

NEW for 1984



photos by Bill Bennett

Light DREAM

For a new year, dacron meets aluminum "lightly" . . . in the amazing new 1984 Light **DREAM**.

The same handling response, coordination of pitch and roll, soaring grace and esthetic beauty are now elegantly crafted in a Light **DREAM** that is significantly lighter than previous models (the 165 size is a mere 49¾ pounds without standard coverbag).

More predictable static balance, renewed ease of ground handling, launching simplicity, improved in-flight handling, and landings you'll barely notice are all desirable benefits brought by the new reduced weight.

But load tested to the same rigorous HGMA standards that are applied to the big, heavy wings of yesteryear . . . you can feel confident and fresh in your new Delta Wing glider.

Call your Delta Wing dealer today, and Light **DREAM** on . . .



Delta Wing Gliders • P. O. Box 483 • Van Nuys, CA 91408 • Telephone (818) 787-6600 • Telex No. 65-1425

HANG GLIDING IN THE UNITED KINGDOM

TRIPLE-PLAY PILOT REPORTS:

"HP" • LIGHT DREAM • DAWN

WHOLE AIR

The Magazine of Hang Gliding and Ultralight Soaring

December/JANUARY 1985 - \$2.50 (Can. \$3.25)



ISSUE
NO. 39
(6th in 1984)

THE MITCHELL WING
LEGACY -- Part One

STILL THE ONE TO CATCH



photo by Pork Stew Smith Rich Pfeiffer

We can say the proof is in the winning, but we believe the Sensors real success comes with its climb rate and glide in marginal conditions. The 160 VG Sensor flown by Rich Pfeiffer remained aloft at the US Nationals when other strong competitors who were tuned for speed went down. Pfeiffer's lead over the next place was 6%, the largest spacing in the top 13 places. A total asset, the VG allows instant adjustment of roll rate and handling to match changing conditions with the desired maneuverability. The Sensor's highly developed VG makes greater performance not only possible, but easier to handle.

"This glider performs the best and it's easy to fly! Bar pressures and roll rate are no problem. The VG lets you fly it any way you want. It's perfect."

—Jon Lindburg, San Diego, CA

"To win major competitions a pilot needs the best performance available, with the ability to execute in all conditions. The VG gives the 510 top L/D performance while allowing the glider to thermal efficiently, even when good handling is mandatory. Other gliders may be able to perform equally at their specialty, but in world class competition and a variety of conditions the Sensor proves to be superior."

—Rich Pfeiffer, Santa Ana

"I have flown with many excellent pilots on state of the art equipment. The certified Sensor 510 160 VG has the best climb rate especially in light conditions, and the best L/D and sink rate in the 30 mph range. With the VG system, I can select the best wing tension to launch, fly and land easily, which gives me the safety and confidence I need to maximize the existing conditions."

—Stu Smith, Grandfather Mt., N.C.

"It out sinks everything, has a wider speed range, and the sail stays clean going flat out."

—Bill Liscomb, Leucadia, CA

"On my second flight with the 510 I pulled off 45 miles. I especially want to commend you on building a glider with an ingenious design and real integrity. The quality of workmanship and the sail work is the finest I have ever seen. I feel very confident and safe flying the Sensor."

—Jerry Nielsen, Washington D.C.

"The sink rate is absolutely amazing; it simply can't be touched. As for glide, I swear it's at least what your figures indicate. The wing simply surpasses all of my wildest expectations. Heres to your insight, sweat and perseverance."

—Bob Hofer, Fort Smith, Ark.

Recently, at the time of its HGMA certification, the Sensor 160 VG underwent improvements to its leading edges and upper surface air foil. The new 510 incorporates *extended half ribs* to the double surface line, a wrap around *nose fairing*, improved shape on the mylar leading edge inserts, a better supported upper surface root section with a close rib spacing of 1.3 ft (.4 meters) and higher leading edge sail tension. The new *wing shape* of the Sensor combined with the new aluminum faired tubes adds up to a performance gain that's a pleasure to fly.

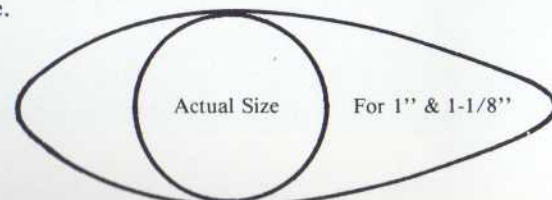
HGMA CERTIFIED* SPECIFICATIONS - SENSOR 510 — 160 V.G.

