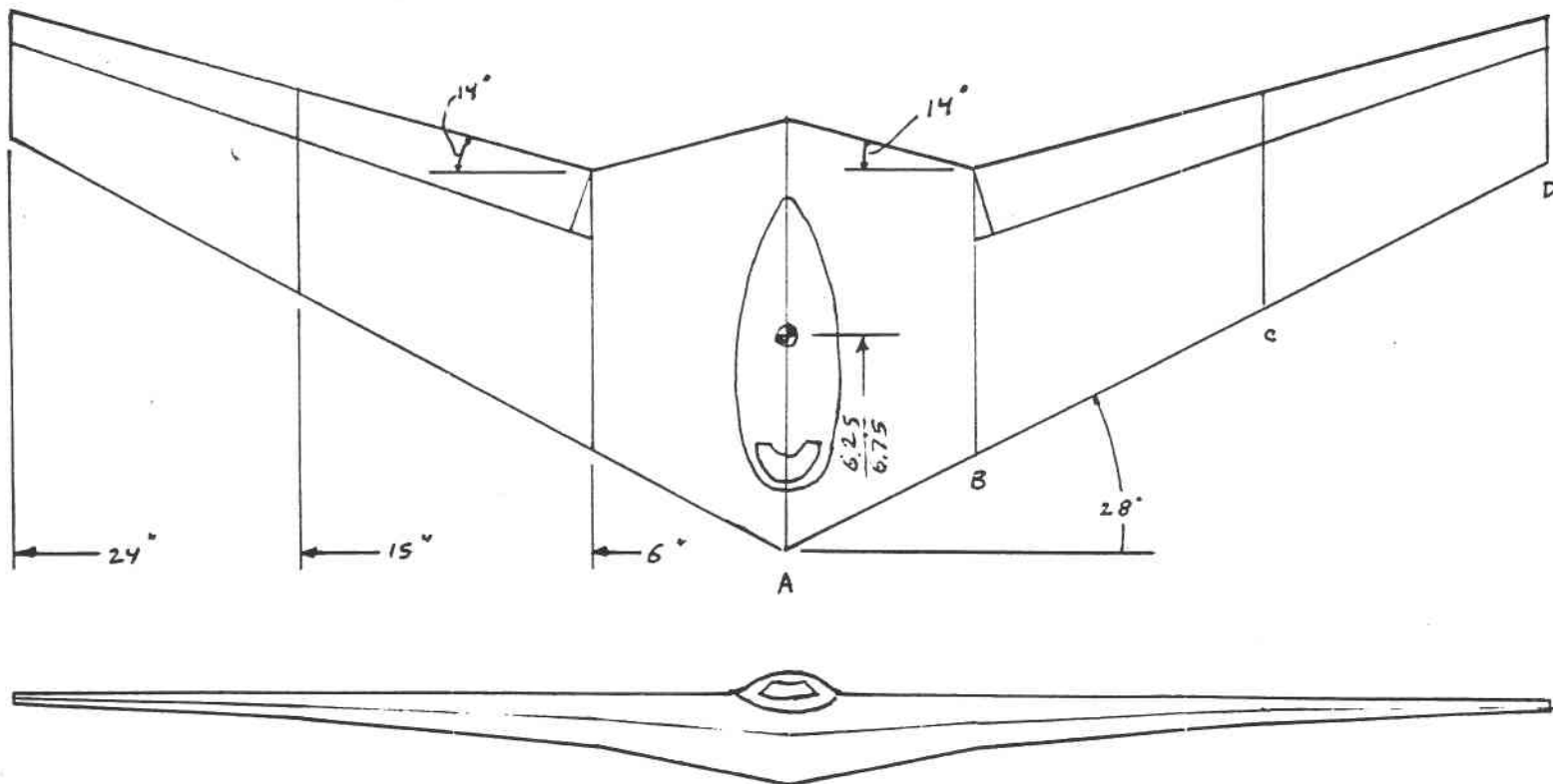
Clark A. Calkins
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Walnut Creek, CA 94596
(510) 939-8153

(Ed. Note: First, we would like to thank Clark very much for his letter, photo and sketch. This is what it is all about, sharing information so we don't have to continually re-invent the wheel (oops, wing).

It sounds like most modelers could build something like this very easily, and those with electronic mixers might even be able to thin the center section down somewhat. The three-view, specifications, and airfoil profiles are shown on page 7.

