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Tandem flight, Owens Valley. Photo by J. Heiney.



Torrey Pines. Photo by J. Heiney.

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OFFICIAL PROGRAM

1986 U.S. NATIONAL - CHELAN, WA
 PILOT REPORT: BAUTEK SAPHIR 17

WHOLE AIR

The Magazine for the Hang Gliding World

JUNE 1986 — \$2.50 (Can. \$3.25 / DM 6)

ISSUE NO. 49 (3rd in 1986)

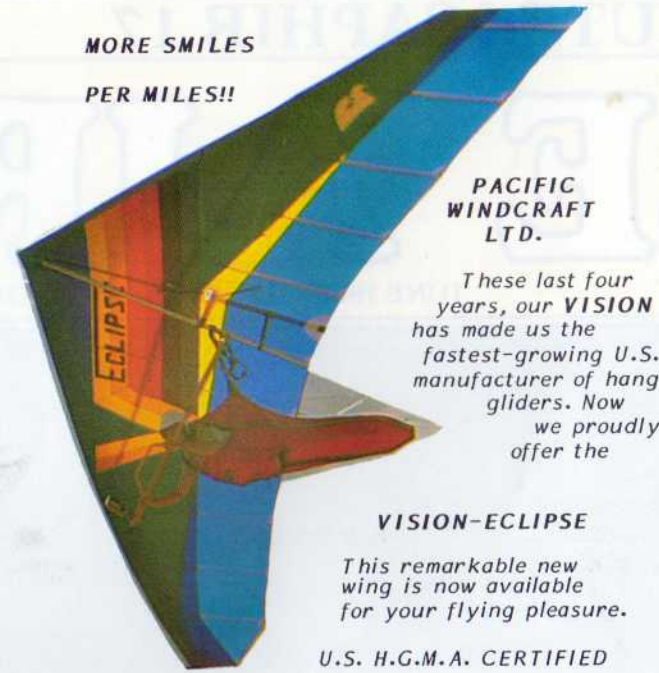


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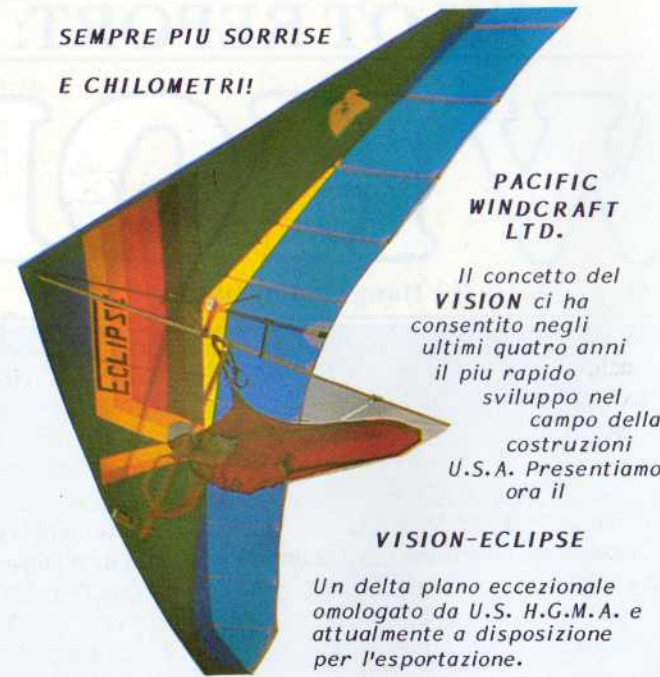
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Ltd.

FEATURES:

16 PILOT REPORT—SAPHIR 17
We fly the bowsprit Saphir from Bautek and discover the superior handling we heard about, but... The flying took place under power from the "Minimum." Before you jump to conclusions, read this one. It's a smoothly achieved, high performing wing.

SPECIAL INSTRUMENT SECTION

34 TOTAL ENERGY VARIOS
Dennis Pagen discusses this feature of the high-end variometers. He tells you what it's all about and whether the function is a "must have" for you. Or not.

35 SPEED TO FLY
Afro instrument distributor Achim Hageman brings you up to speed on MacCready Rings; what they can do for your flying, and how to optimize their use.

37 THERMAL SNOOPER
Since hang glider pilots "discovered" thermal lift, pilots have spoken wistfully about a device to better help locate sources of the convective lift. Now father and son Fisher tell you about the Delta-Therm device they developed. Is it the answer?

39 SPEED POLAR
Pagen refers to the need to devise a polar just for you and your glider. With help from the West German Bautek company, we show you what a speed polar looks like.

WHOLE AIR Magazine is published six times a year by Whole Air Inc., whose mailing address is P.O. Box 98786, Tacoma WA 98498-0786, and whose executive, editorial, and advertising offices are located at 8415 Steilacoom Blvd. SW, Tacoma WA 98498; telephone 206/588-1743. ©1986 by Whole Air Inc. All rights reserved. Nothing in whole or in part may be reproduced without written permission of the publisher. Publisher assumes no responsibility for unsolicited material. All photos, artwork, and manuscripts must be accompanied by a stamped, self-addressed return envelope. This publication is purchased with the understanding that information presented is from many sources for which there can be no warranty or responsibility by the publisher as to accuracy, originality, or completeness. It is sold with the understanding that the publisher is not engaged in rendering product endorsements or providing instruction as a substitute for appropriate training by qualified sources. **Change of Address & Subscription Inquiries** — Send to WHOLE AIR, P.O. Box 98786, Tacoma WA 98498-0786. Expiration on mailing label indicates last issue to be received. Please give six to eight weeks advance notice of address change. Send both old and new address plus mailing label from recent issue, if available. Subscription rate: U.S. and Possessions, one year \$16.00; Mexico and Canada, one year \$20.00. All other countries, one year \$24.00; Air Mail available, write for rates. Single copy price \$2.50. **Back Issues:** Many past issues are still in stock. To order, send \$3.50 plus 95¢ postage to Back Issue Dept., P.O. Box 98786, Tacoma WA 98498-0786. No orders processed without the proper funds. **All Payments:** U.S. Funds only, please.

1986 U.S. NATIONALS PROGRAM

22 PILOTS TO WATCH
This year's crop of top ranked pilots feature the names you might expect... and some surprises. Attendees, participants, spectators, and enthusiasts will all want to know who to observe. Here's who's who.

24 THE 1986 EVENT
Organizer C.J. Sturtevant provides a backdrop of Nationals competitions, and then previews the second edition at popular Chelan, Washington. Is it the ultimate test? Will it prepare "our boys" for the '87 World Meet in Australia?

26 S*I*T*E*S OF WASHINGTON
Our choices from the Cloudbase Country Club guide to sites in Washington State highlights the biggest and best in this state of diversity. Pick an Owens Valley desert site, or fly the tall, green mountains of western Washington. You'll want to keep this issue just for this section.

28 FUN DIVERSIONS
If you fly, but need to cool off from the thermally desert... or if you need to pass the time till your pilot returns from the competition, Chelan has lots to offer. We present our sampler, learned at last year's event.

AERO TOPICS

4 PUBLISHER'S COLUMN
Presenting the Welcome from the Mayor of Chelan, plus late-arriving Clubs & Schools.

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8 INDUSTRY NEWS

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For Bargain Hunters and More

42 PRODUCT LINES
Popular "Inside" News Items



Cartoon by Bob Lafay



Volume No. 9, No. 3, 1986
ISSUE NO. 49

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CJ Sturtevant

On The Cover:

A sea of clouds appears to await these fully prepared pilots at North Bend's Awesome Mount Si. The condition is present early but usually clears, offering superb soaring at the 4,000 sheer vertical site just an hour from downtown Seattle. This gathering was for a Pro-Am meet.

Publisher's Column



A big event, twice

The second in a row U.S. Nationals at Chelan, Washington leads our lineup of good reading this issue. And below appears the warm welcome from Chelan Mayor Isenheart. The town enjoys the invasion of hang glider pilots, and the pilots enjoy the hospitality and state-of-the-art cross country flying that the area offers.

Late Responses

A few entries came in too late to make our Clubs & Schools Listing in last issue. That's unfortunate but publishing—unlike

democracies—has very firm deadlines, and we simply could not accommodate them.

To assure they do get something out of their efforts, though, we'll list them here:

Clubs
Hang Gliding Association of British Columbia

c/o 1200 Hornby Street
Vancouver, B.C.
Canada V6Z 2E2
Contact: Barry Bateman
@ 604/874-5589

The H.G.A.B.C. is funded by the Provincial Government, Sport & Recreation branch, and is a member of Sport B.C. It looks after all aspects of hang gliding in B.C. and is affiliated with the Hang Gliding Association of Canada.

Schools
Great Lakes Hang Gliding Club

569 W. Annabelle
Hazel Park, MI 48030
Contact: Norm Lesnow
@ 313/399-9433

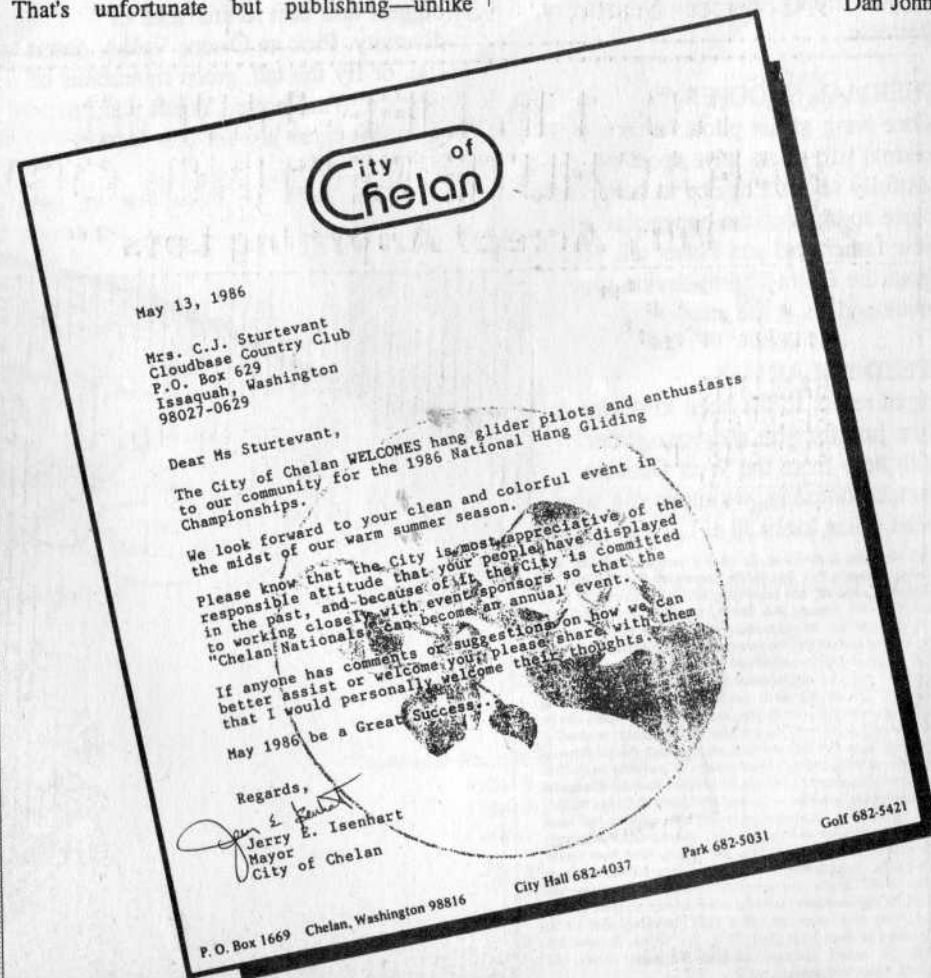
Schools
Sail Wing Hang Gliding

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@ 501/224-2186

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Hazel Park, Michigan
Norm Lesnow
@ 313/399-9433

Thanks,
Dan Johnson



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Contact: Call the dealer nearest you (page 11) for more information on how you can become a Magic glider owner. Dealer inquiries invited (see dealer ad for specific area).

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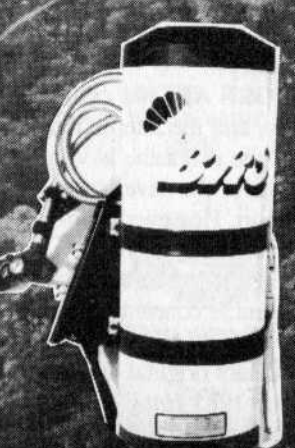
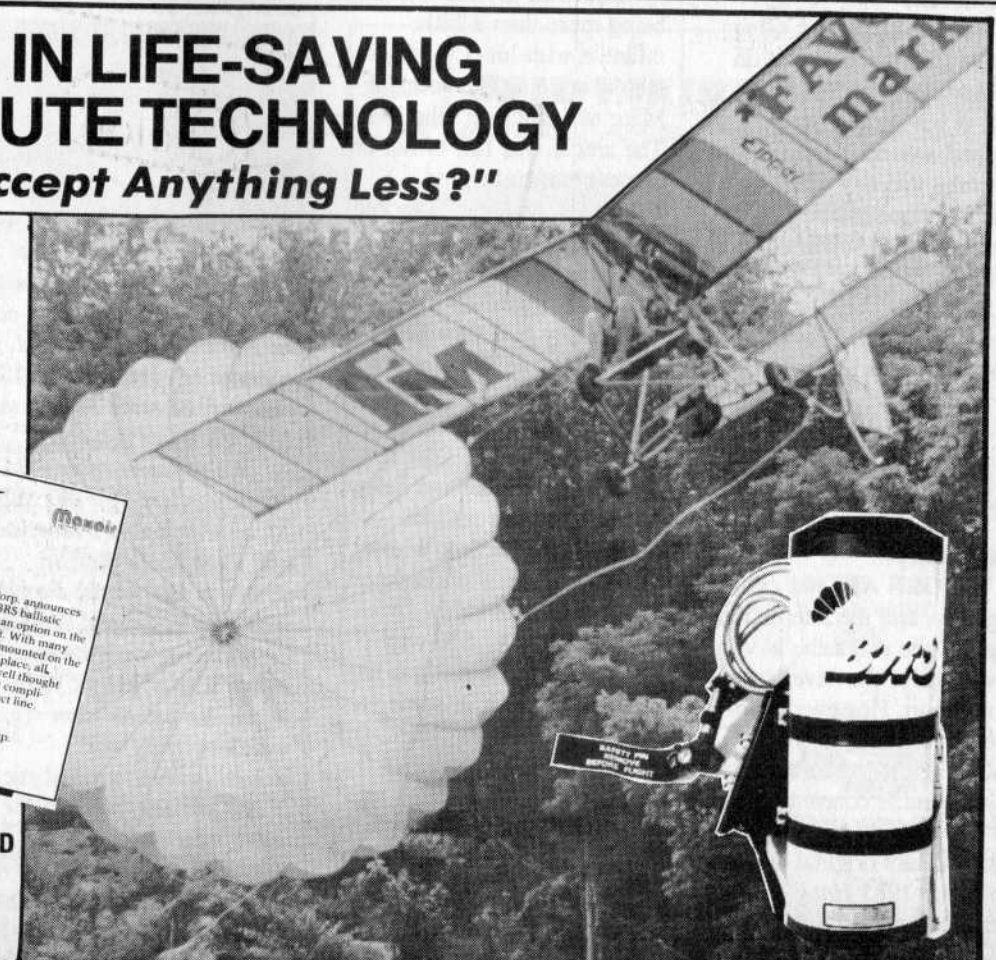
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21... DOCUMENTED "SAVES"





FORUM

Close Observation

Dear Editor;

I would like to ask Greg Roselle (the tandem pilot on the May cover of **WHOLE AIR**) if having his hang strap wrapped around the outside of a downtube had any effect on control. I hope pilot and passenger were still smiling in the LZ.

See-no-evil and hear-no-evil (in the background) evidently recognized a bad situation.

DOUG SHEA
Rogue Valley HGA

Buy American!

Dear Editor;

WHOLE AIR has come a long way, and the international scope of the magazine is very important for the development of our sport. However, I am a little perturbed by Herr Schönherr's response to Mike Meier's article concerning the DHV and HGMA [testing]. I reread Mike's original article in [the] June 1985 *Hang Gliding* after reading Herr Schönherr's

response and Mike's reaffirmation of his opinion.

I have to say the German is being more than a little infantile with his TV-addict-tabloid-style article accusing Mike of "attacking" the DHV. The article was full of out of context half-truths and innuendos, and totally lacked any real facts to support the supposed superiority of the DHV system.

So they tow their fancy test rig with a Porsche. Big deal. So it measures three pitching moments; it fails to measure the most important one. It seems to me Mike can defend himself just fine and his rebuttal did just that, without resorting to petty childishness and pointless babble.

My [Sensor] 510 was certified on a Detroit gas hog and I've flown it in some very nasty air without incident. I'm totally confident in the HGMA. I feel Mike and his colleagues at the HGMA are keeping USA-made gliders the strongest, safest, and best in the world today. I will never

buy any glider other than one made and certified in [the] USA. The only thing I'll buy made in Germany is beer.

And concerning that Italian wing nut Doi Malingri, while soaring at Torrey I witnessed his "launch mishap" on J.C. Brown's [UP] GZ. Torrey Pines is an advanced rated site. How he got his advanced rating with his bogus launch technique I'll never know. He probably bought it. He should stick to exporting olive oil and pasta. That's what Italians make the best.

Maybe I'm a little out of line and too negative in my scope. I'll bet you get more than one letter like this. And if you don't publish any of them I'll be one very disappointed American.

Buy American.

CHRIS KASTNER
(not a red neck)
Harley, Idaho

You probably are out of line in that both systems have strengths. To many, Schönherr sounded defensive, but had the dialogue started in Germany, an American response might have had similar overtones.

In any event, the reason to present opinions by both was to create extra awareness. That certainly was accomplished. Certification information can be extremely dry material. An element of controversy encouraged more review than is typical on this subject.

We welcome more correspondence on this subject. Along this line, we received a call from Mark West in Southern California. For those who may not know, West does certification work for every manufacturer except Wills Wing. He has his own rig, which recently was dramatically upgraded such that it can provide much of the same information as that on the DHV test vehicle. He has favorable comments for both the DHV and HGMA methods.

We find that significant, as West is not affiliated with any manufacturer.

We encouraged West to help **WHOLE AIR** deliver more information on the subject, and he indicated a willingness to do so. Stay tuned. —Ed.

Racist Magazine

Dear Editor;

When I opened the May issue the first thing I saw was a blatantly racist cartoon. A couple of pages later an article [news item] appeared about the South African Nationals. Obviously, your policy is to support and promote racism and apartheid.

John Woiwode should be suspended from the USHGA.

It isn't amazing that hang gliding is a dying sport when such people as you support and promote hang gliding.

DOUG HENDERSON
Las Vegas, NV

Passenger or Pilot?