Span	34.8 ft	10.6 m
Area	161 ft squ	14.96 m squ
Aspect ratio	7.52	
Empty Wt.	66 lbs	29.9 Kg
Hook-in Wt.	145-255 lbs	65-102 Kg
Ideal Hook-in Wt.	175 lbs	80 Kg

*Includes new aluminum fairings, extended half ribs, Kevlar trailing edge and Variable Geometry.

Recommended skill level: Advanced.

Our new certified aluminum faired tubing. Fits most all Sensors made.



IMMEDIATE DELIVERY

Seedwings, 5760 Thornwood Drive #3 • Santa Barbara, CA 93117 • (805) 967-4848

WHOLE AIR

ISSUE NO. 39, VOLUME NO. 7, NO. 6, 1984

PILOT REPORTS

- 13 PRO-AIR DAWN
So many requests have been received for more information on this unorthodox design that Paul Burns gave the model an Air Test.
- 25 WILLS WING "HP"
The glider in development since May 1981 has made its appearance on the market. Report by competition veteran, Bruce Case.
- 31 LIGHT DREAM 185
Paul Burns now finishes the American industry's intermediate glider market as he flies the Delta Wing success story for 1984.

FEATURES

- 9 UNITED KINGDOM — 1984
British Correspondent, Noel Whittall, wraps up the sporting year of 1984 in retrospect.
- 16 NEW FROM EUROPE
European Flight Lines takes you around three interesting areas: Power Steering Systems; the Keller Integral harness; and a Flying Wing update.
- 20 MITCHELL WING LEGACY
Part One of Two in our epic coverage of the amazing Mitchell Wings. . .this time its history and its renaissance.

AERO TOPICS

- 4 PUBLISHER'S COLUMN
Editorial
- 6 FORUM
Reader Commentary
- 7 INDUSTRY NEWS
News and New Products
- 36 DIRECTORY
Where to Buy What You Need
- 37 (New!) CLASSIFIEDS
For the Bargain Hunter
- 38 PRODUCT LINES
Consumer News

WHOLE AIR Magazine is published bi-monthly by Idea-Graphics, whose mailing address is P.O. Box 144, Lookout Mtn. TN 37350-0144, and whose executive, editorial, and advertising offices are located at 3308 Rondaboo, Chattanooga, TN 37409; telephone 615/825-5274. ©1984 by Idea*Graphics. 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 144, Lookout Mtn. TN 37350-0144. Expiration date marked on mailing label in a four digit sequence, followed by two letters. The first two numbers are the year; the second two are the month of subscription expiration. 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 \$12.00; Mexico and Canada, one year \$16.00; All other countries, one year \$20.00; 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 144, Lookout Mtn., TN 37350-0144. No orders processed without the proper funds. **All Payments:** U.S. Funds only, please. Application To Mail At Second-Class Postage Rates is Pending At Chattanooga, Tennessee. **POSTMASTER:** SEND CHANGE OF ADDRESS TO: *WHOLE AIR*, P. O. BOX 144, LOOKOUT MTN., TN 37350-0144. Printed in the USA.

COMING NEXT ISSUE:

Mitchell Wing Legacy. Part II
Towing & French Connections
Tour of LaMouette of France
Vision Pilot Report
Owner Survey Wrap-Up
Florida Tow Log, No. 4



cartoon by Bob Lafay



Volume 7, No. 6, 1984
ISSUE NO. 39

Publisher
Dan Johnson

Editor
Starr Tays

British Correspondent
Noel Whittall

German Correspondent
Gib Eggen, D.O.

Owner Survey Editor
Bruce Wolfe
Towing Section
Tom Phillips
Donnell Hewett

Staff Photographers
BJ Schulte
Cliff Whitney
Doug Barnette
Staff Writer
Paul Burns

Art/Photo Contributors
Doug Barnette
Gib Eggen, D.O.
Paul Burns
W. A. "Pork" Roecker
Noel Whittall
Bettina Gray
Chuck Rhodes
Dan Johnson
Randy Milbrath

Editorial Contributors
Gib Eggen, D.O.
Paul Burns
Chuck Rhodes
Bruce Case
Dan Johnson
Noel Whittall
Richard Boone

Cover Photo
Doug Barnette

On The Cover:

Doug Lawton blasts off Lookout Mtn as he begins the Great Race in a new Wills HP, supported by his integral harness. (See articles on the HP and the integral harness in this issue.)

Publisher's Column

AS WE END 1984, we conclude a year full of uncertainties. Writers in *Hang Gliding* magazine continue to talk about tough times for the beleaguered USHGA. No businessmen have enjoyed a spectacular year, though some plodding progress has been made. And the flying lead to no new records (except an "illegal" altitude gain — see Oct '84 *Whole Air*).