We hope you all enjoyed this material and will consider contributing your own experiences in the future.)

BETA-I SLOPE SOARING GLIDER



Cord = 3.89"
 Thick = 9.00%
 Twist = 6.00°



Cord = 6.43"
 Thick = 13.50%
 Twist = 2.00°



Cord = 8.97"
 Thick = 18.00%
 Twist = 0.00°



Cord = 13.66"
 Thick = 21.00%
 Twist = 0.00°



Wing Span	45.0"
Wing Area	367.0 in ²
Weight	10.0 oz
Elevon Area	55.0 in ²
Construction	Solid White Foam
Covering	Silver Gift Wrap Paper
Mixer	Mechanical

(The following are excerpts from a letter sent to Chuck McGill on his announcement of publishing the Rigid Wing Reader.)

6/21/93

Hi Chuck,

I was very pleasantly surprised to see in the June '93 issue of TWITT that we're about to have a rebirth of the Rigid Wing Reader, formerly published, I believe by Chuck Rhodes. I met him some years ago, and later found out about his RWR, but never did get on the mailing list. Now, years later I'm building my own rigid wing, and would sure enjoy getting hold of the back issues as well as starting out with your inaugural issue.

If I remember correctly the original RWR was devoted primarily to rigid wing hang gliders. Is my guess correct that your format will be similar since aircraft discussions usually assume airfoil rigidity unless otherwise indicated, and the hang glider crowd is the only one that uses the term? If right, I assume you have rigid wing piloting and construction experience, correct?

My first foot launched flight was in a kit built Seagull III hang glider in 1974. I have been in various early construction stages on a kit from Switzerland of a wing called the "Nimbus" that Chuck Rhodes flew and reported on back in the late '80s. Its' most distinguishing characteristics are the smooth organic curves that form the sweep and dihedral. My intention is to replace the aluminum tubing with graphite epoxy composite and the drag rudders with Kasper tips without spending money like it was a government program; hence the long build time.

I am also involved in writing an article for Hang Glider Magazine chronicling the development of a rigid wing formerly called the "Apex" which hopefully will soon be making its formal debut.

I'm enclosing a few bucks to encourage your effort and pay for the return postage, along with several publications/articles in case you haven't seen them.

Good luck Chuck, looking forward to hearing from you.

Larry Witherspoon
4260 W. 182nd St.
Torrance, CA 90504
310-370-9793/522-3107

(Ed. Note: By now Larry should have heard back from Chuck and found out his assumptions were pretty much correct. Chuck McGill is also a TWITT member, and that is how we came to be aware of the new RWR.)

We would like to ask Larry to send us some material on his current construction project, including a photo or two, so we can show our other members what's out there they could get into the air with.)

6/21/93

TWITT:

I love "wings"! Planks, delta, double delta, "V" type (like the Horten), bird types, saucers, and many others.

My problem is, where can one go to "fly" with other wing lovers? You go to a "field" and you are the only one. The other guys are asking questions to you. No one can answer your questions. We as "TWITTERS" are "Lone Ranger" type of flyers.

Years ago, "Jasco" made the "Sail Wing 50" that was my first love. I was "hooked." Norman Gross and his cross wing was my second love. There was the Thermic Trio, also, but not too much more "wings." I would build and fly, but alone. Every one had conventional type aircraft.

To be a "TWITTER" one must be content to fly, build, design, etc., alone. But what about the future of "wings"? The Klingberg Wing, Robbe "Vampire", and Peck Polymers wing are not enough to keep younger generations interested. It is our duty and obligation, as the senior citizens, to supply a large selection of information, kits, ideas, etc. to the kids of today.

Indiana Jones in one of his films fought a villain around a "wing." That is the idea. To show people, old and young, that "wings can fly"! So many times the first question is "where is the body." Hobby Shack has a small foam wing "Star Lite" (not too sure of name) but this is a good wing, but foam. Why not have balsa wood "wings," just like the ones that Gallows and others have, for \$1.00. Mr. David Jones had a "Tailless Terror" that is a very good flyer. There are only a few good wings that are designed small and easy for the kids.