Dear Editor;

To Pete Osborne, who feels he is a passenger, may I suggest one or maybe more of the following:

1) Design a glider or a subsystem like you mention (May 1986, page 30). You may be a closet aerodynamicist and not know it.

2) Quit flying. (I didn't think you would.)

3) Take an advanced lesson.

I was broken of an old habit. It improved my "control touch," which in turn decreased my pilot workload. Remember, nobody is too good for another lesson.

4) Fly a Vision. I probably won't win any speed races with mine, but I've never been a passenger on it. There is no deception in its flying pleasure.

(You're welcome Jean-Michel. Thank you!)

JAMES R. HARRIS
A.P.O. Miami



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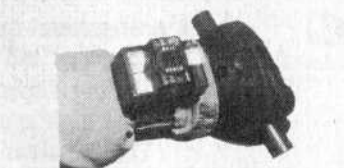
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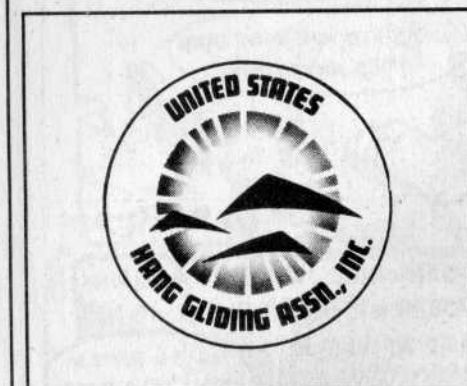


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ADAPTER

Available from hang glider manufacturers and dealers

SPECIAL NEWS

USHGA Fall '86 Board of Directors Meeting Scheduled for Chattanooga, Tennessee



The Fall 1986 meeting of the USHGA Board of Directors has been slated for October 11 through 13. The location will take this group of decision makers to Chattanooga, Tennessee, the first time in the eastern part of the country in many meetings.

The intent of this move is to encourage more interaction from the eastern pilot community. However, pilots from all over the country are also invited to add their feelings about various topics. While this represents no change—USHGA members have always been invited to attend any Board of Directors meeting—the eastern location affirms the intent of the Board to receive such input. "It is hoped that such input will indeed be forthcoming," says Russ Locke, president of the association.

One agenda item that has stirred up considerable controversy is the Competition Point System change. Though USHGA members who compete are a distinct minority, the inequities some view in the new system have generated comments from many pilots, even those who do not fly in meets.

The Chattanooga meeting will be hosted by the local Tennessee Tree Toppers club, and it is believed they will show in some force to apply lobbying pressures to the Board. This action is viewed as good and vital, and all pilots are encouraged to make their feelings known. Two ways to do this are: 1—get your Director's ear and tell him specifics of what you think; or 2—if you can make it to Chattanooga for the meeting (it's also an excellent time of year for soaring the popular eastern location), attend some parts of the three-day-long intensive meeting. Your opinions will get heard, and as few as fifteen pilots attending the Board of Directors meeting can have a dramatic effect on policy making. A larger group has even greater impact, of course.

For further information, contact USHGA at P. O. Box 66306, Los Angeles CA 90066, or call 213/390-3065; or contact the Tennessee Tree Toppers at P. O. Box 136, Lookout Mtn TN 37350, or call club president Dennis Michels at 615/949-3384.

INDUSTRY NEWS

Stu Smith Breaks X-C Record from Grandfather Mountain



Pro Quality '85 Nationals Video Marketed

No. 2 Ranked U.S. Pilot Stu Smith has broken the Grandfather Mountain distance record, with a May 5th flight of 110 miles from the lofty tourist attraction in North Carolina.

Flying as an exhibition pilot on the first Monday in May, Smith managed the long voyage to land some five hours and ten minutes later on the campus of Virginia Polytechnic Institute in Blacksburg, Virginia. A report appearing in the *Avery Journal* on May 15th says Smith averaged 8,000 to 8,500 feet MSL and achieved 10,500 at one point in the flight.

The 110 mile record stands as one of the longest flights in the east, eclipsing Joe Foster's Grandfather mark last April 19 of 63.2 miles. It did not manage to catch Gary Englehardt's 130.1 mile flight from Lookout Mountain near Chattanooga last April 2nd, but nearly matched Mark "Curly" Dunn's 115 mile mark set the same day as Englehardt, also from Lookout Mtn.

To those pilots familiar with Grandfather Mountain and the terrain which surrounds it, the Smith flight has even greater impact. "One hundred miles from Grandfather is equivalent to 200 in the Owens Valley," some have said.

—Report filed by D. Whittington of Georgia.

A professional-quality video tape of the 1985 Chelan Nationals has been completed by John Stevens and Kevin Moore of Chelan, Washington. The premier of "Feast of Flight" was at the Cloudbase Country Club (sponsor of the event) April meeting, where it garnered high appreciation. A copy was also made available to **WHOLE AIR** for review.

The presentation is 33 minutes long and features the video efforts of both Moore and Stevens. Stevens runs Chelan Photo, and will be remembered by many competitors as he provided the overnight developing service for turnpoint photos. Moore should also be familiar to all present at the Nationals as he tirelessly followed the events all week as roving reporter for Radio Chelan (KOZI).

Stevens is listed as the producer, while Moore uses his radio voice and journalism training as the tape's narrator. Moore also wrote the script for "Feast of Flight." Stevens expressed appreciation for the use of Viacom Cablevision editing equipment in Seattle, where he spent some 60 hours editing eight hours of tape down to the half-hour version.

Industry News, Continued on Page 10

polaris

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Surface 15.9
Nose angle 122°
Span 10.7
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N° Battens 25
Sail 3.8 oz
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Weight 32 Kg
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Gamma Zero

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AR	6.4	6.2	5.8	5.25
Surface	13.5 mq	15.8 mq	19 mq	21 mq
Span	9.35	9.90	10.50	10.50
Nose Angle	120°	120°	120°	120°
Top Speed	60 km/h	60 km/h	55 km/h	55 km/h
Stall	25 km/h	25 km/h	25 km/h	25 km/h
Weight	24 kg	27 kg	32.5 kg	33.5 kg

Delta



\$1350 US



Delta Super

DELTA SUPER	13	15
Surface	Superficie 13.5	15.8
Nose Angle	Angolo di naso 120°	120°
Span	Apertura 9.39	9.90
AR	Allungamento 6.4	6.2
Battens	Stecche 13	13
Sail	Vela 3.8 oz.	3.8 oz.
Weight	Peso 24	27
Pilot	Peso Pilota 45/68	62/95

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The effort is one of the finest video productions we've seen, comparable to the best output by network television affiliates. Though it may be rather technical for disinterested viewers, we believe anyone associated with the sport, even casually, would really enjoy "Feast of Flight."

Among many sequences of interest from the highly regarded contest, a memorial of Chris Bulger is included with scenes of him flying just before the tragic occurrence that led to his death. This sad aspect was handled as well as the joyous parts of the major competition.

The Cloudbase Country Club will be marketing "Feast of Flight," for a nominal fee (about \$25) to recoup expenses. For anyone who attended, and for virtually any other hang glider pilot, the tape is highly recommended.

To order, contact the Cloudbase Country Club at P.O. Box 629, Issaquah WA 98027, or call Mark Kenworthy at 206/255-0202, evenings.

Afro Electronics has changed names to Air Tech Electronics, Advanced Air Technology. Air Tech specializes in the manufacturing, distribution and marketing of high quality hang gliding instruments.

"At the heart of the change," according to owner Achim Hageman, "is the need to achieve a better name recognition via a more up-to-date name."

After marketing the West Germany line of Afro variometers, Air Tech has now announced a lower priced line of flight decks called the Aerovario, Aerocom 1, and Aerocockpit 86. All instruments are very small (5 1/2 X 2 1/2 X 1 1/4 inches) and offer what the company calls "the latest in design and technology."

For more information, contact Air Tech at 29 State St., Santa Barbara CA 93101, or phone 805/687-3119.

Stay warm with a wet suit from a windsurfing company? The notion may seem strange at first, but those same neoprene-based garments that keep windsurfers, divers, kayakers, waterskiers and others warm... may indeed offer something to hang glider pilots.

Aquata USA Inc., realizes some athletes participate in a number of outdoor sports where body warmth is a key factor. "We know most athletes cannot afford to buy a specially designed wetsuit or drysuit for each sport in which they participate," Aquata directors surmise. For this reason the company designed suits that can span several sports. A sample of the product is being sent to **WHOLE AIR** and a report will follow some experience with the product.

"For instance, we know that hang glider pilots and windsurfers have many things in common. They need protection from the wind, and they both need flexibility to perform maneuvers," they explain. Aquata's suits are sold throughout the world, and are known for quality and performance. The company manufactures a complete line of wetsuits, drysuits, and accessories for the active sportsman.

For further information on Aquata products, contact the company at P.O. Box 3606, Newport RI 02840, or call 401/849-9601.

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CONTEST NEWS

**1986 U.S. Nationals
Booking Up Quickly
(June 13th is Last Date
For Registration for
Reserved Slots!)**

As of mid-May, nationals organizers have received some 45 pilot registrations, far eclipsing the number at the same point last year. Meet director CJ Sturtevant reports, "This advance registration is most encouraging, and this is before any of the regions have held their Qualifier meets. Since all 80 slots in the Nationals are technically allocated to the top-ranked pilots and those who qualify in their regionals, and because interest in this meet is so high, it is strongly advised that those who have sent in their deposit fee plan on competing in—and winning—their Regionals," she added.

At this time, only the top ten U.S. pilots and the invited foreign pilots can be assured of entry. Should all pilots qualifying in their Regionals decide to attend the 86 Nationals, no free slots will be filled from a waiting list. While this 100% participation is unlikely, it appears the meet will be fully booked. Last year registered competitors numbered 67, leaving some slots unfilled.

Personal checks will no longer be accepted for entry deposits or for the balance payment. Unfortunately last year several payments were invalid. The Cloudbase Country Club does well to break even on the event, and can't therefore allow uncertain payments.

Everyone, even the top ten pilots and those who have qualified through their

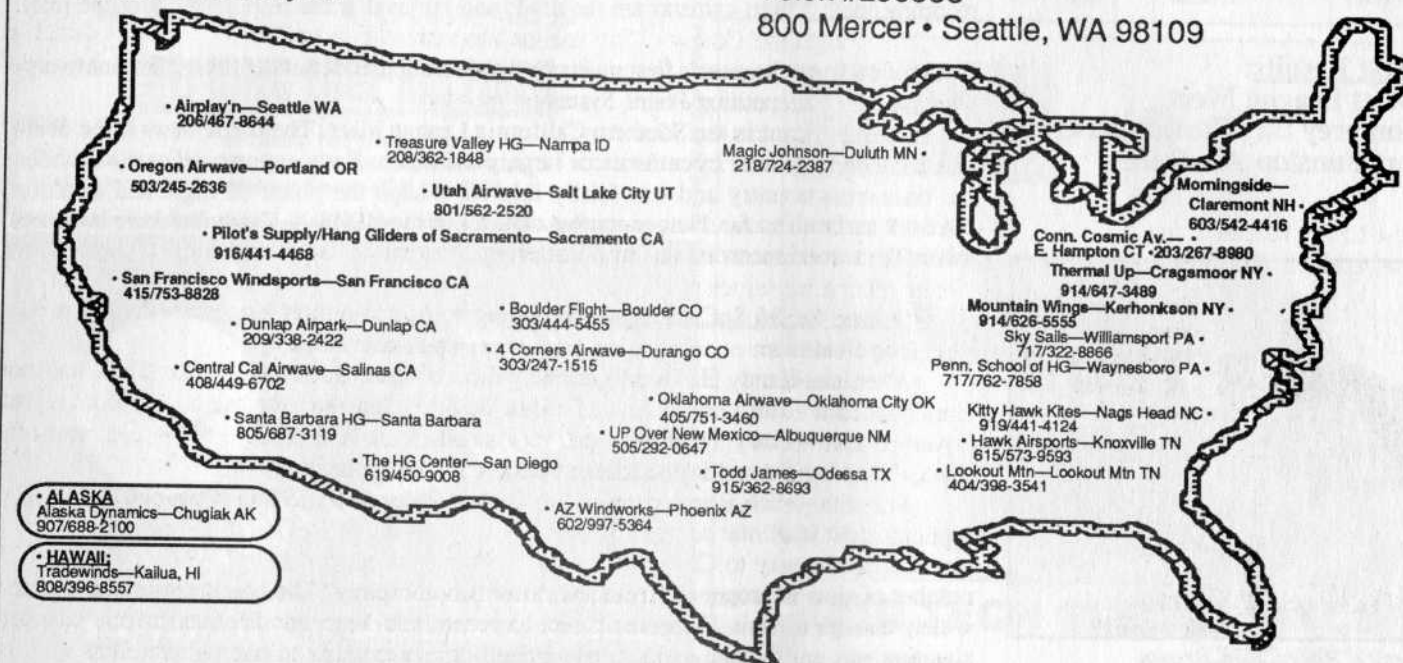
Contest News, Continued on Page 12

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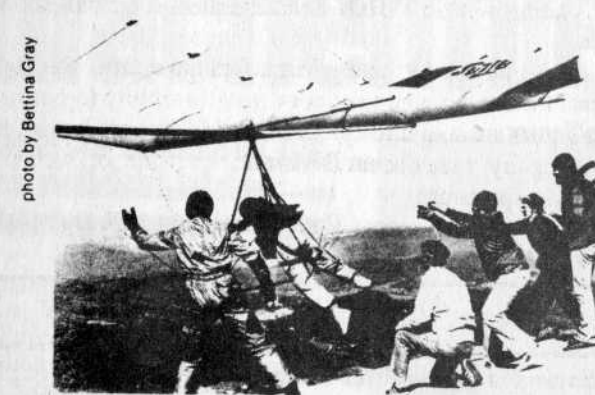


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Regionals, must send in their \$100 deposit by June 13th (*only days from the time this issue is in readers' hands*). "Any slots not claimed by June 13th will be assumed to be open slots, and will be filled from the waiting list according to the procedure outlined in the March issue of *Hang Gliding* magazine," warns Sturtevant.

Some repeated, additional information notifies competitors that they may change gliders during the meet, so long as each glider flown meets the certification requirements and clearly displays the numbers assigned to the pilot for this competition. Radios are recommended; 35mm cameras are required; and retrieval is the responsibility of the pilot.

Contest Results:

**SoCal League Meet
Monterey Bay Steeplechase
Fort Funston Air Races**



Successful Racer, Ken Brown

Early news from the year's first meets brings few surprises, but continues the controversy over the new Competition Points System.

Most significant is the Southern California League Meet. The tragic news is the death of Chuck Jones, under circumstances largely unknown. Early reports indicate he landed out on a cross country and was fatally injured, though the phase of flight and situation have not surfaced so far. New executive director of the USHGA, Cindy Brickner indicates this is the second recorded fatality for the year.

Finishing the '86 SoCal League Meet were:

Individuals:

- 1st—Randy Haney/Magic IV
- 2nd—Jim Lee/HP
- 3rd—Larry Tudor/HP
- 4th—Steve Moyes/GTR
- 5th—Rick Rawlings/HP

Teams:

- Airwave
- Seedwings
- Wills Wing
- Independent Team:
(Joe Greblo, Ted Boise, Steve Moyes)

At least one competitor, Mark "Curly" Dunn, of Region 10 (Tennessee) travelled all the way to California for the meet and was denied entry. While a limited number of slots is proper and practical, information may not have been disseminated widely enough for this 18th ranked pilot to be aware of entry requirements. "This situation was unfortunate as Dunn was merely trying to work within the new CPS system, and was thwarted in the effort," felt USHGA president Russ Locke.

Results from the 6th Annual Monterey Bay Steeplechase:

Pro Division

- 1st—Ken Brown/Magic
- 2nd—Lee Gardner/Magic
- 3rd—Paul Eikens/HP
- 4th—Dave Shelton/Magic
- 5th—Steve McQuilliams/Sensor

Amateur Division

- 1st—John Filighera/Attack Duck
- 2nd—Max Peterson/Magic
- 3rd—Mark Hessinger/HP

Women's Division

- Winner:
Kari Castle/Magic

Vision Division

- 1st—Tom Jones
- 2nd—Bond Schumacher

Target Landing Contest: Winner—Pat Reimer

Results from the '86 Fort Funston Air Races:

- 1st—Ken Brown/Magic IV
- 2nd—Eric Beckman/Odyssey
- 3rd—Rob Kells/HP
- 4th—Brian Porter/Voyager
- 5th—Randy Haney/Magic IV

- 6th—John Erickson/Magic IV
- 7th—Walt Neilsen/Magic IV
- 8th—Jim Bamford/Magic IV
- 9th—Kevin Kernohan/Magic IV
- 10th—Chris Ballinger/Magic IV

PHILATELIC NEWS

Post Office to Cancel Letters with Hang Glider logo at '86 Nationals

1986 U.S. National Championships



Hang Gliding: Quality Airtime

For stamp collectors (philatelists), a first in Postal Services will postmark with a hang glider logo at the 1986 U.S. Nationals. At least this unusual offer is believed to be a first, as the U.S. Postal Service will set up a philatelic station on-site in the public park where the aerobatic pilots will land following their demonstration on Wednesday, the 16th of July in Chelan, Washington.

Nationals organizer CJ Sturtevant said, "The Post Office called me one day asking for a special logo on the next day." Being the resourceful person she is, CJ quickly adapted (and got permission to use) the logo created by Craig Cox of the Rogue Valley Club in Oregon.

Surely no pilot can miss this opportunity to have letters to mom properly cancelled!