RE-ENTER THE FED'

At the end of 1984, word from Washington, D.C. indicates further regulation of our sport seems imminent. My best sources in the DC area say new laws will not go into effect for at least one year, and could take two years for enactment. In the interim, public opinion will be sought.

As mentioned in this column last issue, I recommended the organization of another letter-writing campaign to attempt exemption to the new (anticipated) rules, as has already been done with the regulations in Canada. Maybe this will happen; maybe not. Perhaps — as some feel — further regulation would actually help our still-faltering industry. I personally doubt that, but every story has two sides. Future installments of this column will delve into the pros and cons of more laws and a tighter legal environment for good ole hang gliding.

CONFUSION OVER ISSUE NAMES/DATES

Confusion over *Whole Air* cover dates is not a big problem, but brings us a letter or two a month. It's an easily-solved question so let's do so. At the top of this page in each issue, the issue number (here no. 39) is printed.

The easiest way to know that indeed you *did* get six issues this (or any) year is to keep track of the issue by number. To make this simpler, we've begun putting the issue number, and its position within the publishing year right on the front cover.

The cover *date* (month) we show is somewhat contrived. The date has no effect on the contents of an issue, but is just "part of the game" of selling magazines "on the newsstand." The point is, when referring to an issue to determine your subscription expiration, or if you're wondering if you received such and so issue, go by the issue number.

EXPIRATION INFO

If your mailing label says 8501, you will expire after issue no. 40. If it's 8503, you'll expire after issue no. 41 — 8505, no. 42; 8507, no. 43; 8509, no. 44; 8511 (last of the year), no. 45; 8601 (first of the year), no. 46. And so on. Got it?

EXCITING NEW PLANS

Because of the uncertainties mentioned at the beginning of this column, I've taken initial strides to assure you that the best in American hang gliding magazines continues.

I've some new plans for editorial changes (faster news), paper stock changes (for much lower costs and faster production), layout style changes (to further enhance the timeliness of news items), translation of some articles in other languages (!), greatly enlarged newsstand distribution (on the basis of our good success in 1984), sample mailings to pilots who *still* don't subscribe (why not?), and possibly a change of addresses to the west coast (!!).

All these alterations are being thoughtfully considered before any of the above ideas are put into action. Many of the changes are not easy or pleasant. All have their difficult aspects. But insuring *Whole Air's* future is the stake, and I consider it a big one.

NEW GROWTH

Contemplating these changes and more gives me reason to project new growth. Of course, it's only speculation at this date, but I hope to *triple* our international circulation by the end of 1985 (to over 1100 copies). I also expect to *double* our American distribution, primarily through newsstand sales. If we succeed at these two goals (could be read "gambles"), *Whole Air* will pass *Hang Gliding* in circulation, exceeding 10,000 copies per issue.

By the end of 1986, I hope to *again* increase our foreign sales by double to triple, as we try to capture reader interest around the world.

After a trip to Europe in October, 1984, I now view the American market as consisting of *less* than 10,000 pilots. While this *might* still be the world's largest national group, in Europe alone, the number approaches *triple* that figure. Surprised? I was! Thus it becomes *vital* to appeal to the world community of hang glider pilots (and advertisers).

I feel *Whole Air* is in a good position to attempt these growth plans as we can do so without staggering expense, using the ideas mentioned above. But like all business ventures, it *can be* a "crap shoot." We hope you will continue your support, and also encourage your flying friends to subscribe.

Best of the holidays to you and yours, and here's to a great year of flying in '85!

Thanks,
Dan Johnson

HP HIGH PERFORMANCE BY WILLS WING

TECH SERIES

3

THE CONCEPT

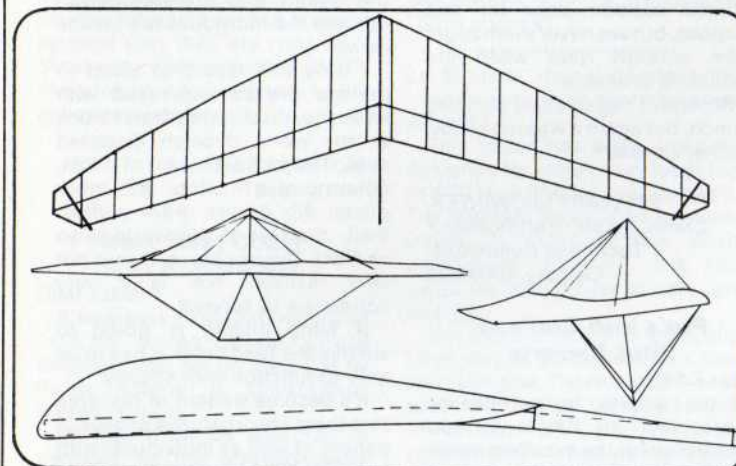
The Wills Wing HP is an innovative, high aspect ratio (7.0), high span (34.3 feet), structurally efficient (66 lbs.), very high performance foot launched flex wing hang glider. Superior performance is achieved in three primary ways:

REDUCTION OF SPANWISE TWIST

Three factors contribute to the exceptionally low spanwise twist of the HP. Tension in the sail is very high, the leading edge spar is very stiff, so that deflection in the spar is very low, and the high density of full length battens provides extra support for the roached area of the sail. The resulting low twist maximizes effective span and aspect ratio, and lowers the induced drag to a minimum.