I have built the "Tailless Terror" and placed the "wing" on a wooden pencil. Now you have a "wing" and a pencil. The kids can relate to this. I have just completed modifying and Gallows "Strato Streek" into a wing with a pusher prop. You just cut the wing into two halves, glue at 30° sweep back and about 1/2" dihedral. Glue this onto the body with the prop epoxied to its shaft. Cut off the body beyond the rubber stop end. You could use the stabilizer halves as wing tips in a polyhedral, very easily.

I have taken the Hobby Shack "The Spirit of 76" wing, cut it at 30° sweepback and have made a few wings. (They will sell just the wings.)

Mr. "Bill Northrop" of Model Builder Magazine also said in one of his "workshop" articles that our radios are hundreds of dollars, the kits are also very near that cost, and that the pressure on the kids that fly balsa gliders or even rubber powered planes is that it is "kids stuff."

We TWITTERS have a job to do. The future of wings is in our hands. We are having fun now, but the future kids will only know of

"wings" in their history books!

Eugene Turner

(Ed. Note: Gene seems to be making a good point about the promotion of flying wings to our younger generation. We should take every opportunity to inform others of the benefits to be gained by using flying wing planforms for all types of aeronautical applications.

If you have a chance to speak to a high school or college class about aircraft design, don't forget to include our "unconventional" type of aircraft in with the more traditional ones they may ask about.)

ADDITIONS TO TWITT LIBRARY

Thanks go to Karl Sanders for contributing these documents. They are among the many we have received from Karl over the years.

"Aerodynamic Investigations On Tail Effects in Birds," by D. Hummel, Braunschweig, Z. Flugwiss. Weltraumforsch 16, Springer-Verlag, 1992, pp. 159-168. Analysis of the aerodynamic characteristics for a wing with control devices in the form of inboard aft extensions of the planform, representing the tail of a bird.

"Preliminary Results of Experimental and Analytical Investigations on the Tumbling Phenomenon for an Advanced Configuration," by Raymond D. Whipple, Mark A. Croom, and Scott P. Fears, AIAA Paper 84-2108 (A84-42376), (no date), pp. 509-518. Beginning with a historical review of the tumbling phenomenon, this paper discusses the current experimental results of dynamic model tumbling tests of the X-29 and the initial efforts to establish an aerodynamic and mathematical model for analysis.

NEW DESIGN CONTEST

The San Diego Flight Museum is sponsoring a "I Will Design Aircraft For Food" contest. The following is a brief rundown of the contest rules. If you think you would be interested in submitting a design, entry forms will be available at the TWITT hanger or can be obtained at the Museum at Brown Field. For you out-of-town TWITTERs, please send us a long, stamped, self-addressed envelope and we will return the rules and entry form to you.

CATEGORY 1: Sportplane (JAR-VLA Type) - The design should meet or exceed requirements of JAR-VLA which is a European Category being adopted by the FAA replacing the "Primary" category and allowing a simplified certification process. Ease and cost of

construction will also be judged.

REQUIREMENTS: 2 seats (360 lbs total), single engine, range 1000 nm, max gross weight 1200 lbs, +6G, -2G, Vs 45 kts, fixed gear, day VFR, dual instrumentation and for hire uses, but no commercial use.

PROCEDURES: Contestants should submit 3 view drawings, an orthogonal view, specifications and calculations of their conceptual design. Materials specifications, performance data, and all necessary data to describe the aircraft. Show your math and assumptions for each area. Complete stability and control calculations are not required but the design should meet minimum accepted standards of stability and control. Unusual or innovative submission must be supported by windtunnel, watertank or a recognized laboratory data, or identification of software used.

SPIRIT of the contest is to encourage design work, to provide recognition and rewards to the winners. We wish to reward innovation. The decision of the judges shall be final and you agree to this by submitting an entry.

DEADLINE: Due to publishing delays, the submission deadline has been established as midnight, December 1, 1993. The submission fee is \$10.

CONTEST DATE: The final selection will be made on a date in mid-January 1994, to be announced, at the S.D. Flight Museum, 7049 Curran St., Brown Field, CA. Finalist will be invited to optionally present their design with the aid of slides, models, graphics, etc. with the presentation not to exceed 10 minutes. Your presence is not required to win.

PRIZE: 1st - \$500 cash. Other prizes will be secured for 2nd and 3rd places.