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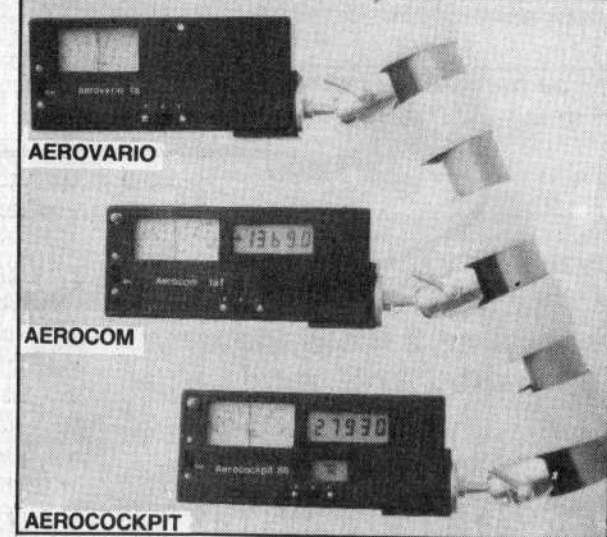
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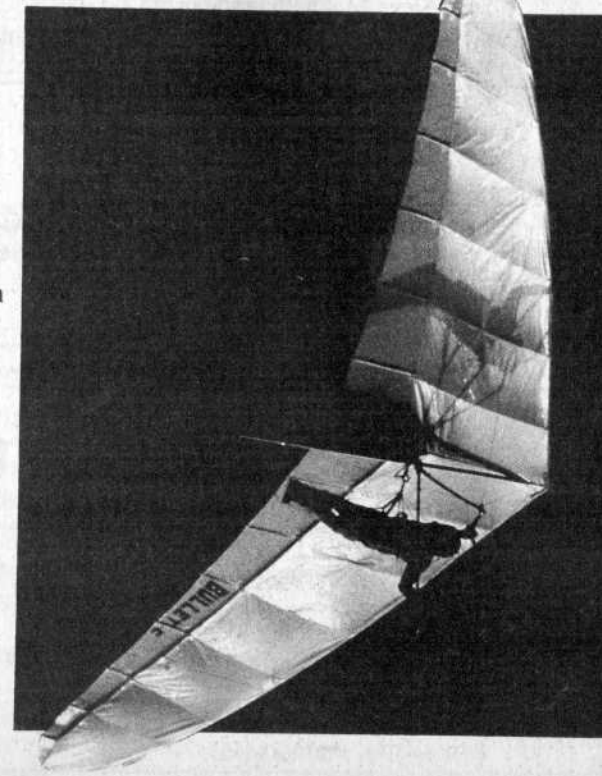
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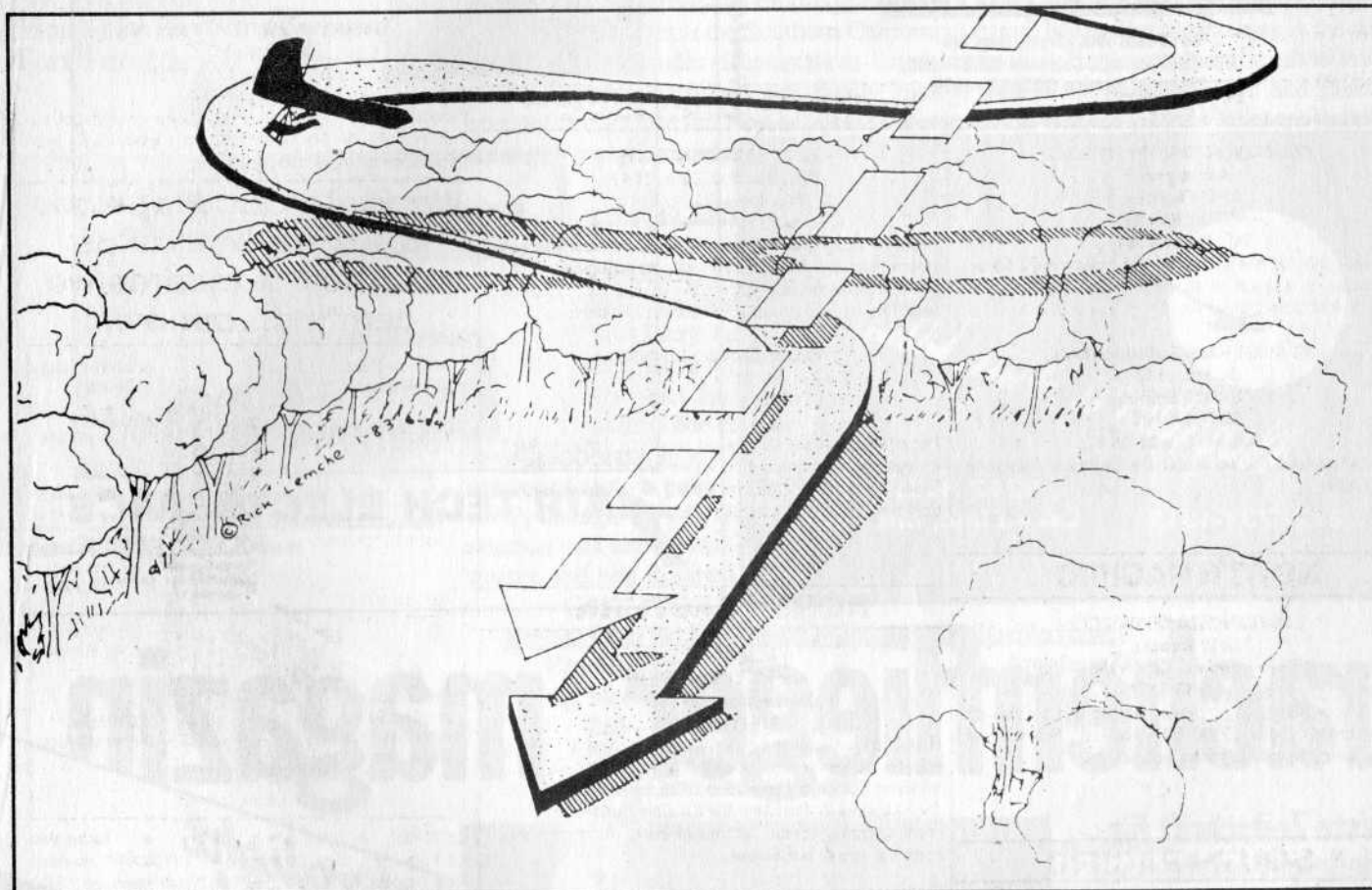
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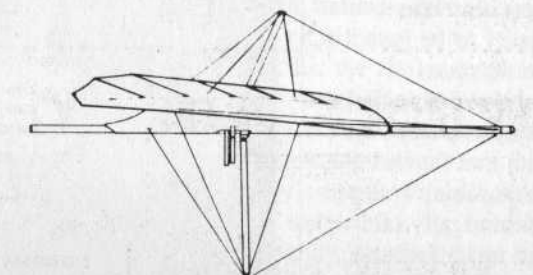
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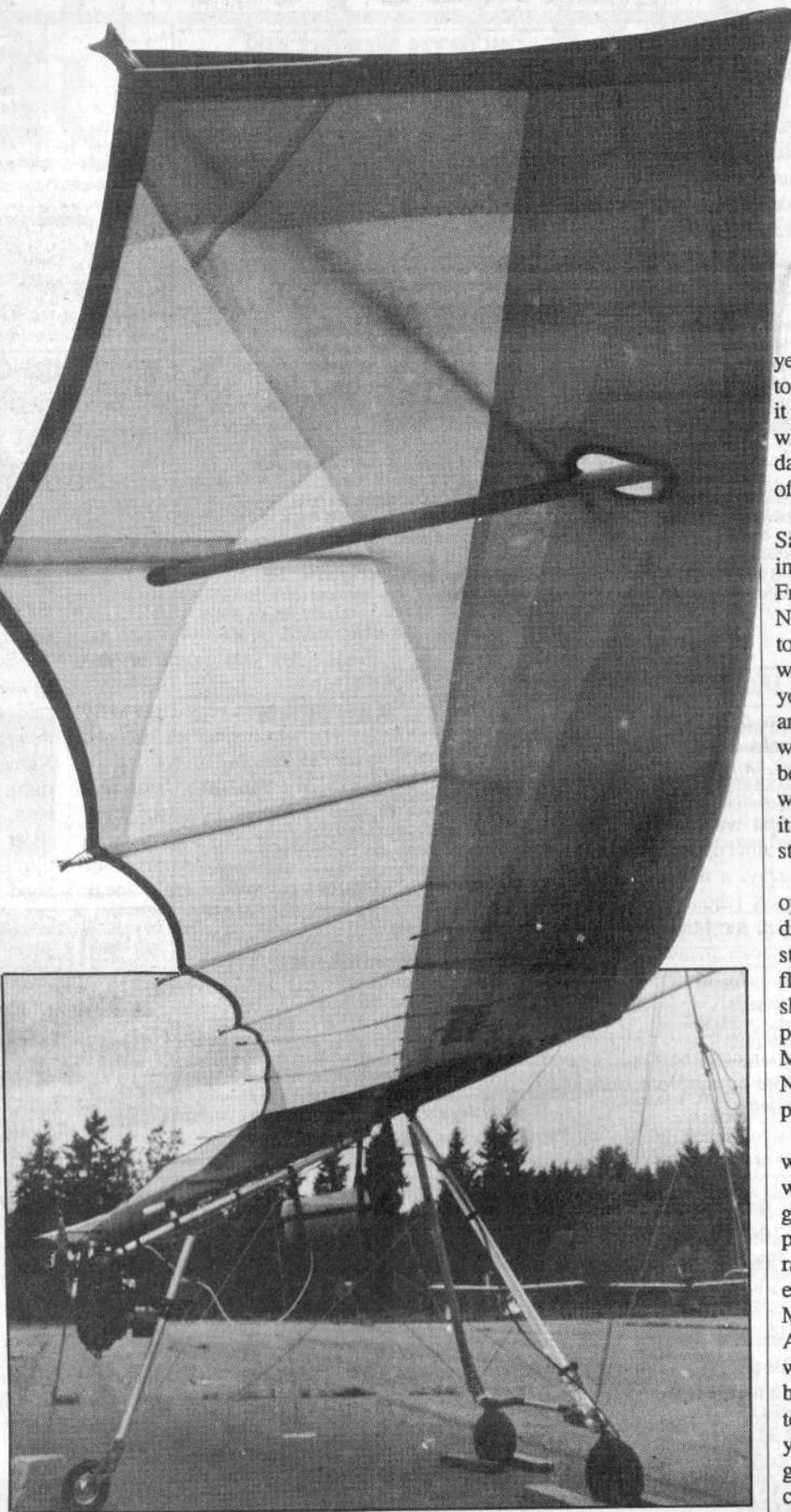
WHOLE AIR PILOT REPORT

BAUTEK SAPHIR 17

A

Soarmaster it ain't! The Minimum by Schwarze of West Germany is a pretty refined animal for powering a hang glider. Especially when compared to the old PP-106 Soarmaster of the late 70s/early 80s. Still... this is a hang gliding magazine, not an ultralight rag. So why does a pilot report on the Saphir 17 begin with all this chatter about a power system—regardless of its state of refinement? Good question.

Prologue
If you lived in Washington state, where **WHOLE AIR** is now headquartered, you'd find yourself surrounded with majestic mountains, and possibly the most aesthetic natural beauty to be found in the 48 states. You'd also find a lot of overcast days with that famous Seattle rain. Truly, it doesn't really rain that much (volume). Atlanta gets more inches of rain per



year, so says the tourism bureau. But, it does indeed get a whole lot of "moist" days, drizzle and such off and on for hours.

Thus, when Saphir/Minimum importer Hans-Josef Frings travelled from New York specifically to help us provide you with this pilot report, you might imagine he arrived to a long weekend filled from beginning to end with... you guessed it... rain, Seattle-style.

We made optimistic plans to drive to Seattle's stunning Mount Si flying site (3,500± sheer vertical), or perhaps to Dog Mountain. Mother Nature had other plans.

It blew from the wrong direction. It was intermittently gusty, and generally pretty unfriendly. It rained off and on the entire weekend and Monday. March and April were quite nice, weather-wise. May has been an abomination to those of us yearning for some good hang diving conditions.

But it provided—

by DAN JOHNSON

maybe we should say "forced"—a chance to evaluate a hang glider with a power package. Instead of being a side story on a motor unit for this German wing, it became the only way we were going to achieve a pilot report within the time available. "Fire that thing up, Hans, let's go flying!"

Something completely different...

A little background. I've a lot of time in trikes and a whole logbook full of time in various ultralights. The engine didn't bother me, though I really preferred to fly the Saphir without it. By the end of our wet session, I had a different view of the Minimum; perhaps being compelled to use it wasn't so bad.



Since we were stuck with it, let's discuss the Minimum for a bit.

You can see from the diagram and the photos what the assembly basically looks like, so we'll skip the narrative. It is a 16 horsepower single-cylinder Solo engine, swinging a 63 inch prop (big!) through a 2.9:1 reduction drive. The prop has very narrow chord area, and with its 1,800 rpm revolution speed, provides an extremely quiet operation. We aren't exaggerating the noise level. In Germany, a maximum noise of 55 decibels is permitted at 150 meters (about 500 feet). While no one quite achieves this level yet, the Minimum is said to be the closest (about 57 dB). Just for comparison, a normal indoor conversation amounts to 45-50 dB. The Minimum is so quiet that veteran ultralight field operator Jim Long—who was kind enough to loan us the use of his facility—said, "If we'd had ultralights that quiet five years ago, the ultralight scene would be completely different today!" In the air I wore no ear protection, and believe it or not, it seemed none was needed.

While the engine's placement all the way at the rear smacks of a big adjustment to control tail heaviness, it just isn't so. The Minimum attaches to the kingpost mount bracket on top, and—via two "hip tubes"—to the pilot's harness on the bottom. So all thrust is transmitted in a manner not at all unlike the center-of-mass towing arrangement (about half to frame and half to pilot). Plus the suspended 49.5 pounds of weight—yes, that's all—hangs from a point very near the center of gravity.

Good heavens! The more this is described the more unlikely all the claims seem. But the Minimum is well thought out and has been in operation in highly-regulated Germany for five years. A Soarmaster it ain't. And that's that.

The Minimum is designed to be added a large number of gliders. It has been bolted to some 16 models already in Europe, including the Wills Duck. Under the German certification system, each Minimum/glider combination must receive a

Gütesiegel.

Perhaps we'll do a more thorough report on the Minimum in a future issue. For now the above will suffice. If you want more details, contact Frings and he'll be glad to help out. But you better act quickly. He says he's

important, but since no one says they'd rather have performance or handling over basic strength, it seems nearly unnecessary to say so.

Now, as Chris Price has said in his inimitable style, "Owners are a glider's best salesman." When you own a



amazed by the response to his ads.

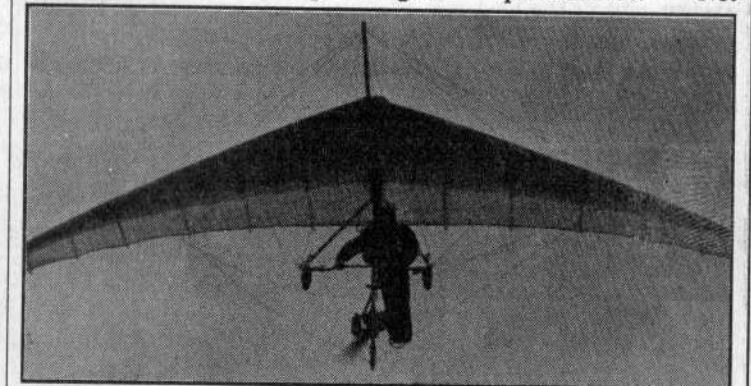
Bautek's Saphir 17

Aah, the real point of this report.

I had been very eager to fly a Saphir ever since an extended trip to Europe in the fall of 1984. At that time, I ran into the Saphir at numerous sites. When I could converse with Swiss, German, Austrian or other pilots—I don't speak

model, you just about *have* to say it's the best. Otherwise, why did you buy it? When you sell it, you can tell the truth.

Still, the many pilots I spoke to in Europe uniformly said the same complimentary things about the Saphir. Namely, "It does everything right... it's easy to handle, to land, to launch, to pack up short (very important to Europeans), and it offers really good performance. Not



speaking German—they all bubbled with enthusiasm over their wing. And this excitement really caught my ear as they mentioned magic words to me, "Great handling."

To those who have read my pilot reports over the years, it should come as no surprise to hear that for me, handling is numero uno. Well, of course, structural integrity is more

competition-level performance perhaps, but more than adequate for a recreational pilot." Even given that the above comments were from owners, the standard quality to this response seemed to bring some belief.

My interest was piqued. I really wanted to fly one. No opportunity came on that trip, however, and I had to bide my time patiently.

Patience rewarded. Those I'd seen were Saphir 16s. The one Frings brought was a Saphir 17. Not only was the size a bit larger—16 and 17 refer to square meters of sail area, equalling about 170 and 182 square feet—but it had all the refinements a careful builder can add in two years of development.

Looking it over

Some of you may already have said, "But it's a bowsprit, for cryin' out loud, and everyone knows they're relics that went out with the Eipper Antares, UP Mosquito, or early Stratus." Care to eat some crow?

Yes, it's a bowsprit. Drag-wise, it is likely to be no more efficient than today's CFX gliders, maybe even less so. One advantage is that the weight can be held down with no crossbar. It weighs only 65 pounds without cover bag. This is not a remarkably low weight by 1986 standards, but it does not qualify as heavy for a 182 square foot wing.

What's really pleasant about the Saphir 17 is the state of refinement. Some specifics will support that subjective evaluation.

Inside the leading edge pockets and keel pocket, little dacron "pouches" cover the bolt location hardware. Duct tape or some foam will do the same job, but these show care and thought in their execution. Dual zippers afford simple, quick access inside the double surface at the keel. The tensioning mechanism—at the bowsprit, of course—is very smooth, not all that reminiscent of the frustrating system used on the Stratus.