REDUCTION OF PARASITE DRAG

Most of the keel is enclosed within the double surface or fitted tightly against the sail body in the rear. The keel pocket has been eliminated. On a conventional glider, the keel and keel pocket represent a significant



portion of the total drag area of the glider, especially when the glider is slipping or skidding. The elimination of the keel pocket also brings the pilot and lower rigging and structure closer to the wing and into a region of reduced airflow, thus further reducing drag.

PRECISE AIRFOIL DEFINITION

The Wills Wing HP has 20 full length battens across the top surface of the sail, providing precise definition and control of the airfoil section at each station across the wing, helping to control the twist, and eliminating flutter even at the highest speeds. The cut of the sail has been carefully designed to conform to the in-flight shape of the airframe with extraordinary accuracy.

THE INNOVATION

The most striking visual difference in the Wills Wing HP is that it has no keel pocket. The keel is almost entirely enclosed within the double surface, and is held tightly to the top surface of the sail in the rear.

In early hang gliders, the keel was bolted to the crossbar and the sail was attached tightly to the keel. Turning control was effected primarily as a direct result of shifting the mass of the pilot off center to one side, producing first a roll, and then a slip induced yaw in that direction. In the quest for performance, wingspans were made larger, sails were pulled tighter to reduce twist, and weight shifting alone became inadequate for turning control. At each stage of hang glider design evolution, adequate turning control became the limiting factor on the designer's ability to increase sail tension to reduce twist, increase effective span and thus improve performance. With the invention of the keel pocket, the sail could transfer billow, and hence twist, out of one wing and into the other, and do so automatically in response to pilot weight shift. The keel pocket thus transformed the entire sail into a weight shift actuated aerodynamic control surface. This allowed for gliders with larger spans, lower twist and improved performance while retaining adequate lateral control.

Next came the floating keel, which allowed the pilot's hang point to float from side to side, reducing the pendular bar forces in lateral control movements.

Three and a half years ago, we began looking at another approach to lateral control on a high tension membrane wing. Using movie cameras we carefully analyzed the relative motions of the keel and the sail during the initiation of a turn on a conventional glider with a floating keel

and keel pocket. We found that the keel and the sail both move about the same distance in the same direction at the same time when the pilot shifts his weight. We realized that with a floating keel, the keel pocket was unnecessary, and further that removing the keel pocket might actually improve turn response. The reason is that with the sail attached to the keel, when the pilot's lateral movement pulls the keel to one side, it will also pull the sail in that direction, rather than relying only on the imbalance of weight on the wing to produce the billow shift. The HP, with floating keel and no keel pocket, rolls quickly in response to pilot weight shift, even with very high sail tensions. Also, because the sail is attached tightly to the keel, the glider has a more "connected" feel to it providing better feedback to the pilot in thermalling conditions.

EASIER GROUND HANDLING

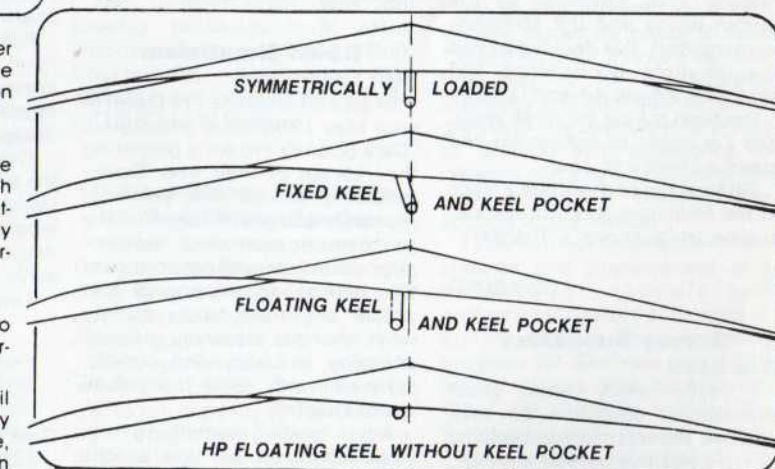
The "no keel pocket" configuration of the Wills Wing HP leads to a host of other advantages. Because the mass of the wing is closer to the pilot, and because the glider has a more connected feel to it, ground handling is much easier and more positive.