AVAILABLE PLANS & REFERENCE MATERIAL



Tailless Aircraft Bibliography

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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

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Below: Outline of Bob Chase's diffuser tip concept model. Trace onto a 5X8 index card, cut out, put in dihedral along the longitudinal center line, add the duct tape for nose weight (you may have to try several versions depending on the weight of the tape you use), and make a test flight. It will work without any modifications to the tips, so the experimenting is up to you. We will publish the article on the Finchtip next month, which should give you some more ideas. Gook luck.

(The Horten 3-view is from the August 1946, AVIATION magazine.)

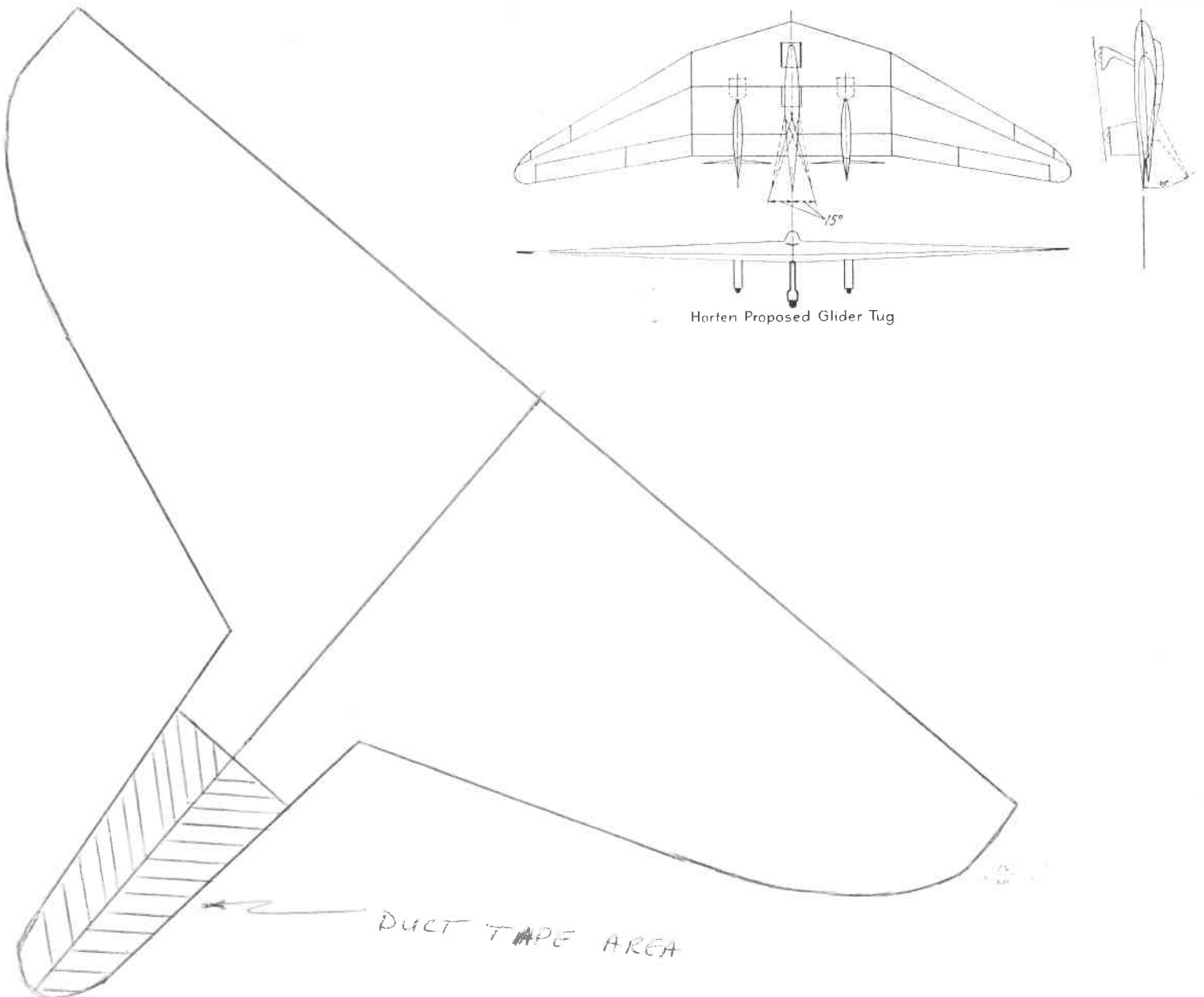
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