The rib bag is a delight, with compartments for batches of ribs, permitting a very orderly storing of ribs in a manner that may help keep them from damage. The ribs themselves come

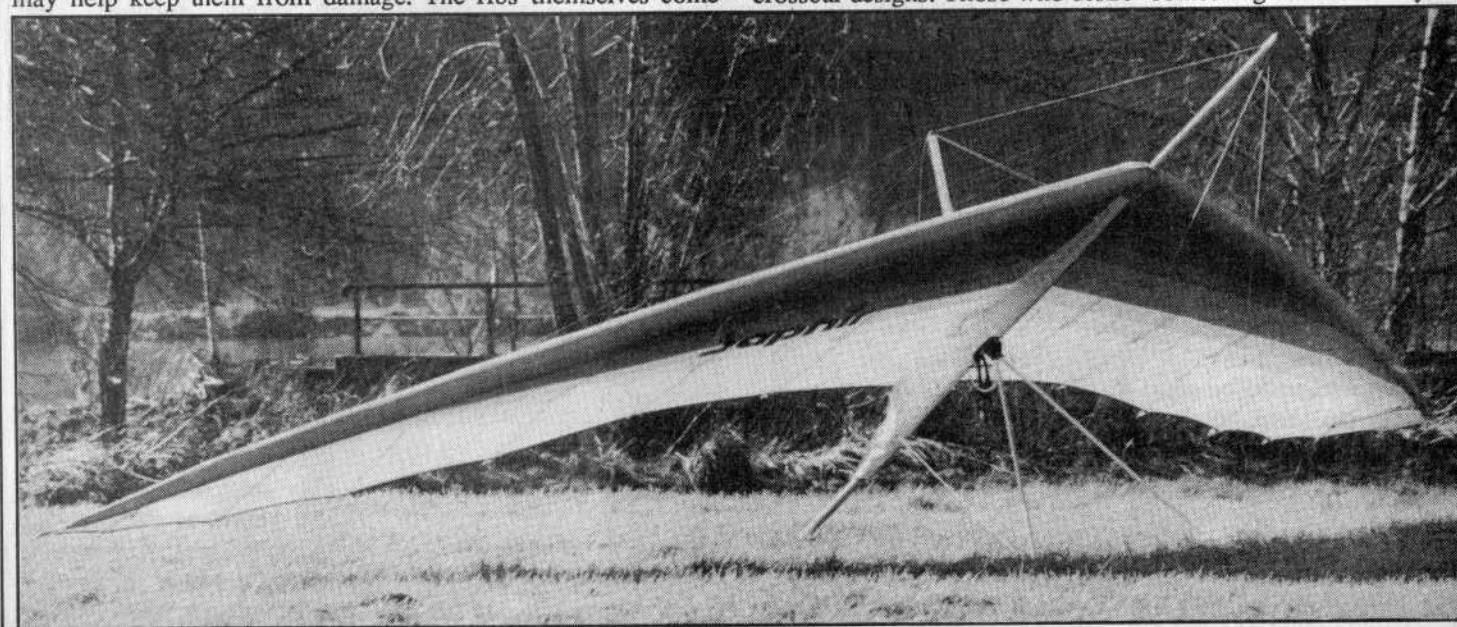
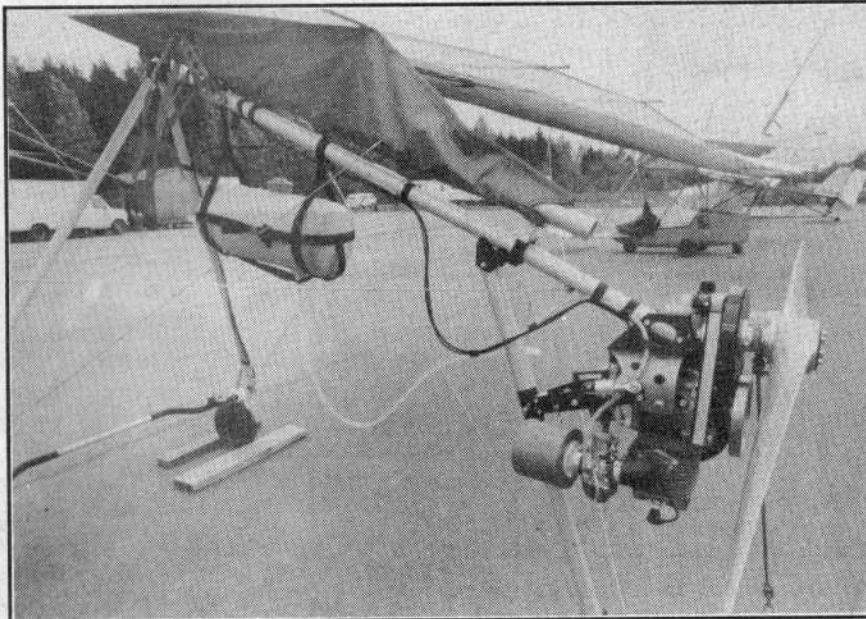
with tape at the ends that identify their order for insertion. Now, this does not mean bits of electrical tape. This tape is specially-made material that has printed, color-coded rings on it, a different number of rings and colors (requiring a different run of tape manufacture) for each rib.

The wingtips have a plastic extension of the leading edge tube that neatly conforms to the sail at that point. The control bar corners use quick pins. At the bowsprit, the leading edge cables are tidily tucked inside the extended keel, employing swaged cable fittings. The slider block for the control bar to keel mount moves very smoothly. The Saphir uses rib support extensively numbering 28 total, including half ribs. Nose cone, streamlined tubing on control bar and kingpost, wire kink protectors and more; it all comes off very professionally, matching the premium level of finish exhibited by the world's best gliders.

According to Frings, who obtained information from a trip to Germany in May, Bautek can qualify as Germany's largest manufacturer right now. La Mouette (France) and Airwave (England) do very well in Germany, but Bautek is reported to be the most prolific of the native firms.

Backorders are strung out enough to make for six week delivery, though most dealers buy "slots" to assure inventory throughout the busy season. This practice is common in Europe, less so here in America.

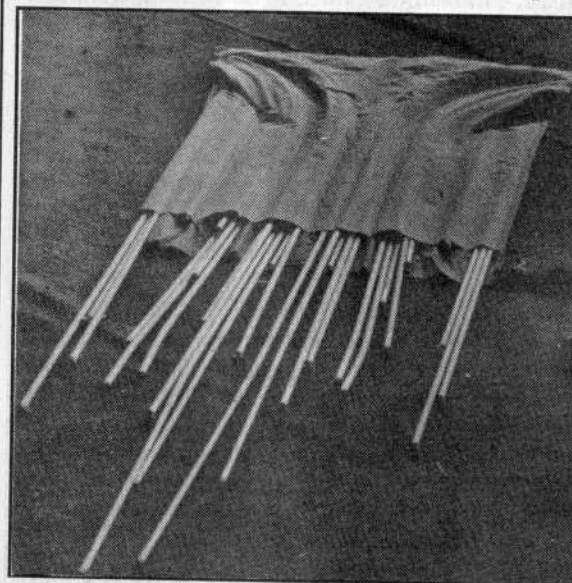
A couple more things: being a bowsprit need not be a negative. To many buyers, the current generation of gliders is so similar that they defy identification at a distance. Not so if you see a Saphir. It is unmistakable in today's scene of buried crossbar designs. Those who desire "something different" may be



endeared to the Saphir 17 for this reason alone.

The Saphir 17 is said to work with a very wide range of pilot weights. "Very light pilots, down to 132 pounds hook-in, and up to 245 pounds all report pleasing handling and performance," indicates Frings.

The glider will pack down to three different lengths. Full length of the leading edge is one, of course, but the Saphir 17 can also be disassembled to two



RIB BAG—Saphir's highly organized rib bag is compartmentalized and shaped.

shorter sizes, very handy if you want to ship the glider. Frings was able to obtain a \$20 excess baggage charge to ship the craft from Seattle to San Francisco. Try that with your full length diver!

Actually, that's still not all, but other points deserving mention will follow with the in-flight review.

Up, up, and away we go. Not so fast. With the long experience so many of us have today, a very close inspection like that mentioned above, can tell one of us "experts" a lot about the way a wing should fly. So it may be worthwhile to look at the Saphir 17 some more, but with an eye to its flight characteristics more than its finish quality.

If smoothness is as valuable as today's clean machines suggest, then the Saphir can have an edge in smoothness of undercambering (curvature of the lower

surface—called "hollow vault" by Bautek). The sail has no crossbar to curve around, and plenty of rib support. The factory states, "The whole elastic structure of the bowsprit systems leads to a superior handling and better load dynamics in turbulence."

Span has direct correlation to glide angle, and the Saphir 17's 35.43 feet is among the larger measurements to be found. A wide nose angle (132°), high aspect ratio (6.9), and significant double

surface (70% according to the factory) all add to the performance appearance along with what seems a pretty short root chord.

You'll have to make your own judgments about whether this contributes to the level of performance you require. But the factory states the following figures:

- Sink Rate — 172 fpm at 24 mph
- Best Glide — no angle stated (!), but found at 26 mph
- Stall Speed — approximately 18 mph (* see later)
- Top Speed — 55 mph+ (* see later)

A last fact; then we'll go flying. The Saphir is certified by the Swiss Certification Board, to requirements used by the Swiss and German Gütesiegel (Seal of

The proof—"real air"

As Tom Peghiny once said, "You can test and evaluate all you want, but until you fly in 'real air' you just don't really know what you've got" (or words to that effect).

In the air we had when the equipment was available, the weatherman didn't say "real air" would be present. In fact, listening to him was just discouraging, so we quit. We went to the airport anyway (knowing it was not going to be mountain flyable).

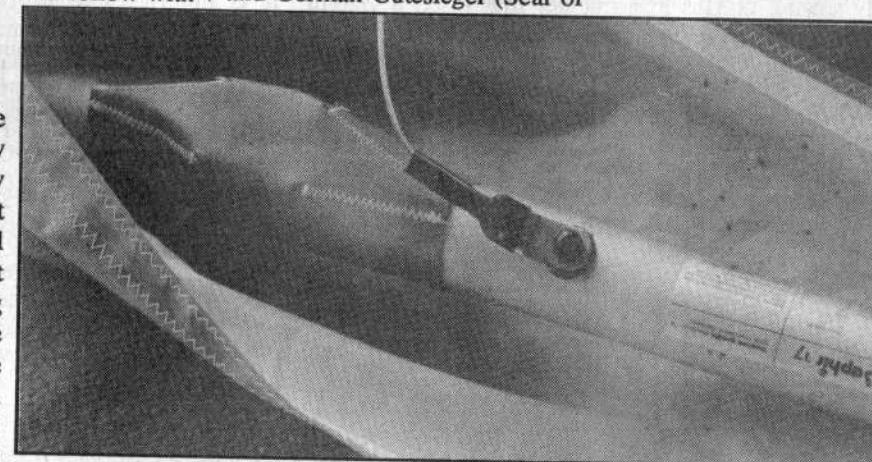


CENTER STRUCTURE—The Saphir 17's primary suspension attaches to the kingpost, and zippers for each sail layer permit inspection inside the wing.

As the Minimum and Saphir supplied by Frings were both brand new, I had an extra learning session aiding him as we assembled the two packages. While very time consuming, it was educational. Plus, it helped mellow my anxiousness to go fly. We built the components in a sheltered area while watching the rain fall, the wind blow, and the gusts pass.

Finally, the opportunity came.

As the Minimum will receive a separate report later on, I'll be mercifully brief in descriptions of it. But because it



PROTECTIVE POUCHES—All hardware fittings inside the wing are covered.

Approval). While not yet HGMA certified, it has performed well by the best European tests, and has a long history without blemish.

allowed us to be airborne at all, it must be mentioned.

Taking off involves a trike-like procedure in that after an acceleration, the control bar wheels lift gently, followed by a rather abrupt upward pitch action when the Minimum is no longer supported by the tail wheel. The Minimum pivots from the center of gravity, and "hangs" lower in the air than it sits on the ground. So when all wheels lift, it will move into its flight position.

After a swerving takeoff—caused mainly by a sticky steering mechanism that we later corrected—I settled down to a fairly smooth climbout above the half-mile-long runway. Steering? The Minimum calls for small wheels to attach simply but effectively to the control bar. One pivots freely and follows the left wheel which is steerable. The turns are effected by a twist grip arrangement that requires a lot of effort at slow speed, but little at takeoff speeds. I simply overcontrolled.

Flight position

In the air under power from the Minimum, you find your body well past the base tube. It wasn't uncomfortable for two reasons: one, it seemed very like the position experienced when aero towing with harness attachments; and two, the glider does indeed offer light handling. This made the rearward displacement of the bar not nearly as compromising as on other gliders which I've aero towed. I still didn't like it, and wished I could feel it just as a glider.

Since I grew up in our sport acclimated to gliders whose bars end up under your chin, I get a strange feeling when the bar is back twelve inches. I was glad it handled lightly, but kept wishing I could bring it back where it "belonged." The fact is, while Frings and I discussed an extra forward base tube, we later concluded this may allow you to lower the thrustline too much (visions of induced tucks). Perhaps this is why Schwarze has not offered such an add-on modification. My observation in Europe indicates the unpowered Saphir has a "normal" bar position.

Meanwhile, I climbed at 300-500 fpm. I tried to measure this on my Ball 652 Flight Deck, but the reading jumped too much for any precision. Suffice it to say the climb is enough but not too much. It is, after all, intended as a way to get up, not a cruise ultralight.

Once I had a few hundred feet of clearance, I began some turning control. It was here that I discovered the Saphir to exhibit handling very close to my expectations.

Handling

Roll rate in and out came with very light control effort, and the response was rapid.

It took little muscular effort, and none of the usual grunting associated with today's highest performance wings. I liked it. A lot. Just like you may now be thinking, I kept wondering if this could be due to the Minimum's weight and/or thrust. I can't answer, except to speculate.

I flew at an airspeed of about 30 indicated (errors are likely in the Ball airspeed indicator mounted on the bar). This proved to be slow, as stall occurred at 26 mph, some 8 mph faster than that listed for the glider alone. Best climb came at 30, and the bar was relatively more forward. But a safer number was 35 mph. Hmmm? Again almost exactly like one experiences when aero towing.

At either of these speeds, control pressures and responses were similar. They stayed essentially the same up to the maximum speed I could attain of 48 mph. I say all this to relate my impression that roll control may be equally as light (i.e., pleasant by my standards) at slower hang glider speeds.

Pitch was a little different with the powerplant pushing me, whether at high thrust or a much lower setting. The trouble was, I could not remove the effect of that power, except by going to idle thrust. Even then, I could not shut down. The unit's in-air restart was not yet installed. I did not wish to shut down due to insufficient landing areas. Plus the low cloud base did not allow for much idle thrust flying. Too bad.

On the first flight I was disturbed by a tendency for the nose to fall through when I got "slow." I had no airspeed indicator then, and was just getting used to the Saphir/Minimum's feel.

By the second flight, some of the strangeness had left and I could observe speeds. Stalling deliberately, I discovered a very mild recovery, but one that left no doubt about the wing's desire to lower the

nose. While in turns, I found I pushed out far enough to stall, which of course dropped the nose. It was this that I'd felt earlier. The "problem" was cured by carrying more speed through turns, and by relaxing my desire to push out. Keep in mind that all these impressions are with a powered version of the Saphir. The characteristics must be somewhat different when unpowered.

Other flight regions

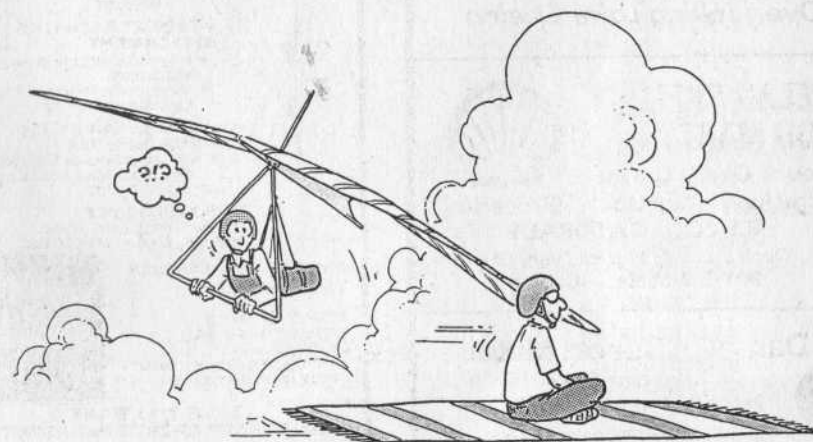
Landings and takeoffs could not be evaluated from a hang glider-only standpoint. But approach to a landing offered some of the same feelings as landing in small fields. The airport we used required a crosswind technique, and lots of S-turns to burn off altitude (trees surround the area). The Saphir turned willingly and without delay during all this maneuvering, further whetting my appetite to fly it only as a hang glider.

But such free flight was never to arrive before Frings had to move on to California before returning to New York. He was willing to stay so I could hang dive, but the weather guessers gave a poor outlook for any changes, so he chose to leave.

At some other occasion, I will take any opportunity to fly the Saphir extensively as just a glider. I felt great potential there for a machine that served up precisely the kind of flying that I like. If any of you get the chance before me, please do. It is my conviction that you will fall in love with the Saphir 17's handling and performance package quickly, and will be amply satisfied with its appearance and construction. It retails in the U.S. for \$2,500, which price includes all options.

For more information

Contact Saphir America and Hans-Josef Frings at P. O. Box 2343, New York NY 10009, or phone 212/673-6461.



TOMASIC

MODEL 1F PANEL MT. VARIO METER

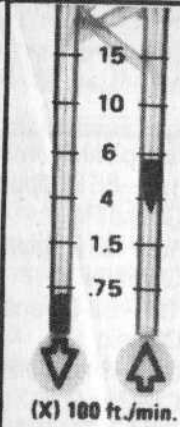
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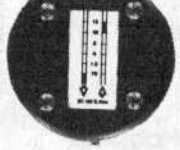
Actual size: 3"x4 1/4" Weight: 11 oz.

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MODEL 2S: Attaches to horiz. cross tubing. Good for rear pilot of Schweizer 2-33 \$85

MODEL 4

Actual size: 3"x4 1/4" Weight: 10 oz. Fits standard 2 1/4" instrument panel cutout. Complete, no connections, no assembly. \$90



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PILOTS TO WATCH AT

AMERICAN

COMPETITORS

No. 1 Ranked U.S. Pilot

Name: Rick Rawlings
Home: Sylmar, California
Age: 29

Occupation: Framer
Years in Hang Gliding: 7
Glider: Wills Wing HP

Accomplishments:
1st—86 Australian Nationals
1st—85 U.S. Nationals
1st—84 SoCal League Meet
1st—83 Region III Qualifier
2nd—84 Canadian Nationals

Other Interesting Facts:
85 World Team Member
1985 U.S. Points Champion
1983 U.S. POints Champion

Hobbies:
golf

No. 4 Ranked U.S. Pilot

Name: Rob Kells
Home: Santa Ana, California
Age: 30

Occupation: President, Wills Wing
Years in Hang Gliding: 10
Glider: Wills Wing HP

Accomplishments:
1st—84 Cascade Grand Prix
1st—80 Grouse Mtn Meet

2nd—84 U.S. Nationals
2nd—82 Telluride Aerobatic Contest
2nd—80 SoCal League Meet

Other Interesting Facts:
85 World Team Member

Hobbies:
skiing, scuba diving, dirt biking, private pilot

No. 5 Ranked U.S. Pilot

Name: Lee Fisher
Home: Seattle, Washington
Age: 35

Occupation: Salesman
Years in Hang Gliding: 11
Glider: Airwave Magic IV

Accomplishments:
1st—Chelan Classic (Sporting Class)
1st—83 U.S. Nationals
1st—83 Chelan Classic
5th—84 U.S. Nationals (World Class)

Other Interesting Facts:
1983 Rookie of the Year

Hobbies:
skiing, hunting, fishing, outdoor sports

No. 7 Ranked U.S. Pilot

Name: Ken Brown
Home: Seattle, Washington
Age: 24

Occupation: Entrepreneur
Years in Hang Gliding: 6
Glider: Airwave Magic IV

Accomplishments:
1st—86 Marina Steeplechase
1st—86 Funston Air

Races
3rd—85 Region I Qualifier
3rd—85 Region II Qualifier
12th—85 U.S. Nationals (World Class)

Other Interesting Facts:
1st in several Marina Steeplechases and Funston Air Races; owns glider shop in Seattle area

Hobbies:
skiing, windsurfing, sailing

No. 8 Ranked U.S. Pilot

Name: Bruce Case
Home: Minneapolis, Minnesota

Age: 30
Occupation: Aircraft Salesman
Years in Hang Gliding: 10
Glider: Wills Wing HP

Accomplishments:
1st—78, 80, 81, 83 Region I Qualifier
3rd—85 U.S. Nationals (World Class)
3rd—84 Grouse Mtn Meet
3rd—81 U.S. Nationals
4th—78 U.S. Nationals