MORE PITCH AND ROLL AUTHORITY

Also, by bringing the pilot and wing closer together, control authority in both pitch and roll is increased, and damping in both pitch and roll is reduced without reducing the length of the pilot suspension pendulum, which would result in higher control forces. With the pilot closer to the wing, the same lateral weight shift requires the glider to roll through a larger angle before the pilot and glider are once again in vertical alignment and the rolling moment disappears. By the same token, for a given number of degrees of bank angle change, the glider moves through a shorter arc in its revolution around the center of mass, and hence the amount of roll damping is reduced, making for a faster roll rate.

EASIER LANDINGS, BROADER SPEED RANGE

The greater pitch authority yields easier, more positive landing flares and provides a broader speed range with less of the tiring physical effort required to hold high speeds in conventional designs.



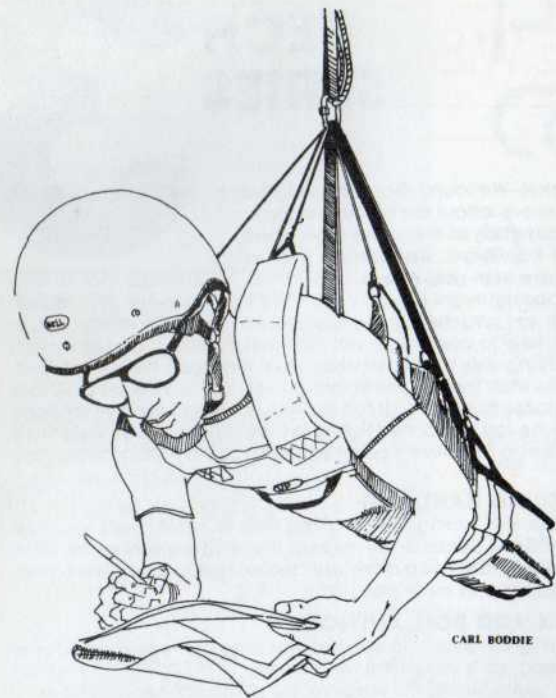
HANG IV PILOTS ONLY

The Wills Wing HP is not, however, a glider for everyone; it requires a true, current Hang IV proficiency, and a safety conscious, disciplined approach to flying. Its extraordinary control authority and extremely low drag configuration provide the means by which an inexperienced or careless pilot can easily exceed the placarded limitations of the aircraft. This glider is suitable only for highly skilled, experienced, and mature pilots.

WILLS WING

YOU CAN FEEL THE DIFFERENCE!

1208H E. Walnut, Santa Ana, CA 92701 (714) 547-1344 / 6366
DEALER INQUIRIES INVITED



FORUM

Stickin' With Us

Dear Editor:
Enclosed is my renewal. After reading your coverage of the Horten wings and the Minimum [motorglider], I've decided to quit the ultralight publications and stick with *Whole Air* and USHGA. I've been triking for three years, and I'm ready to lighten up and stand a chance to soar. Perhaps the pod will find a place in the Minimum (both prone and supine, or "suprone"). Thanks!

LEW BOYD

Survey Successes

Dear Editor:
I really enjoy your glider evaluations, emphasis on their positive aspects notwithstanding — I'm a positive person anyway. Liked your comparison of the Comet and the Harrier (March '84 *Whole Air*). I have both and fly each for the very reasons your survey said was their appeal to owners. For whatever it is worth, I shall continue to subscribe to *Whole Air* so long as you keep to hang gliders and limit coverage of ultralights to the area of tow vehicles. I've been flying since '73, and still learn from every issue of *Whole Air*.

SCOTT S. KINNER,
Canon City, CO

Thanks, Scott. We sincerely do appreciate your support of our efforts. We will keep on as long as the support continues. —Ed.

Dawn Skepticism

Dear Editor:
In an article on the Pro Dawn in your May 1984 issue, you stated, "Dick Boone's Pro Air is preparing the release of their new Dawn, following almost five years of research and development. The performance-attuned reader/pilot would do well to pore over the photos accompanying this article and thoughtfully ponder what changes are really present. Jumping to unfounded conclusions will only serve to confuse the evaluator."

Am I reading something into your words or are you a little skeptical of this "new" design? Is this the design of the future or just a passing fancy?

Having only one summer of flying experience, I really need more information before spending \$2,300 for a glider. I would really appreciate any information you could send me on the Pro Dawn. I would also value any personal judgement you might make on this or any other glider. But I am specifically interested in the Pro Dawn.

Thank you.

JIM JOINER,
Willows, CA

We weren't being negative, Jim. But you're right, we were being skeptical, because we feel new designs always warrant some degree of skepticism.

But we were also very intrigued by the new directions Dick Boone was using. And we feel our pages should report new developments.

We hope you enjoy Paul Burns' PiRep (in this issue) on a glider about which we've received many letters. —Ed.

Glide Angle Testing

Dear Editor:
Your article on glide angle testing was a good idea. I hope it spurs further work in this area. I have had a long interest in performance testing and have been wanting to use a high-altitude balloon drop for this purpose, but we never seem to get calm enough days when the balloon is available.

Recently I began using a skyting launch, but again it was too windy. Sooner or later!

STEWART MIDWINTER,
Chmn., HGAC Certification/
Technical Committee,
Calgary, CANADA

Pro's and Con's of Pilot Reports

Dear Editor:
I am writing to express my appreciation to *Whole Air* and Paul Burns for the excellent series of articles on intermediate gliders.

Pilots can't fly all designs and need to rely on articles by someone who has had the opportunity to examine various designs.

This effort by *Whole Air* is one of the best features of the magazine. Without something like this, pilots would have a difficult time deciding which glider would best serve their individual needs.

Keep up the good work.

DICK FORTNER,
Barberton, OH

Dear Editor:

I just got the August issue and I had to write. In general I really like the product reviews, but the one on the Wills Wing Skyhawk was just too much.

For the most part I have little to disagree about, but the final three paragraphs were just overstated. I own a Wills glider so don't get the idea that I'm down on them, but the last bit was more fitting for advertising copy. The only thing that could have made it worse would have been to have an ad for the glider in the middle of the review (as in *Stereo Review*). Reviews should really be objective and not so obviously patronizing. I had to get this off my chest

because I really think that you have a fine magazine, but it won't be if you continue with that type of writing. Thanks for your time.

STEVE GOLDMAN,
Cary, NC

Thanks for your comments, good and bad, Steve. Hope you find enjoyment in Bruce Case's admittedly not-very-objective review of the Wills HP. —Ed.

Promotion and Communication in Our Sport

Dear Editor:
The magazine is once again on a quality upswing. The equipment reviews are really nice. . . keeping the quality and professionalism up, and the individualistic facade down.

I have this idea that pilots in general are so impressed with what they do that they start to look at the world through distorted eyes. The world, to a lot of pilots, consists of #1- pilots; #2- other pilots; #3- drivers; #4A- wuffos; #4B- the rest of the world (also wuffos). The trouble is, that is not very realistic, nor is it very conducive to survival.

If hang gliding is going to survive the hard times it has to be able to function with society.

It's become evident in our area that there are organized groups of people as well as individuals with land and/or money that can close down launches and landing areas.

Since pilots don't generally have a lot of money, then individually we don't have much power.

ADVERTISER'S INDEX

Aerial Dynamics	35
Airwave Gliders U.S.	30
Ballistic Recovery System	8
C W Photographics	35
Delta Wing .. 39 (IBC), 40 (BC)	
High Energy Sports	10
Leading Edge Air Foils	34
Litek Variometers	24
Mission (Speed Rail)	24
Northern Sun Gliders	34
Progressive Aircraft Co.	12
Publitec (Pfeiffer book)	24
Rigid Wing Reader	34
Seedwings	2 (IFC)
Skylines, Ltd.	11, 24
T-Shirts (<i>Whole Air</i>)	35
U.S.H.G.A.	34
<i>Whole Air</i> subscription	29
Wills Wing	5
Windgyppy (flight school)	8
(New!) Classifieds	37
Dealer Directory	36

Collectively, provided we are organized properly, we can present an organized, respectable group worthy of consideration in governmental and community planning. I've also noticed that it's always a small minority who does the organizing, footwork, planning, and executing.

So, congratulations for being a leader in the endeavor. *Whole Air* and *Hang Gliding* are the two most important assets to the sport. You realize that I'm sure. Without newsletter and magazines there would be no growth, communication, or anything. Seriously! No magazines and the sport would gradually die.

Pilots make an effort to communicate with the world once or twice a year by sending in a subscription to a magazine. That's not a whole lot of effort in return for the information and support systems that they are tying into. So anyway, without further ado, I'll close for now, but seriously — you are appreciated.

AARON SWEPSTON,
Seattle, WA

New East Coast X-C Record Set

Dear Editor:
A new east coast X-C record of 107.86 miles (great circle distance) was set on Sept. 1st by Randy Adams of Stockbridge, Massachusetts.