No. 9 Ranked U.S. Pilot

Name: Jim Lee
Home: Taos, New Mexico
Age: 33
Occupation: Skier
Years in Hang Gliding: 9

Accomplishments:
1st—85 Beppu, Japan Grand Prix
1st—85 Region V Qualifier
1st—82 Owens X-C Classic
3rd—84 Owens X-C Classic
5th—85 U.S. Nationals (Sporting Class)

Other Interesting Facts:
1981 Unofficial Distance Record of 168 miles

No. 12 Ranked U.S. Pilot

Name: John Woiwode
Home: St. Paul, Minnesota
Age: 34

Occupation: Transmission Mechanic
Years in Hang Gliding: 12
Glider: Airwave Magic IV

Accomplishments:
1st—85 Region VII Qualifier
2nd—85 Chelan Classic
7th—83 U.S. Nationals
7th—86 South African Nationals

Other Interesting Facts:
Only foreign pilot in 86 South African Nationals

Hobbies:
kayaking, skiing, rock & ice climbing, fixed wing piloting, motorcycling

No. 23 Ranked U.S. Pilot

Name: Mark Kenworthy
Home: Renton, Washington
Age: 29

THE 1986 U.S. NATIONALS

Occupation: Software Engineer
Years in Hang Gliding: 4
Glider: Wills Wing HP

Accomplishments:
9th—84 Cascade Grand Prix
11th—85 U.S. Nationals (Sporting Class)
25th—84 U.S. Nationals (World Class)

Other Interesting Facts:
Meet Director 85 U.S. Nationals
Seattle Hang Gliding Club Chairman

Hobbies:
windsurfing, skiing

No. 25 Ranked U.S. Pilot

Name: Gerry Uchtyl
Home: Chippewa Falls, Wisconsin

Age: 33
Occupation: Teacher/Coach
Years in Hang Gliding: 14
Glider: Airwave Magic IV

Accomplishments:
1st—85 U.S. Nationals (Sporting Class)
4th—85 Region VII Qualifier

No. 34 Ranked U.S. Pilot

Name: Kevin Bye
Home: Seattle, Washington
Age: 25
Occupation: Aero Engineer
Years in Hang Gliding: 7
Glider: Wills Wing HP

Accomplishments:

3rd—85 Chelan Classic
5th—85 Region I Qualifier
15th—85 U.S. Nationals (World Class)

Other Interesting Facts:
Holds distance record from Chelan Butte (122 miles)

No. 37 Ranked U.S. Pilot

Name: Rick Sauer
Home: Witter Springs, California

Age: 35
Years in Hang Gliding: 8
Glider: Airwave Magic IV

Accomplishments:
1st—83, 84, 85 Sonoma X-C Championships
2nd—85 U.S. Nationals (Sporting Class)
6th—85 Region II Qualifier

Other Interesting Facts:
Also owns and flies ultralight and airplane
Hobbies:
stained glass, hackey sack

CANADIAN

COMPETITORS

No. 1 Ranked Canadian Pilot

Name: Randy Haney
Home: Dawson Creek, B.C.
Age: 24
Occupation: Oil Derrickman
Years in Hang Gliding: 7

Glider: Airwave Magic IV

Accomplishments:
1st—85 Chelan Classic
2nd—85 Grouse Mtn Meet
3rd—85 World Meet; Austria
4th—85 U.S. Nationals (World Class)

Other Interesting Facts:
Canadian Points Champion—84, 85, 86
Flew 120 miles B.C. to USA
Flew 110 miles Chelan to B.C.

Hobbies:
mountain bikes, travel

1985 Canadian National Champion

Name: Mark Bourbonnais
Home: Mississauga, Ontario
Age: 28

Occupation: Truck Driver
Years in Hang Gliding: 8
Glider: Wills Wing HP

Accomplishments:
1st—85 Canadian Nationals
4th—85 U.S. Nationals (Sporting Class)
4th—83 Canadian Nationals

Other Interesting Facts:
Once held eastern U.S. distance mark (107 miles)

Hobbies:
windsurfing, scuba, fishing, swimming

Other Features of this Chelan, Washington 1986 U.S. Nationals Program:

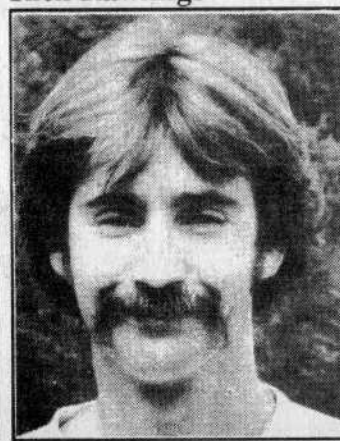
"Two in a Row"
An overview of the history behind the style of competition that has brought hang gliding to the 1986 edition, by meet organizer C.J. Sturtevant
Page 24

"Sites of Washington State"
Especially for travelling pilots who will be in the state for this year's Nationals, or for those who one day will travel to the area, information collected by the Cloudbase Country Club (sponsor of the Nationals)
Page 26

"Diversion & Where They Are"
For pilots and non-flying friends; includes locations of businesses, by Dan Johnson
Page 28

Pilot Photo Credits
Rawlings: Grandfather Mtn Masters Program, 1985; Kells: Howard Handy; Kenworthy: Rande Laskewitz; Uchtyl: Dan Johnson.

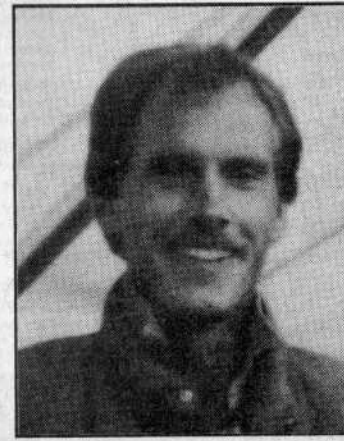
Rick Rawlings



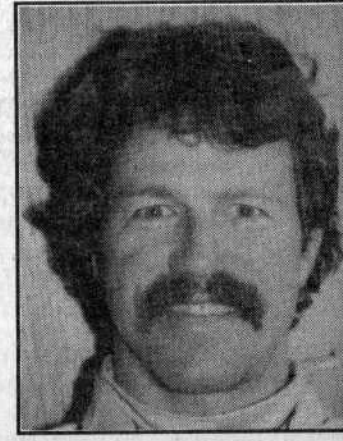
Rob Kells



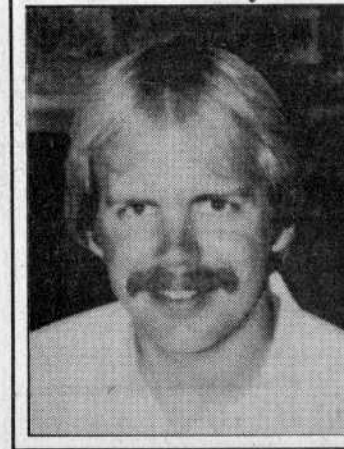
Lee Fisher



John Woiwode



Mark Kenworthy



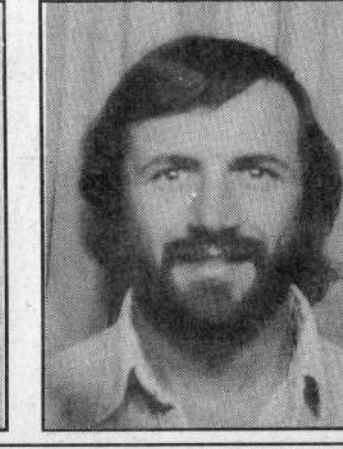
Gerry Uchtyl



Randy Haney



Mark Bourbonnais



Hang Gliding as a Spectator Sport? In Eastern Washington, You'd Better Bring Your Binoculars!

For years, Chelan Butte has been one of the favorite gathering places for Northwest hang glider pilots. Few sites in the area, or even in the country, can compare with the Butte if you're the type of pilot who wants to get far above the hill tops and fly beyond the horizon. Until last year though, the Butte's superb flying conditions were known to only a select group of local pilots. This summer like last, the Seattle-based Cloudbase Country Club sponsors the U.S. Nationals competition at Chelan, Washington. The secret of Chelan Butte is out.

Last July, 67 pilots from all across the U.S. and around the world gathered at Chelan for the 12th annual edition of the Nationals. As with any sport's Nationals, these meets are a gathering of the country's most talented participants for the purpose of determining who is the best in the field. For several of the pilots, this was their first national competition. Some were veterans of many Nationals. But even the most experienced pilots agreed that the Chelan Nationals had something excitingly different to offer.

Early Competitions

In the early years, national competitions

field where spectators could congregate.

As improvements in glider design made it possible to stay in the air for longer periods, and pilot skill increased to allow more variation in the tasks, the format of the meets changed. Pilots could launch and fly to turnpoints—also called pylons—several miles away, staying higher above the ground. Spot landing skills were no longer considered to be a valid method of determining America's best pilot.

Now the skills being tested were those needed to fly as fast as possible between two or three distant pylons, completing courses of 12 miles or so, before a landing was necessary. Pilots needed to know more than simply how to maneuver their gliders with precision around a pylon and into a field. They needed an understanding of the dynamics of air in which they were to fly. The pilot who could find and use a lifting parcel of air would have an extra boost on the way to a turnpoint five or ten miles away. A less skillful pilot or one less lucky would find himself landing short of the goal.

Fishbowl Racing

For several years the format of these national competitions was "fishbowl racing." This meant following a closed circuit course around several pylons (ground-based markers), trying to make the



were ideal for spectators. Many colorful gliders were set up on the top of a hill, launching at regular intervals, perhaps flying a specified course for the few minutes that they remained airborne. A spot landing attempt usually followed in a

required number of circuits in the shortest possible time. There's more to it than just flying fast, though.

The courses are usually long enough that it is necessary to stop and use upward moving air to avoid landing short of the

TWO IN A ROW

1986 U.S. NATIONALS at CHELAN WASHINGTON USA

by C.J. Sturtevant
Meet Organizer

Photo by Howard Handy

goal. New skills were being tested. Pilots had to locate the needed lift. Once found, they had to decide how long to stay with the lift. Gaining an unnecessary amount of altitude extended their time on the course. Not gaining enough might put them on the ground early. The pilot had to develop a strategy, and after many circuits, to recall where lift could be found. This discipline separated the skillful from the lucky.

The '85 Chelan Nationals

Last year's Nationals took the testing of pilot racing and strategy skills one step further. Fishbowl racing would not work from Chelan Butte. Bordered by the deep Columbia River Gorge, with most of the flat land filled up with Apple orchards left few places for a landing if strategy failed a pilot. Topography in the area dictated a new format for the Nationals. Racing to a distant goal was chosen by the organizers.

This cross country racing was not a new concept in hang gliding competition, but it had never been used in a Nationals competition. Since several of the pilots came from regions where cross-country flying is more difficult, it offered a new experience for many.

Those who were spectators to last year's event may have been puzzled by the apparent lack of action. Plenty could be seen, but not by the casual observer.

Each morning, the pilots gathered at a field near the road up the Butte. Loading massive trucks which transported them and their gliders, they were driven to the fire lookout towers on top. Because of last year's extreme fire danger—it was an exceptionally dry season—the road up Chelan Butte was closed, preventing spectators from



witnessing the sight of 67 brightly colored gliders set up wingtip to wingtip.

Once their gliders were assembled, no pilot ventured far from his or her craft. Periodically a dust devil—looking like a miniature dirt-filled tornado—would swirl through the setup area, tossing loose clothing into the air, and threatening to overturn any glider that was not securely held down.

The heat on top was oppressive. Pilots wore the bare minimum, and took shelter from the dazzling sun under their gliders' wings. They watched. They waited. They evaluated the conditions continuously, searching for the subtle weather signals that would tell them to launch and begin their flight.

The appearance of the first dust devils out on the immense flat lands across the Gorge created a noticeable increase in pilot tension. The sign meant rising air, just what they were seeking. Those too new to realize this development wisely observed those with greater experience. Gear was re-checked. Warm clothing was put on, even in the great heat, as the high altitude air they would seek would bring low temperatures. Such is the nature of thermal lift. When you do well, you get high. When you get high, you get cold.

No one wanted to launch first. Those who do are sometimes called "wind dummies." The title is appropriate. They may get in rising air. They may not. If they did not, they had to land, get back up the hill, and take their place at the end of the line. This could delay them from launching when in fact conditions did improve.

At some point, for reasons sometimes subtle to state, someone elected to launch. This changed the atmosphere among the pilots. Instead of watching and waiting, their actions became purposeful and brisk.

All gear and clothing were checked and secured. A place in the launch line up was sought. All eyes were on those who launched first.

Go or No-Go

If that first pilot lost altitude—"sunk out"—the remaining pilots might return to a waiting mode. But... if he succeeded in utilizing the uplifting air, an awesome spectacle began. A lemming-like rush of pilots pushed forward to launch, one after another, circling tightly together in the known lift areas. Gradually they gained enough altitude to strike out across the wide gorge (where lift was weaker or nonexistent). As the earliest pilots succeeded, others followed, till in groups, they sped out of sight. As the last pilots launched and lifted to great heights (10,000 to 12,000 feet was common in 1985), the air on top of the Butte became empty and quiet, the tangible excitement dissipating. The "action" for this day, was over.

But for the pilots in the air, the action was far from over. Their objective was to fly as fast as possible from the Butte to designated points—each day brought a different goal, or "task." The distances ranged from 60 to over 100 miles out toward Spokane on the state's easternmost border.

They couldn't just speed straight to the goal. They had to locate lift at various points along the way, recovering altitude used up by their last straight dash toward the goal. After ascending to ten or twelve thousand feet, they again would point to the goal and race on till more altitude was again needed.

Where is lift?

Here's where experience pays

Continued on Page 28



WASHINGTON STATE S * I * T * E * S

Western Washington Sites

Site Name: Dog Mountain
Nearest City: Morton, WA
Seasons: Sp, Fa, Su, Wi
Soarable: Ridge & Thermal
Launch...

Elevation: 1,450 ft.
Ramp: Concrete
Obstructions: none
Faces: West
Road: gravel, 2WD
Remarks: new launch 9/85

Landing...

Elevation: N/A
Type: pasture or lakeshore
Obstructions: tall grass
Remarks: rotor often present in north LZ

Protocol/Rules: USHGA membership, Int/III rating or Nov/II with instructor, sign agreement-waiver, purchase key

Additional Notes: Land owned by Champion Plywood, used by agreement, use permitted only on weekends and after 5 pm on weekdays, relock gate after passing through.

Contact:

Al Gibson—Sumner, WA @ 206/897-8436, or Ken Godwin—Bainbridge Island, WA @ 206/842-4970

Site Name:

Site Name: Mount Si
Nearest City: North Bend, WA
Seasons: Sp, Su, Fa
Soarable: Ridge & Thermal
Launch...

Elevation: 3,800/3,900 ft.

Ramp: none (from logging road)
Obstructions: none
Faces: South & West
Road: rough 4WD only
Remarks: South launch for South and East winds; West launch for North and West winds

Landing...

Elevation: 400 MSL
Type: large pasture
Obstructions: trees around edge; cows
Protocol/Rules: Not regulated

Additional Notes: Don't fly low over fish hatchery, Hang III or IV recommended minimum, turbulence,

min. goats, long turn-around.

Contact:

George or C.J. Sturtevant—502 Ogle, North Bend, WA @ 206/888-3856

Site Name: Tiger Mountain
Nearest City: Issaquah, WA
Seasons: Sp, Su, Fa, Wi
Soarable: Ridge & Thermal
Launch...

Elevation: 1,650 ft.
Ramp: (South) ramp; (North) short slope
Obstructions: none
Faces: South & Northwest
Road: long, steep in places, rough 2WD

Landing...

Elevation: 150 MSL
Type: grassy field
Obstructions: tall trees and power lines around field, rotors
Protocol/Rules: Under discussion with State officials at this time; also under observation by all local residents.

Additional Notes: Solid

Hang III sites especially for landing, long turnaround

Contact:

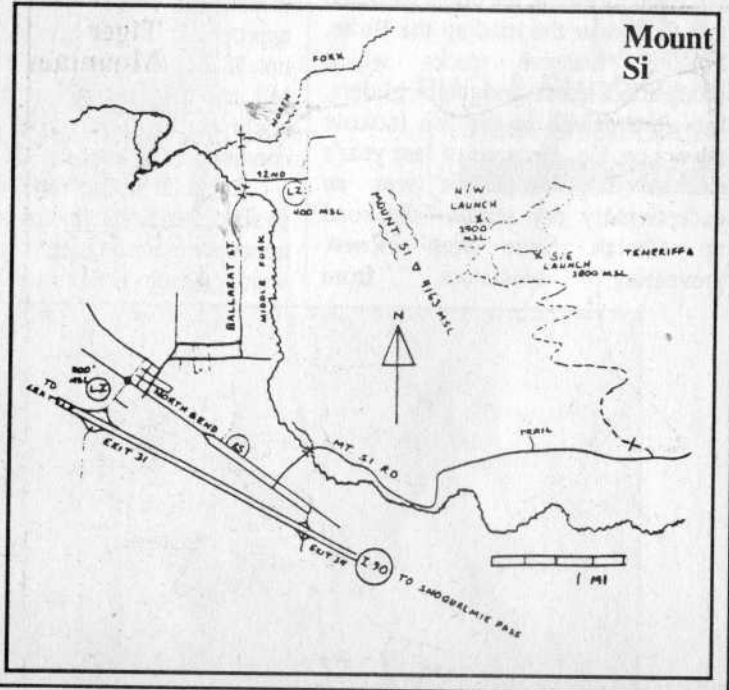
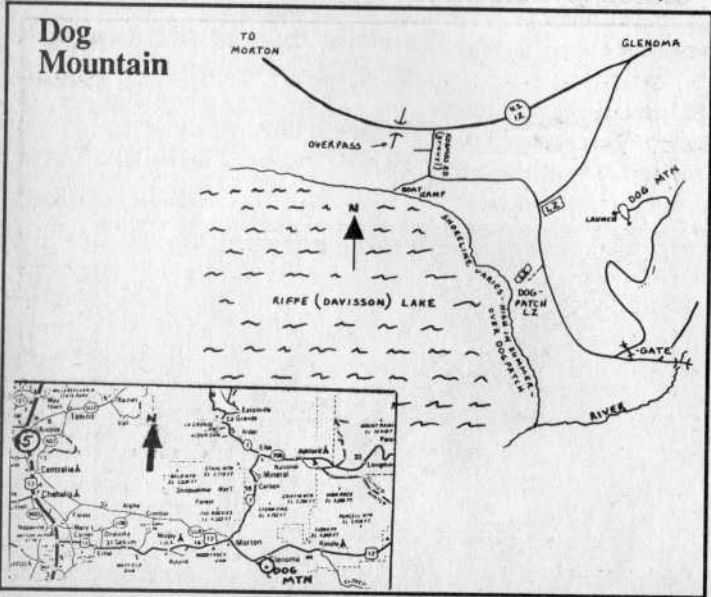
Mark Kenworthy—Renton, WA @ 206/255-0202

Site Name: Little Mountain
Nearest City: Mount Vernon, WA
Seasons: Sp, Su, Fa, Wi
Soarable: Ridge & Thermal
Launch...