He flew from Mt. Asscutney in Vermont to the Massachusetts coast at Gloucester. He flew a Duck 180.

Randy has been flying for only two years and this year won the regional contest, but couldn't attend the Nationals.

This flights betters that by Mark Bourbonnais flight from New York to Pennsylvania, which was not measured by great circle distance (Aug. '84 *Whole Air*).

DEANE WILLIAMS

Moyes To Produce Advantage Harness In Australia

The Advantage harness is a Rich Pfeiffer designed product that has gained good initial market acceptance. The harness was inspired by the "clean" Aerodyne helmet. States High Energy spokesperson, Betty Moyes, "We are pretty sure this is the first time a harness was designed around a helmet!" Those Aerodyne head fairings may be ordered from High Energy.

Evidently assured of the advantages of the Advantage harness design, Moyes Delta Wings, based in Australia, recently obtained the rights to produce the High Energy harness in that country.

INDUSTRY NEWS

La Mouette of France Announces Two New Atlas Designs

The recently revised Atlas 85 has just passed the German certification program and received the Gutesiegel (Seal of Approval).

The load test requirement has been pushed up to a positive 750 kg [1650 pounds] and a negative 375 kg [825 pounds] to allow it to be equipped with a very light trike.

The new Atlas model is lighter and weighs only 24.3 kilograms [53½ pounds].

La Mouette also announced the unveiling of their monster-sized Atlas 22.

This glider has been specially designed for extra heavy loads (up to 400 kg or 880 pound payload!). The intended application is mainly used in conjunction with agricultural spraying, but has value for instruction at very low speeds.

The trike mated to this unusually large wing is powered with a four stroke engine. The Atlas 22 — with patent by Darlet, famous for his invention of the "french connection" — has its right and left sail halves separated to reduce handling pressures.

The company reports that the package flies at less than 40 km/h [25 mph] even with a 300 kg [660 pound] load. Specifications of the Atlas 22 are:

Weight 39 kg [86 lbs]
Nose Angle 120°
Span 11 m [36 ft]
Area 22.5 m² [242 ft²]

Kitty Hawk — West Calendar

DEC 29 to JAN 6 — Southern California Flying Tour: Crestline, Elsinore, Sylmar, Little Black, Torrey Pines. Trip includes: Guide, Instructor (USHGA Advanced), Driver, Chute Clinic & Repack (on earlier date), Rating Tasks, and 7 flying days, weather permitting. Cost is \$225.00

FEB 21-22 — Basic I.C.P. course.

APRIL 26-28 — Marina Beach Steeple Chase.
For further information on activities at Kitty Hawk — West, call 408/384-2622.

Mini Owens Enters Towing Market

Mini Owens Tow systems, operating out of Alexandria Minnesota, is a new entrant in the supply of state-of-the-art land towing hardware.

The Mini Owens Tow Release is a sailplane-type release, with minor modifications to permit hang glider towing. The release is designed to work with one-piece bridle systems intended to remain with the pilot. This eliminates some problems associated with what is sometimes called, "flyaway" bridle systems.

Because of a built-in pulley used to alter bridle angles, pitch pressures under tow are said to decrease. This is apparently especially true when compared to three-ring releases or typical, unmodified sailplane releases.

The company has tested the release to over 800 pounds, yet they say release pressures remain light. The designer recommends the use of 5/16 inch bridle line to further decrease bridle backlash.

Mini Owens also makes a hydraulic line tension gauge as a safety device. The gauge shows 200 pounds of pressure in five pound increments, allowing precise control of line tension through continuous feedback. Their gauge comes with sufficient line to work with rear bumper mounting and windshield read-out.

For further information on towing products from Mini Owens, write them at 2409 E. Golf Course Rd., Alexandria, MN 56308, or phone 612/763-5712 (Central time).

Subscriptions Available to Rigid Wing Reader

If you have ever flown, are flying, or have dreamed of flying a rigid wing hang glider you will want to read the *Rigid Wing Reader* newsletter.

The publication, which emanates from San Pedro, California is edited and published by long-time rigid wing enthusiast, Chuck Rhodes. Rhodes is the author of numerous articles for *Hang Gliding* magazine, and has just begun editorial contributions in *Whole Air* as well.

In *Rigid Wing Reader* you'll learn who is doing what and where in the world of foot-launched sailplanes. Read about the Mitchell Wing Renaissance and the latest composite wing construction techniques that are now being utilized by rigid wing builders. Experience the world of three-axis "hang gliding" and hear reports from foreign rigid wing projects and flights from Germany, Brazil, and New Zealand.