Elevation: 960 ft.
Ramp: ramp
Obstructions: shallow launch, some trees in front, use caution
Faces: Southwest
Road: gravel 2WD
Remarks: Launch can be marginal if wind is not straight in, beware of trees below in such conditions

Landing...

Elevation: N/A
Type: 2—large field, smaller field
Obstructions: large trees in center with fences dividing fields, power



lines along roads
Protocol/Rules: Not regulated
Additional Notes: 20 minute turnaround
Contact: Jeff Bowman—Anacortes, WA @ 206/293-3282

Site Name: Barr Mountain
Nearest City: Monroe township, WA
Seasons: best in summer
Soarable: rarely
Launch...

Elevation: 1,000 ft.
Ramp: none
Obstructions: N/A
Faces: North or East
Road: rutted but passable
Remarks: North launch is excellent, East launch is shallow cliff

Landing...

Elevation: N/A
Type: pasture
Obstructions: cows
Remarks: Ample landing area in any direction, watch for cow and cowpies

Protocol/Rules: Launch owned by public, landing owned by Farmer Barr; act accordingly to preserve positive relationships

Eastern Washington Sites

Site Name: Rock Island (Badger Mtn.)
Nearest City: Wenatchee, WA
Soarable: Ridge (in NW wind) & Thermal
Launch...

Elevation: 1,500 ft.
Ramp: Cleared Area
Obstructions: none
Faces: Northwest
Road: Excellent
Remarks: natural bowl facing prevailing winds

Landing...

Elevation: N/A
Type: pasture or lakeshore
Obstructions: high bank between lake and field
Remarks: Primary landing is a triangular open field on the far side of the first un-named lake. Secondary landing is on the gravel road to the top.

Protocol/Rules: USHGA membership, Int/III rating or Nov/II with instructor, sign agreement-waiver, purchase key

Additional Notes: West/Northwest launch is just off road, look closely for the cleared

area. West/Southwest launch is off the road edge near where the road turns inland.

Site Name: Tekoa
Nearest City: South of Spokane (30 mi.)
Season: Sp, Su, Fa, Wi
Soarable: In 15 mph wind
Launch...

Elevation: 1,000 ft.
Ramp: none
Obstructions: none
Faces: West
Road: good, dirt
Remarks: launch slope-25 degrees; owned by Bell Telephone

Landing...

Elevation: N/A
Type: good, pig farm or field
Obstructions: high tension power line; 1 mile to landing from launch

Remarks: Ownership uncertain; be respectful
Protocol/Rules: Hang III, controlled by Inland Empire HGA
Additional Notes: Terrain is wheat fields

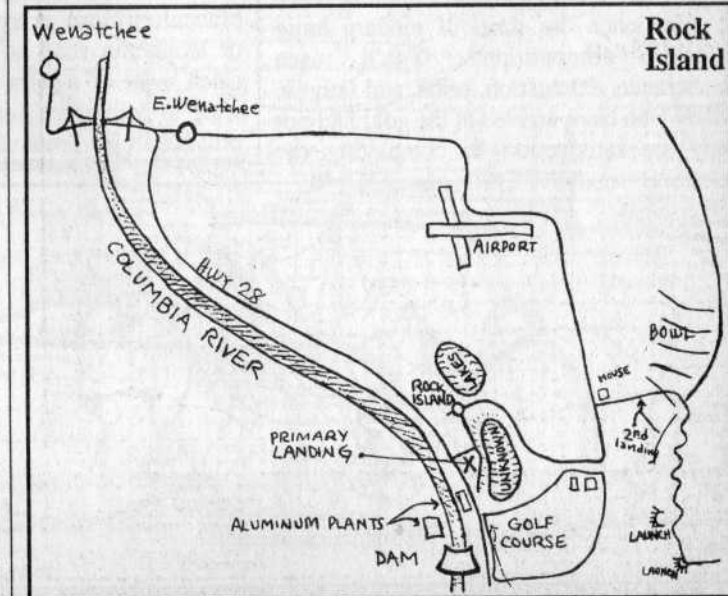
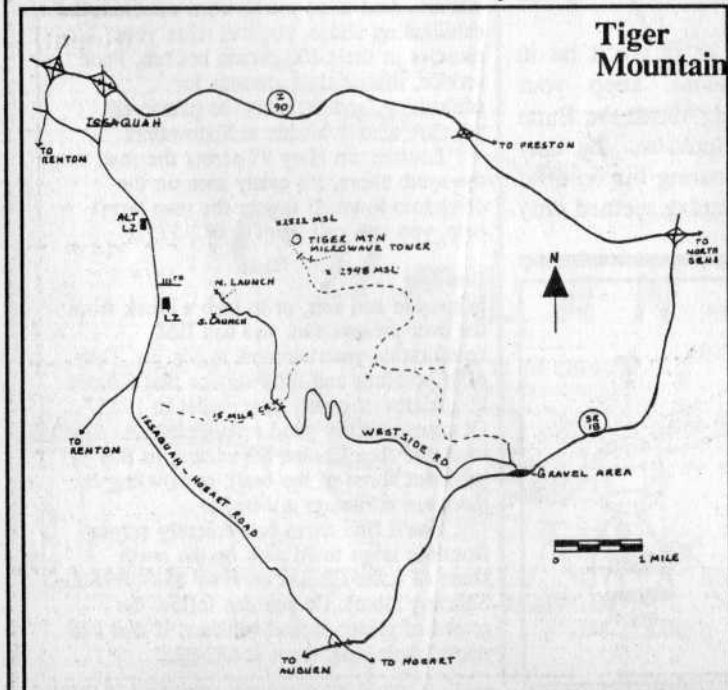
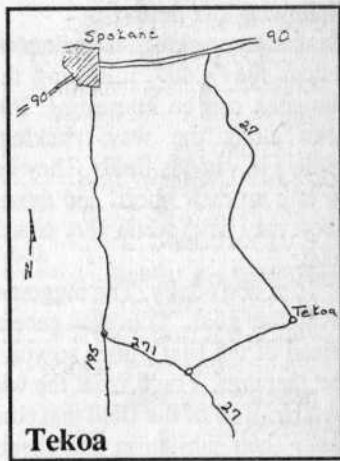
Chelan Butte

NOTE: Chelan Butte is Eastern Washington's premium site. But due to extreme fire danger during the summer season, the Butte will be

closed to all but registered competitors and officials. This will be enforced. Violators will be fined up to \$500. For further information on flying Chelan Butte contact the Cloudbase Country Club (who insures the site) by writing P. O. Box 629, Issaquah WA 98027-0629, or call George of C.J. Sturtevant at 206/888-3856, evenings.

Most of these sites are regulated and/or insured by the Cloudbase Country Club of Seattle. To be sure, contact the club first to assure you will cause no problems when using these sites:

P. O. Box 629
Issaquah, WA 98027
206/888-3856



dividends. Where do pilots look for lift? Dust devils are a visual clue, but beware. Dust devils can be violent and unpredictable. Close to the ground, they can be lethal. Dark-colored fields absorb sunlight and produce more thermals than light-colored ones.

Having pilots ahead of you is an even better sign. Watching their experiences can tell what will be found at that point. Maybe.

Whatever the technique—there are many—the objective is to get high as quickly as possible, then race on toward the goal, stopping to use lift only when necessary, and then trying to select the fastest rising air. The better pilots will be in the air for hours. Less skilled pilots will land short of the goal. The wait for retrieval vehicles can be long and hot. But if they've made a good distance, they'll still score points. Not as many as those who made the full trip, but points nonetheless. There's always tomorrow.

Following the action

To keep up with these pilots, a drive out across the "flats" following the route to the goal, can be interesting. Pilots can be seen along the way, packing up their gliders in various fields. They usually love to talk up their sport, and those who land short may have some very creative tales to relate.

But don't dally. The biggest excitement is at the goal. You can generally arrive ahead of the first pilots, so you can watch the landings. You'll meet the winners, that quarter or so of the field that completes the task. Their jubilation and cheers for each other make that distant field the real place to experience the thrill of modern hang gliding competition. You'll see exuberance, exhaustion, pride, and fatigue. Many who have arrived at the goal had not only the satisfaction of completing the

task, but may have set new personal marks for flying higher, faster, farther than ever before... pushed to new levels by the intense competition.

Pilots react favorably

Many veteran competitors acclaimed the 1985 Chelan event as the best Nationals they'd ever flown. "Grueling," said some, "but a highly valid way of choosing a champion from a large field of very talented pilots. Quite a few pilots, even those who made the distant goals, were delighted to have bettered their own personal records. For many of these, landing short of the goal was no shame, but a whole new level of accomplishment.

The U.S. Hang Gliding Association's competition committee sent a formal request for the local club to sponsor a repeat performance for 1986. Everyone involved was impressed with the site, remarking, "The meet director calls a 100-mile task, and—it's incredible—we actually fly 100 miles!"

How will 1986 compare?

If the weather cooperates, it should be just as exciting and just as rewarding for the participants. Many who flew last year have already registered for this year, and encouraged others.

Competing in the Nationals is a unique opportunity to learn first hand from the experience of true world class pilots. It's a chance to meet and rub shoulders with fellow enthusiasts from all over the country and world. It's physically exhausting and mentally demanding, but somehow in each pilot's mind, all of that adds up to great fun.

If you can attend, or if you'll be in Chelan for other reasons, keep your binoculars close at hand. Above the Butte or along the road to Spokane, you may catch sight of a pilot soaring his colorful wing to points that yesterday seemed only possible in his dreams.

Chelan

THINGS TO DO IN CHELAN

Lake Chelan is a resort town par excellence. The summer population swells several times, as physical evidence of the drawing power of this city on the beautiful lake. So, you'd correctly imagine that an abundance of entertaining activities can be found.

Below we list a few of the ones we feel will appeal to the crowd that follows hang gliding. Of course, a little searching will uncover even more.

The map on the next page will help you find the locations of the activities listed. *The exact position of these businesses may be slightly in error.*

Jet Ski Rentals

If you've never done any Jet Skiing or if you're an accomplished hot-dogger, zipping about on gorgeous Lake Chelan is invigorating, and one of several ways to beat the heat and dust that this near-desert city serves up in the summer. They have 440 and 550 Kawasaki models and even "trainer floats" for those that remain uncertain.

Chelan Boat Rentals offers sailing, mopeds, and small sailboats for rent at reasonable rates. You'll find a willing assistant in Dan White, one of the staff who also flies hang gliders. They're on the south shore of Lake Chelan just before you arrive at the waterslide park (see below), and are easily found by looking for the yellow bus out front.

Watersliding/Hot Tubs

A beautiful waterslide park called "Slidewaters" is one of town's newest and nicest attractions. If you think you've seen waterslide parks before, wait till you catch this one.

Several major slides with interesting courses will refresh even the most heated visitors. And after you're worn out from the exhilarating slides, you can relax your muscles in their 100-person hot tub. Food service, immaculate grounds for sunbathing, and "scenery" to please all eyes are also available at Slidewaters.

Located on Hwy 97 across the road from the south shore, it's easily seen on the drive into town. If that or the map won't help, you can call them at 682-5751.

Bowling

When the sun sets, or to take a break from the ever-present sun, you can find comfortable entertainment at Mr. J's. They offer bowling and food service that pleased the palates of nearly every pilot in 1985. Of course, many good restaurants are available (see Chelan advertising in this issue for some of the best), so bowling is the main attraction at Mr. J's.

You'll find them conveniently across from the large town park on the north shore of Lake Chelan on Hwy 150 (past the Safeway store). Or you can follow the crowd of glider-racked vehicles. If that still doesn't help, call them at 682-2251.

FUN DIVERSIONS

Floatplane Tours

The 55 miles of Lake Chelan are perhaps best travelled by one of the Lake Chelan Boat Company's seaplanes. It's a tour you won't forget, as they fly you up to the remote Lake Stehekin Lodge, one-time playground of the ultra wealthy.

If you want a longer tour, or dinner on-board, you can take one of the several boat trips on Lake Chelan at the same location.

They're located on the south shore just past the waterslide as you drive the south shore into town. But if you need better directions, call at 682-5555.

Hiking/Outdoor Enjoyment

The area around Lake Chelan offers some of the most scenic outdoors you'll find anywhere, justifying the expression "The Switzerland of America." If you're an outdoor enthusiast, you'll can stop at the office of the U.S. Forest Service and Park Service to find out more information.

They are located on the south shore of the lake, just before you arrive in the town of Lake Chelan, as you approach on Hwy 97. Call for information, at 682-2549.

Sailing

The M & M Marina offers sailboard and sailboat rentals for nominal fees. They are

found just past the Lake Chelan Boat Co. (see above) also on the south shore of the lake.

You can obtain lessons there as well, and if you don't see them on your first drive into town (Hwy 97), you can call at 682-4333.

Golfing

Play the Lake Chelan Municipal Golf Course, by driving out of Chelan on the way to Manson (Hwy 150). Tee times must be reserved, but for those getting a later start, the rates decrease after 2 pm.

Call for additional information or directions at 682-5421.

Mini-Golf

If the big 18-hole course is too much for you, you can check out Pat & Mike's Corner where a miniature golf course is available. Groceries and fuel also available.

You'll see them easily when you arrive into the area from Wenatchee. They're located right where Hwy 97 turns toward Chelan (as the road meets the lake), or you can call 682-2841.

Sunbathing and Swimming

Chelan has many places to enjoy the town's cool, blue lake. Two of the

best—and least expensive—are the town parks. One is on the north shore, the other on the south shore. Each is hard to miss. Both offer food concessions, and "scenery" for all.

General Information

The source for everything else you need to know is the Lake Chelan Chamber of Commerce. They're right in town on 208 E. Johnson Avenue.

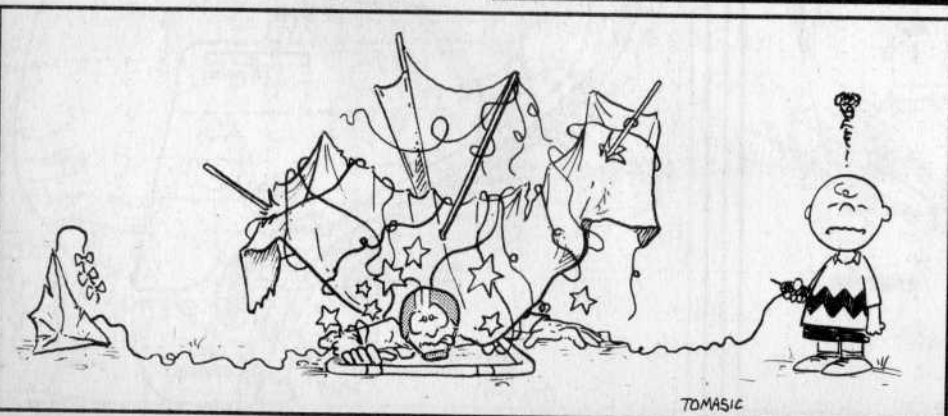
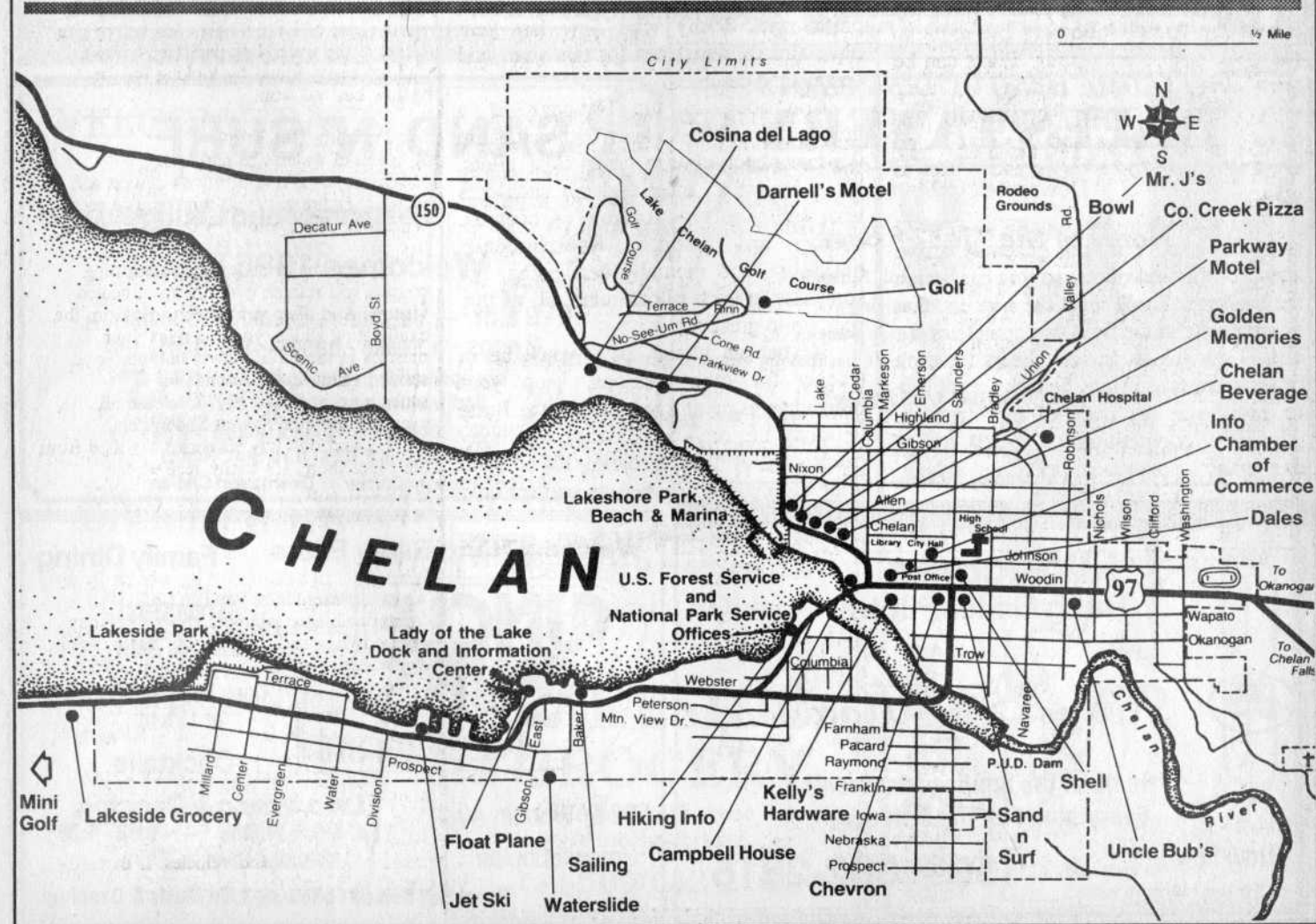
They have brochures for everybody who is a member of the Chamber (almost everyone is), and can tell you what you need to know in a professional, courteous manner. They're even open seven days a week to serve the needs of visitors.

If you can't find them, or want information in advance, you can call out-of-state at 1-800/4-CHELAN (1-800/424-3526), or locally at 682-2022.

Restaurants and Motels

Chelan offers a wide variety of good eating and accommodations. Consult Chelan advertising in this issue, or a variety of other sources. **WHOLE AIR** encourages you to patronize those that helped make this program possible (see ads on pages 30-33).

—Compiled by Dan Johnson



TOMASIC

Cartoon by Richard Tomasic

BEEBE

Quality Apples
from Beebeland
CHELAN

WELCOME 1986 PILOTS!



COMPANY CREEK PIZZA
ORDERS TO GO

Join us at the Creek for Cold Tap Beer!

Pizza Salad Sandwiches
CHICKEN ORDERS TO GO

on the Manson Rd. across from Lakeshore Park

OPEN
4 p.m.
TIL
?
COME
LATE!

682-2000

Chelan Beverage

Welcomes
1986 Hang Gliding Championship Pilots
COLD HEINEKEN
plus other imports
Low Prices — Cold Beverages

! NOW IN STOCK !
Sunny Slope Soaring "Hang Gliding Wine" from Weston Winery
"Varietal wines with the Hang Gliding Label!"
In the new Chelan Plaza
246 W. Manson Rd. 509/682-2145

Mr. J's LANE ELEVEN

CASUAL DINING / GOOD FOOD
Where all the Hang Glider Pilots Eat
Open Late
518 North Manson Road
Chelan, WA 98816 509/682-2251

WELCOME HANG GLIDING PILOTS DALES TAVERN

Downtown Chelan

Home of the "Jar of Beer"

- Heineken
- Seafood
- Chicken
- Favorite beer or wines
- Pool (Billiards)
- Dancing
- Video games
- West Coast bands

"Let's go down to Dales"

(509) 682-5723



SAND 'N' SURF

Restaurant and Lounge

Welcomes 1986 Pilots!

6 - 9 a.m. — Hanggliders Breakfast Special
2 eggs - hotcake - bacon - **\$2.45!!**

We specialize in Steaks & Seafood
and feature a great Salad Bar.

Lounge - serving Heineken & Amstel Light
Live Entertainment Tues. thru Sun. Nights
At the Stoplight Corner - Downtown Chelan

Welcome Hang Glider Pilots Family Dining



502 E. Woodin Ave.
"Uptown Chelan"

Live Music & Dancing
Fri. & Sat. Nights — 9:30 - 1:30
Lounge Open 'til 2 a.m.

Breakfast Served Following Live Music & Dancing



THE CROCKERY Steak & Seafood House

Breakfast — Lunch — Dinner

WELCOME

Where the Glider Pilots Meet

- Steaks
- Seafood
- Salad Bar

Good food and a genuine relaxing atmosphere

- Wine
- Imported & Domestic Beers

Open 6 a.m. — Serving Dinner 5 p.m.

Open 7 Days A Week

Serving Late For Pilots — Call Ahead For Your Group

Located in downtown Chelan at 114 N. Emerson across from Post Office
509/682-5925

WELCOME BACK
1986
National Hang Gliding
Championship
Pilots



1 HOUR PHOTO

Quick returns on your
turnpoint pictures.

Special Attention for
Competition Pilots

246 N. Manson Highway
in the new Chelan Plaza
(Next to the Family Grocer)
CARY & JANET JONES

Open
Every
Day

7 a.m. to Midnight

Welcome Hang Glider Pilots

- Ice Cold Beer
- Pop
- Groceries
- Ice
- Sandwiches
- Wine
- Gatorade
- Beach & Picnic Supplies
- Gasoline
- Diesel

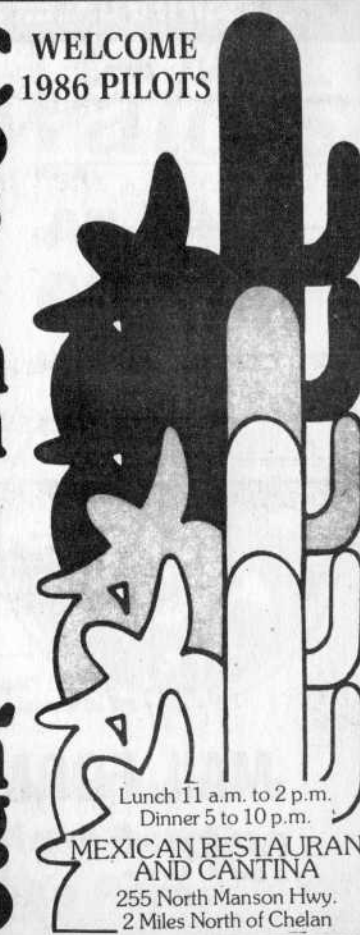
**LAKESIDE
GROCERY**

Located at the base
of the Butte Road

Call 509/682-2741

WELCOME
1986 PILOTS

Cosmopolitan



Lunch 11 a.m. to 2 p.m.
Dinner 5 to 10 p.m.

MEXICAN RESTAURANT
AND CANTINA
255 North Manson Hwy.
2 Miles North of Chelan

SELL IT

DEALERS!
Here's our
lowest cost
ad section.

THE BEST DEAL IN THE SPORT

20 WORDS for 2 ISSUES for only \$5

PAID IN
ADVANCE
ONLY

Fill out form completely, and send with payment.

PHONE NUMBER AC () _____
(We must have your telephone number for our computer files.)
NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
Please Type or Print Clearly - Help Us Avoid Errors.

**MAKE YOUR AD MORE
EYE-CATCHING**
Add a logo or photo
for \$5 per inch.
PAY ONCE - 2nd time
FREE.

CLASSIFIED ORDER FORM

Classification Name _____ Total No. of Runs _____
Classification No. _____ Total \$ Amount _____

(1-\$5)	(2-\$5)	(3-\$5)	(4-\$5)
(5-\$5)	(6-\$5)	(7-\$5)	(8-\$5)
(9-\$5)	(10-\$5)	(11-\$5)	(12-\$5)
(13-\$5)	(14-\$5)	(15-\$5)	(16-\$5)
(17-\$5)	(18-\$5)	(19-\$5)	(20-\$5)
(21-\$5.40)	(22-\$5.80)	(23-\$6.20)	(24-\$6.60)
(25-\$7.00)	(26-\$7.40)	(27-\$7.80)	(28-\$8.20)

METHOD OF PAYMENT: Cash or Check MasterCard VISA

Card No. _____ Exp. Date _____

NOTICE: Please check your ad after its first insertion. We will be happy to correct any error called to our attention and rerun the ad without additional charge. Credit on classified errors is limited to a rerun of the corrected ad.

MAIL FORM To: P.O. Box 98786, Tacoma, WA 98498-0786

OR...

- ① Fill out form (to prepare your wording)
- ② Get out your Bankcard
- ③ Call us Toll-Free at 1-800-426-8538
- ④ Give us your ad. . .

Weston Winery

Presents

SunnySlope Soaring



White
Riesling

Cabernet
Sauvignon

Blanc de Blanc

Each bottle
adorned with
beautiful
artwork depicting
a hang gliding
scene.

Available
NOW
at
**CHELAN
BEVERAGE**
246 Manson Rd.
509/682-2145

Lake Chelan's Quality Family Resort

- All lake front, view units
- Sandy beach
- Jacuzzi
- Color TV
- 3 outdoor pools
- Phones
- Campbell's lounge, live music, hors d'oeuvres

Dear Hang Gliding Friends:

While in Lake Chelan to ready the '86 Official Program, I stayed and dined at Campbell's. With an intriguing menu, Art Campbell's husband and wife chefs prepare some of the best meals I've ever tasted. Do yourselves a favor, while in Chelan dine at Campbell House for food that nears perfection.

Best of Luck at
the '86 Nationals -
Greg O'Neill
Whole Air Advert. Manager

Motel and Dinner
Reservations
509/682-4250



Motel
Open
Year
Around

Campbell's
OF LAKE CHELAN

Once Again Happily Serving Hang Gliding Pilots - Good Luck in 1986!

CHEVRON ... The Sign of
Service on Lake Chelan



FULL & SELF SERVICE PUMPS
COMPLETE CAR SERVICE!
FREE PICKUP and DELIVERY

- Atlas Tires
- Atlas Batteries
- Tune-up computer
- Air Conditioner Service
- Complete Brake Service
- White Gas
- Computer Wheel Alignment
- Computer Wheel Balance

FREE PICKUP and DELIVERY

- We Honor BANK CARDS -

- Master Card
- Visa

**Chelan
Chevron Service**

Corner of Woodin & Sanders

Chelan

682-2014

Slidewaters

A beautiful, clean
park with sparkling
clear water offering
9 slides, an inner
tube "River Ride,"
arcade, gift shop,
concessions, 60
person hot tub &
more. Fun for all
ages. Group rates.

AT LAKE
CHELAN



(509) 682-5751

**One of the Northwest's
Largest & Most Exciting
Waterslide Parks**

SPECIAL SECTION: Total Energy Varios, Speeds to Fly, Thermal Snoopers, and Speed Polars

In flying circles, TE refers to total energy. An instrument that displays total energy changes is very useful since we must extract energy from the air in order to soar. However, to achieve this display a special instrument is required. We'll explore the meaning and limits of total energy compensation instruments so that the reader can decide whether the returns are worth the expense. We'll start with the facts.

Energy Types

If you ever wander through the halls of academia you may happen upon a creature known as a physicist. The first thing this creature will do is look you earnestly in the eye and say, "The energy of a system can be divided into two parts: kinetic and potential." We're on his turf. We'll have to believe him.

Kinetic energy is simply the energy an object has due to its motion (or momentum to be proper). It only makes sense to speak of motion in relation another object. In the case of a glider, we'll speak of an increase of kinetic energy as being an increase in velocity with respect to the surrounding air mass during flight. We call this airspeed. (We could measure our kinetic energy with respect to the earth, but a moving air mass also has kinetic energy which would have to be factored in for our purposes here.)

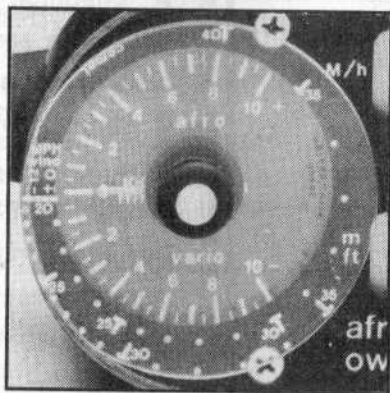
Potential energy is the energy "stored" in an object. For example, a three-year-old after a breakfast of candy masquerading as cereal is full of chemical potential energy. An atomic bomb stores nuclear potential energy. A stretched bungee cord has potential energy due to the mechanical properties of the elastic molecules. A glider positioned above the earth has potential energy due to its displacement in the gravitational field.

It should be clear to us that a glider in flight usually has a combination of both kinetic and potential energy. In fact, we can readily exchange kinetic energy for potential energy and vice versa by pushing out or pulling in on the control bar. When we push out, we slow down (less kinetic energy) and climb (more potential energy). When we pull in, we speed up and lose height faster. Of course, there are limits to this process due to a glider's aerodynamic limits, that is, stall and maximum diving speed.

Instrumentation

Now that we know all this practical physics, let's do something with it before it goes to waste. We can understand that to get high and go places we need both kinetic and potential

“
to
TE
or
not to
TE
”



© 1986
by
Dennis Pagen

energy which we can combine and call total energy. We get our energy by driving up a mountain and from the air which is ultimately moved by the sun. The air can add or subtract from our total energy with respect to the earth (that is, it can lift us, drop us, speed us up, or slow us down). It is our quest in flying to find air that will add to our total energy and avoid air that will subtract from it.

Instruments are most useful in this quest. An airspeed indicator is a direct measurement of our kinetic energy with respect to the air. An altimeter is a direct measurement of our potential energy with respect to the earth. An altimeter is also a recording device to tell us how well we have extracted total energy from the air over a period of time. The two instruments together could be used to indicate an instantaneous value of total energy, but only a physicist would want to know this.

The most important instrument in our bag of tricks is a variometer. In its basic form, a variometer tells us the rate of change in our potential energy. If the vario reads up, our potential energy is increasing. The higher the vario reading, the faster the energy change. A variometer helps us imagine a three-dimensional dynamic map of the sky so that we can maximize our time in lifting air.

A useful addition to a variometer is a McCready speed ring. This is a chart on a variometer dial (it's only a ring on a round variometer) that indicates how fast to fly in a given condition of lift, sink, headwind, or tailwind in order to maximize our glide ratio over the ground. There is a specific chart for every glider/pilot combination. Wing loading affects speed-to-fly charts (McCready speed ring values) quite a bit. On the other hand, different designs, of the same class can probably get by with the same speed ring without introducing too much error.

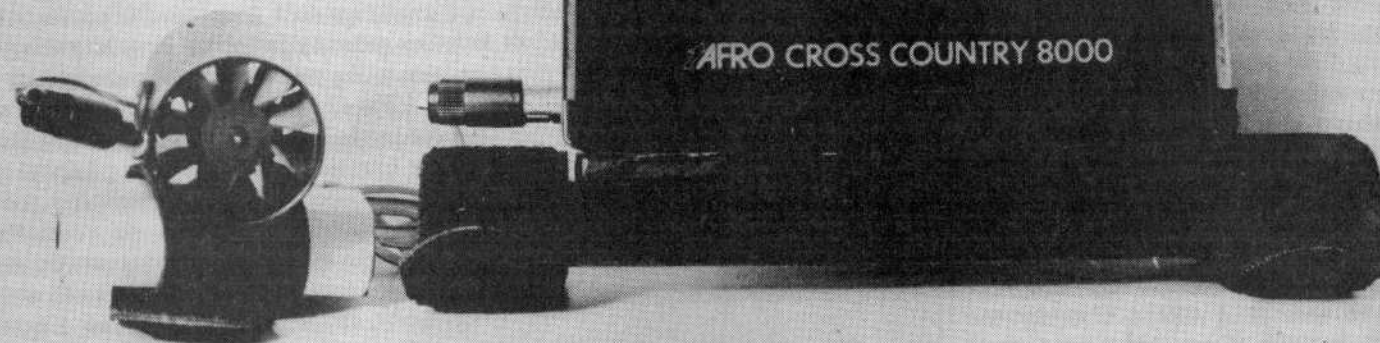
Speed-to-fly techniques are extremely important concepts and should be understood as well as utilized by every pilot. (For more information on this concept, see Pagen's book "Hang Gliding Techniques," advertised in this issue, or refer to the articles entitled "Speeds-to-Fly" in the April, May, and June issue of Hang Gliding magazine.)

Total Energy Compensation

We have now arrived at the main thrust of our investigation: total energy compensated variometers. To understand their purpose, recall that to a certain extent we can trade kinetic energy for potential energy, and vice versa. If we are flying fast and push out

TE Varios, Continued on Page 36

Speed by Achim Hageman to Fly



This article will provide the basic information a pilot will need to effectively use a McCready Speedring. Therefore, hang on and give yourself 15 minutes, and it will improve your flying.

In the sailplane community total energy compensated varios and speedrings have been around for more than 25 years. Dr. Paul McCready stunned the soaring community when he first introduced his theory about speeds to fly. The introduction of speedrings by McCready, also the inventor of the Gossamer Albatross and the Solar Challenger, led to a dramatic increase in soaring speeds. The development of TE compensated varios for hang gliding will have the same effect. Total energy compensated instruments and speedrings are already being used by many competition pilots and not only win speed tasks but also let the pilot cover more distance in less time.

The first time I used a speedring was some years ago when I got drilled below launch at the Eliminator in Santa Barbara and still had to make it over those infamous power lines on my way to the LZ. The situation was pretty awkward because, by not clearing the power lines, my only other landing field would have been a very small emergency landing patch down in Rattlesnake Canyon (a name that accurately identifies the local "residents").

One look at my vario told me that I was in 600 feet of sink per minute. I checked my speedring which was mounted on top of my vario to find how fast I had to fly in order to get my best glide. I was flying a Comet I at the time and my speedring was based on a Comet I polar. The speed to fly was 26 mph and I was only flying 20 mph. I pulled in until my airspeed indicator read 26 mph and sure enough I cleared the power lines. Had I flown slower or faster my glide would have been worse and I probably would not have made it.

Speedring Requirements

Flying with a speedring requires a few things. First you need a

total energy compensated vario. I used a European flight deck, the Afro Owens Valley 8000a. Another model offering these features is the TE compensated Ball 652 vario. Total energy compensated (TEC) means that your instrument filters out stick thermals electronically and reads only true lift or sink. Stick thermals are not thermals at all. Non TE compensated varios read them when you just fly and push out on your control bar. A non TE-compensated vario will read lift or sink even when no lift or sink is present. All you did was push out or pull in on the control bar.

Also required is an airspeed indicator that reads true airspeed—not the airspeed measured where the airspeed probe is located. The Owens Valley 8000a and TE compensated Ball varios have airspeed indicators that are electronically compensated to read the [expected] airspeed in front of your glider's nose.

In short, to use a McCready Speedring you need a quality flight deck that provides you with a true vario reading and a true airspeed reading. It is very simple to use a speedring, but the increase in performance can be dramatic. Using a speedring can increase your performance by 10 to 15 percent. In competition or in cross country flying some are convinced it gives quite an edge over a pilot who just flies by "feeling."

How to Use a Speedring

The McCready Speedring on the Owens Valley 8000a is a clear plastic disk with two speed scales printed along the edge. (On the Ball 652 TE vario, a metal ring is fitted like a bezel around the vario face.) The Afro's speedring is mounted on top of the analog vario with the vertical mark of your speedring sitting on the zero mark of the variometer. The speedrings available right now are based on a Comet I and a Sensor 510B polar. Both speedrings can be used on a variety of gliders with similar performance. The speedring uses two scales, one for 0-12 mph headwinds, and the

Speeds to Fly, Continued on Page 38

quickly we will climb and our vario will indicate lift. This has been called a "stick thermal," though in hang gliders it might be more accurate to call them "control bar thermals." The popular concept says that when moving from areas of sink and lift, the continuous airspeed changes required to follow best speed-to-fly techniques induce so many "bar thermals" (and "bar sink holes") that precise flying is rendered difficult.

Up steps a total energy compensated variometer (TE vario) to save the day.

A TE vario simply samples the airspeed along with the change in climb rate and indicates up only if your total energy is actually increasing. In other words, if the sum of potential and kinetic energy increases, a TE vario will register up. If you push out in calm air you will climb, but the TE vario notes a slowing of your airspeed and refuses to indicate so much as an inkling of lift. A TE vario gives us a direct picture of the rate of change of our total energy which is what we wish to know.

How does a TE vario work?

There are several ways to sample airspeed and factor out bar thermals. One way is to use a type of probe that automatically factors out the tradeoff between dynamic pressure changes (due to airspeed) and static pressure changes (due to changes in height) with a suitably designed venturi. These probes need to be in the undisturbed

Here are two important points to understand: First, when speed is constant (at any airspeed) a TE vario acts exactly the same as a conventional variometer. Secondly, it is a wrong statement to say that a TE vario is required to use a McCready speed ring. A TE vario can enhance the use of a speed ring if a lot of constant changes are required, but as we shall see, the latter is rarely the case.

Personal Views

In the preceding, I tried to present the facts as well as I could determine that they were indeed facts. Here I present my opinions. The reader should weigh the facts with my opinion, that of others, and his own in order to decide whether to TE or not to TE.

**"...with my simulated voice
total energy vario whispering
gently in my ear,
'Don't get excited cowboy, it's
only a stick thermal.'"**

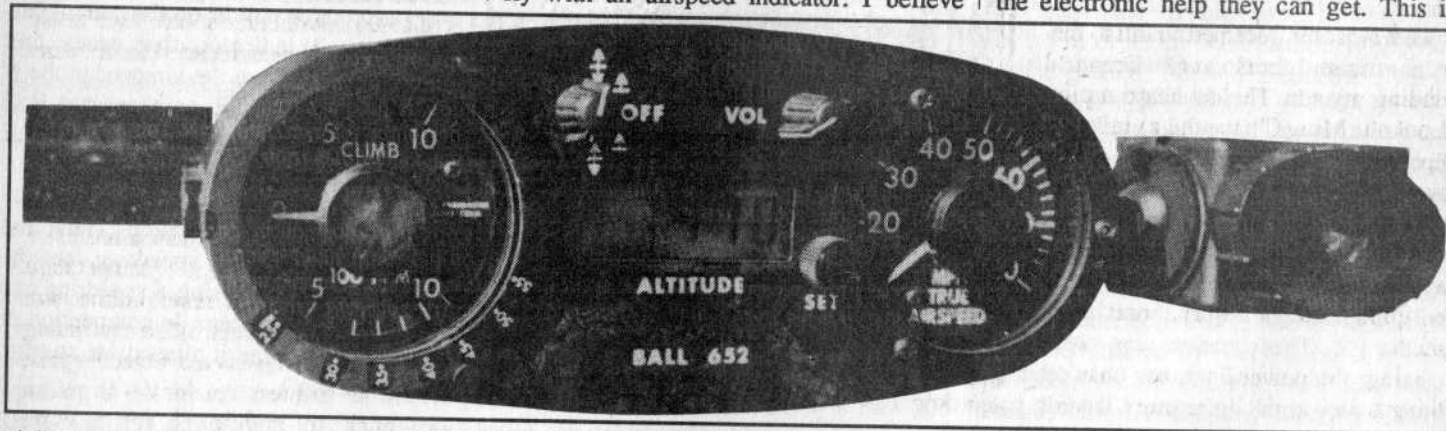
My first opinion is rather a matter of personal philosophy. That is, that I want my flying to be as unencumbered as possible by geegaws and gimcracks. I do fly with a vario and altimeter, but I don't fly with an airspeed indicator. I believe

with the large control bar movements and the fact that airspeed changes take place within about a second and we can conclude that TE compensation is not required for hang gliding.

Sailplanes typically operate from 40 to 120 mph. They can climb well over 1,000 feet merely by slowing up rapidly from top speed. For their operations, TE varios are indispensable. On the other hand a hang glider is slow to accelerate and quick to decelerate due to its high drag and light wing loading. Thus, bar thermals usually disappear long before we've flown through a real thermal large enough in which to circle. In the cases where thermals are small, we soon learn the lift patterns and can mentally factor out sink rate changes due to the reaction time of our gliders.

The final opinion that I'll offer is that airspeed should be eliminated entirely from the loop and we should use a positions-to-fly system for maximizing our performance in different air conditions. With this system, the chart on the variometer doesn't give an airspeed to fly (which requires looking at an airspeed indicator) but gives a bar position to fly. This is a much simpler and more accurate system. (To learn more about positions-to-fly and how to set up a system for your glider, see Pagen's article in the March 1985 Hang Gliding.)

My final word is that whereas I choose not to fly with a TE vario at the time, I realize that some pilots need and want all the electronic help they can get. This is



airflow, which is nearly an impossible requirement to meet on a hang glider.

The system used on TE varios designed for hang glider application is a simple airspeed indicator that is electronically compensated for the low readings of airspeed always found below a hang glider wing. With a suitable array of circuitry, the vario can then display only total energy rates of change by factoring out the potential/kinetic energy tradeoff.

STATE-OF-THE-ART—The deluxe Ball 652 Flight Deck can be Total Energy compensated

that with 50 hours or so of flight time a pilot can achieve an accurate sense of relative airspeed by using his body directly in the airstream.

A close corollary to the above is that because we are in the airstream we can directly sense the changes in airspeed that result in "stick thermals." Combine this

fine since it sure would be boring if we were all made the same. Furthermore, a dramatic increase in hang gliding performance somewhere down the road will most likely change my opinion. When we're flying enclosed in a 20 to 1 footlaunched sailplane, I'll be right up there alongside the rest of you with my simulated voice TE vario whispering gently in my ear: "Don't get excited cowboy, it's only a stick thermal."

What if you could sharpen your senses to rival those evolved in birds that soar? Perhaps you can with the aid of sensors, amplifications, and suitable translations to your acute senses. Or man may even devise soaring aids that birds will envy. The simple device described here

THERMAL SNOOPER

Subtle Temperature Changes Indicate Nearby Lift

by Alan and Jeff Fisher

appears to be another step in one of those directions. But first let me briefly tell you how it came to be.

I am not a hang glider pilot, but my son is. As Jeff doesn't own a vario, he wanted me to build him one. But being one who would rather find a new option than reinvent the wheel, I began wondering what other indications might be helpful. The thinking, trials, failures, and surprising successes follow.

Air rises primarily because it is warmer than the surrounding air. That is clearly the case for thermals. And even though wind movement rather air temperature is the prime cause of ridge lift, that air is also likely warmer because it has been deflected from a lower level. Therefore an indicator of subtle increases in airstream temperature might well alert a pilot to nearby lift and greatly assist him in finding, and remaining in its warmest core.

That reasoning seemed sound to me, but I found pilots very skeptical including my son. He had heard a pilot at Lookout Mtn (Chattanooga) tell of a temperature indicating device which proved useless in flight tests. And an experienced vario owner said he didn't give a "hang" about temperature changes—he just wanted to know if he was going up or down, and how rapidly.

Being undaunted (and having nothing better to do at the time), I built such an indicator anyway and named it the Delta-Therm instrument. Jeff flew with it in local ridge lift and dutifully reported, "No indications whatsoever." His body language seemed to add, "...and I told you it wouldn't work."

I was disappointed but insisted it would work when I found the right sensitivity. Within a week I had a promising new version ready and asked Jeff to fly it. He said, "Sure, what have I got to lose." Indeed, something could

be lost. That second version got knocked off his downtube at the first launch. The squirrel below that site likely got a continuous indication of temperature for the next 16 hours. Needless to say, that was the last version using only a spring clip for a mount.

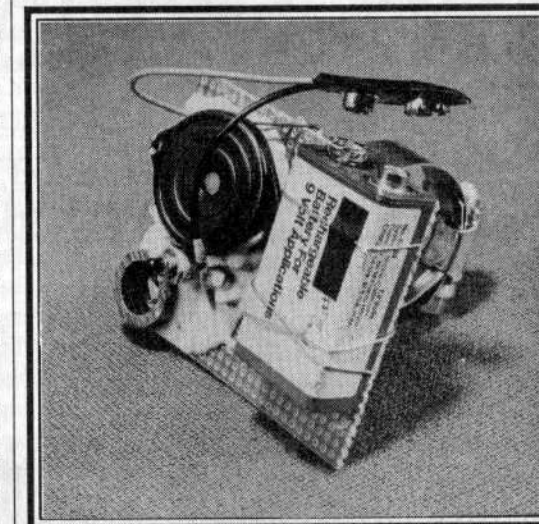
Finally flight version no. 3 worked. In fact, it worked so well that Jeff would later agree to

have thought to be a thermal. When I heard the pitch rise I was ready to react and had a constant warning of what was ahead. I always imagined that the effects of a thermal stopped at the sink-to-lift boundary. It surprised me to realize that air significantly outside that shear action is detectably heated.

others evaluating it only if I would replace his. Below, in Jeff's words, are his main experiences to date with that device.

Actual Experiences

"I have borrowed a vario once or twice, but most of my 50 hours of soaring time have been without instrumentation until testing the Delta-



DELTA-THERM—A simple yet potentially valuable device that could be used with a vario.

Therm. I had become slightly acquainted with the indications of that third version before the First Annual Alabama Hang Gliding Association Fly-in occurred. That was held on 9 and 10 November 1985 at Walker's Gap (a site with 500 feet of vertical). The competition was my first experience with the device in cross country flight. It operated beautifully.

"I was amazed to hear its pitch rise seconds before feeling any indications of a thermal ahead. And once within a thermal, it warned me if I circled close to the edge. The first thermal indicated took me to 1,500 feet above launch. I was able to track its movement all the way up.

"Whenever I had to revert to ridge lift to maintain, the device then distinguished between gusts and thermals. I was now no longer wasting turns to work what I otherwise might

"In the two days of competition, I placed third. I was the only pilot flying without a vario. Tom Phillips [then] of Lookout Mountain Flight Park won, and Kim Merriwether placed second, beating my total distance by one mile."

Details of the Device

The photo shows the version that Jeff used with its hose clamp mount, sixteen hour battery, reset button, and sounder. Note that the electronics are coated with an epoxy compound to protect the circuits. The airstream temperature sensor is located in the corner opening and is guarded from impact damage by short lengths of tubing. The sensitivity is such that a change of a fraction of a degree Fahrenheit produces a pitch change of one musical semitone. Unless gradual, that much pitch change is easily noticed by all but one who is tone-deaf. But with that sensitivity only a moderate range of temperatures can be indicated without some additional referencing. Hence the need for the reset button.

When the reset button is depressed, the audible tone is set at middle C. The slightly warmer air raises the tone pitch and cooler air decreases the pitch. The indicated changes are from a reference temperature—that temperature occurring when the reset button was last depressed. Thus, if a persisting change causes a pitch extreme, the pilot will want to press the button to return the pitch to middle C for a more suitable reference.

The instrument is proving quite useful to a pilot in several situations. On a marginal day, ridge lift contains gusts mixed with workable thermals. It is then excellent for indicating which is the real thermal, both at launch and in flight. When seeking a thermal in flight, if the pitch increases slightly and then reverts, you have likely grazed

Snooper, Continued on Page 39

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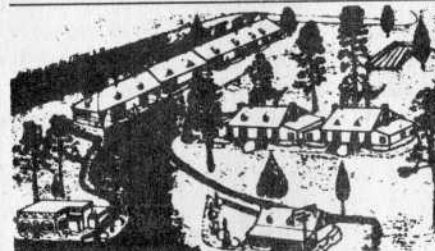
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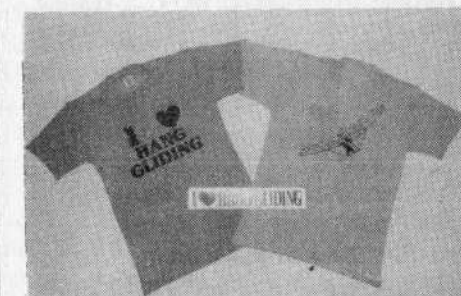


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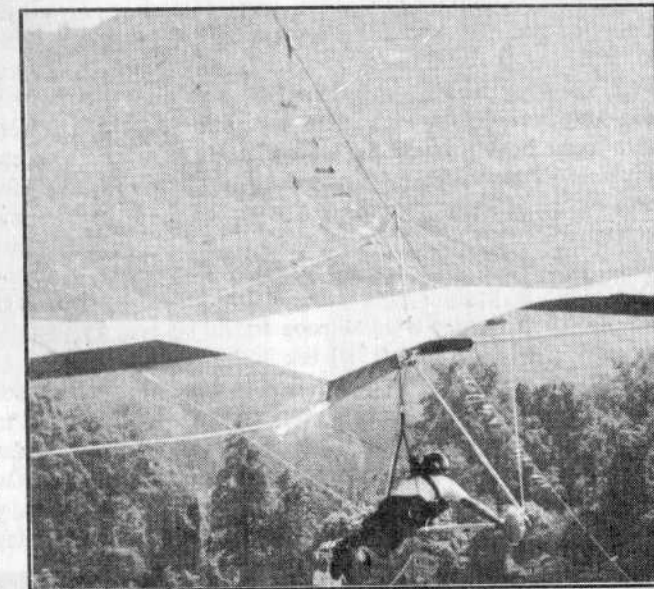
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PRODUCT LINES

TACOMA, WA — A fellow named, simply, **D. Whittington** (yeah, he goes by D, as in Dee) has been making his presence known via mailings all over the place. A bunch of these have been printed in a number of the many newsletters that arrive at **WHOLE AIR** offices. It's been kinda interesting to see how the various editors handled his requests. Some have printed the letter D mailed just as he sent it. Others have modified it. But the most common action has been a type of disclaimer... it usually goes like this: "Here's a letter we received. Respond if you like, but since he asks for \$10 with your pilot résumé, be advised this could be a scam." Others haven't been so polite. Because the variations have been seen in so many newsletters, and because we know D, we thought we oughta call him and see what his intentions were. Simply put, he has some contacts with major corporations that have expressed differing levels of interest in sponsoring hang glider flying at events. Some may want pilots to merely fly their logos on wings. Some may want exhibition-style flying at events organized for purposes outside of hang gliding. And others may want to sponsor company "teams" to tour the hang glider competition circuit. Now, D's an energetic guy. And he does indeed appear to have some companies that could be willing to sign contracts. But we also know this act has been tried before, by some very capable people, and nearly every one has fallen flat on their faces. It's just not an easy endeavor. An organizer like Whittington's **Whitt Wings** is up against New York ad agencies, and people who organize things like the Olympics. While that may sound a bit unrelated, it all comes down to getting money from firms like Pepsico, Kool Tobacco, Coors Brewery, MacDonalds. And if you imagine those guys let go of their promotional millions without some real serious consideration, guess again. A-n-y-w-a-y, D's got some activity going with the likes of **R.J. Reynolds/Nabisco**, **Coca Cola** (whose headquarters is right in D's backyard), **Remington**, and a few others like Wendy's, Budweiser, Burger King, Delta Air Lines, Miller Brewing, and Club Med. He's got no signed contracts, yet. That may sound like he's nowhere. Not entirely true. It's a tough racket. And these big money sources want prospectuses, proposals, figures on everything remotely connected with the proposed plan, and on and on, ad nauseam. So, what Whittington is doing is really pretty straightforward. We sincerely doubt it's some kind of scam to get \$10 each from would-be show pilots. He's gotta have info so he can present same to the big boys with the big bucks. He says the \$10 keeps him from having to deal with every single pilot willing to fly for some dinero. If you're interested in demo flying, competing, and suchnot, you can't hurt yourself much by getting in touch with him. You kin do so at Box 1652, Lilburn GA 30247, or phone 404/923-8093. Speaking of hang gliding demos, Region 5 Director **Mike King** sent some poop on the **Nampa Centennial Airshow** at the end of the first week in September. A number of pilots and he are hoping to be involved in that event with surface towed flying demonstrations. A proposal has been submitted to organizers and may bear fruit. At least we wish him luck. These sort of demos can create increased visibility for our sport. On another note relating to Mike and **Lisa Tate**, these guys finally tied that old knot. Yup, King and Tate were married on May

10th. Congratulations to them! It's summer (in case some of you have been hiding in your integral harnesses and haven't noticed). So, chatter about promotional flying is zinging around. Another call we got told us of a plan to sorta "preview" **Greg DeWolf** and **Raoul Mazzoni's** "Fly America" campaign, slated for 1987. We'll have some coverage of the Fly America plans in a later issue of **WHOLE AIR**, but for 1986 --- has a plan to fly across the state of Kansas. The plan, called "Hang Glide Kansas" is a precedent to the national idea Mssrs. DeWolf and Mazzoni have concocted. --- has gotten support from the Kansas state chapter of the American Cancer Society. This organization can throw a whole lotta weight around if they get behind something, so perhaps --- has something started. We'll have some more on Hang Glide Kansas in next issue. Now, on an even longer-range basis, a **Presidential Commission** on sports use of America's recreational areas has been taking public comment at meetings around the country, so reports Yoo-sh-ga exec director **Cindy Brickner**. This type of federal planning takes forever and a day. But it could have some real impact on hang gliding in federal parks and places like that. Brickner wasn't informed about the hearings till it was too late to make the one near U-saga headquarters. Attempts are underway to be represented at another in the Seattle area. More later on this as information becomes available. Jetting "back east" (as west coasters put it), we find a couple news bits of interest. One is a new site in New York that has not only good flying to offer, but townfolk that are stoked to the max over hang diving. Get this name: **Utsayanthia** (something like: Yut-say-en'-tah). It's a 1,400 foot vertical in the Catskills about two hours from Ellenville, a drive **Greg Black** calls "worth it." Good cross country potential, a paved road to the top, which Black says is "unusual," and support of the sport like he's not experienced. Town fathers want to make the town "hanggliderville" (nothing like Margueritaville). They're willing to obtain heavy equipment to clear launches. Landings which welcome pilots are apparently available everywhere. Aah, such a change from many "trouble spots" where the sport is in a constant battle to hold sites. Utsayanthia offers launches for NW, NE, and SW winds, all with their own ramps. The last problem to common access—what else?, insurance—has been secured, and everything is A-OK. On a closing note we heard from old friend and hang glider "heavy," **Tom Pehiny**. Seems he and another old mainstay, **Jim Aronson** are back in biz. Details weren't available at presstime (dam those deadlines!) but he and Aronson—who formerly co-owned **Aerial Techniques**—were moved to an address in Monroe, New York. For new readers that may not be aware of the significance of this team, Pehiny is respected for the design of several prominent hang gliders, of which the Kestrel is perhaps the most famous. He's also designed the FlightStar ultralight, and could build about anything he wants to, as he's got loads of practical design/manufacturing experience. Aronson and former partner Douka Khanes (who, sadly, was killed in an airplane accident several years ago) started Aerial Techniques and built it to one of the top two or three hang glider retail shops in the east. Anyway, we'll bring ya more in next issue. For now... got news or opinions? Send 'em to "Product Lines," Box 98786, Tacoma WA 98498-0786.

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