They welcome submissions on projects or flights of all kinds of rigid wings, and anyone may subscribe to the bi-monthly newsletter.

For more information or subscriptions, contact Chuck Rhodes' *Rigid Wing Reader* newsletter by writing 27670 S. John Montgomery Dr., San Pedro, CA 90732, or phone Rhodes at 213/514-3056.



Matt Taber Joins Skylines

Well-known as Manager of Chattanooga's popular Lookout Mtn Flight Park, Matt Taber has accepted the appointment of U. S. General Manager for Skylines Ltd., an affiliate of Pacific Windcraft in Salinas, California.

Says Jean-Michel Bernasconi, president of Skylines Ltd., and Pacific Windcraft Ltd., "Skylines is about to depart in quite a big way from its current position in the hang gliding industry for 1985. We are extremely happy to have Taber join us for this new venture. Not only is he a dedicated instructor and pilot devoted to the growth of our sport, but he brings to Skylines his experience in creating and managing one of the most successful hang gliding schools in the nation."

Taber will be responsible for the creation and development of a network of schools and professional dealers across the U. S., as well as the marketing program for Skylines new 1985 line of gliders and accessories. Taber will continue to head the Georgia-based flight park as well. For further information on Skylines' products for 1985, call 408/422-2299 or 404/398-3433.

Comet 2s Reign at Argentine Nationals

Positions 1 thru 5 were occupied by Comet 2s, as Argentina's 2nd Annual International Hang Gliding Competition was won by American UP team pilots Eric Raymond and Larry Tudor.

Utilizing 3,000 foot "Cerro de la Cruz" — the flying site which overlooks the provincial capital of La Roja — offered impressive terrain and local flying conditions. The long north/south mountain

range is flanked by a modern highway which tended to remind Owens Valley pilots of the White Mountain Range.

Altogether 34 pilots came from every South American country with the exception of Brazil to a major cross country contest that Americans considered one of the best meets in a long time. . . especially because of very little "bickering over stupid rules." Simply put, the longest distance made the most money.

The Argentine organization was reported as "world class, with all official support vehicles and meet control linked by FM radio communications." At all times organizers had a Bell Jet Ranger helicopter available for search and rescue operations. Official scored distances were marked by official kilometer stripes on the adjacent highway to ease scoring problems for meet judges who paced competitors in official autos.

Argentine enthusiasm was high for the contest, with local pilots arriving from all provinces — some as far away as 500 miles — to participate and to examine equipment of visiting pilots.

When it was all over, winner Eric Raymond pocketed a cool \$2,000 of the \$3,000 purse for his victory.

The meet was marred by the crash of the only two Magic IIIs in

INDUSTRY NEWS

the event. Two incidents had Argentine pilots finding difficulty on launch, and Miguel Bermudez was killed when his glider stalled and crashed immediately after take-off. Even quick action by the helicopter and military search and rescue teams were unable to save Bermudez's life. Bermudez was one Argentina's leaders in the sport of hang gliding. His efforts were quite influential and had brought about growth in flying activity in the La Rioja Province, resulting in this meet.

The event was scored based entirely on the number of kilometers flown in the five-day-long competition. Tudor's 163 kilometer flight in a southwesterly direction set new Argentine and South American records. This impressive flight vaulted Tudor into second place, after he began the contest two days late.

The Venezuelan team of Fernando Imora, Ignacio Plaza, and Simon Piera had the most cross country flying experience, compared with the other South American teams. The trio flew very competitively with the best flights

of Americans Raymond and Tudor. Imora eased past Plaza on the final tasks to end up in third place.

Report filed by Peter Brock

Grinolds Joins High Energy Team

Long-time harness maker for Wills Wing, Shelly Grinolds, has

joined the High Energy company, run by Betty Moyer and Rich Pfeiffer. Grinolds was instrumental in aiding the design of Wills products like the Flylite Deluxe harness.

Grinolds will continue to work with new designs and quality control at High Energy.



WINDGYPSY

PROFESSIONAL HANG GLIDING
INSTRUCTION, SALES, SERVICE
U.S.H.G.A. CERTIFIED

PAUL BURNS

(714) 678-5418

M-O-R-E BRS "return" customers do the talking . . .

Dear BRS;

"During a routine training flight, the 2-seat (ultralight) suffered a structural failure. We deployed the BRS at approximately 250 feet . . . the BRS performed as per spec's, with full deployment within two seconds.

We now intend to install the BRS on all our aircraft. Thank you for your great 'chute."

Bill LaPointe,
Canada

Dear BRS;

"When the engine on my ultralight failed, the only field available suddenly looked very small. At 300 feet, there was no way I could have deployed a hand thrown 'chute.

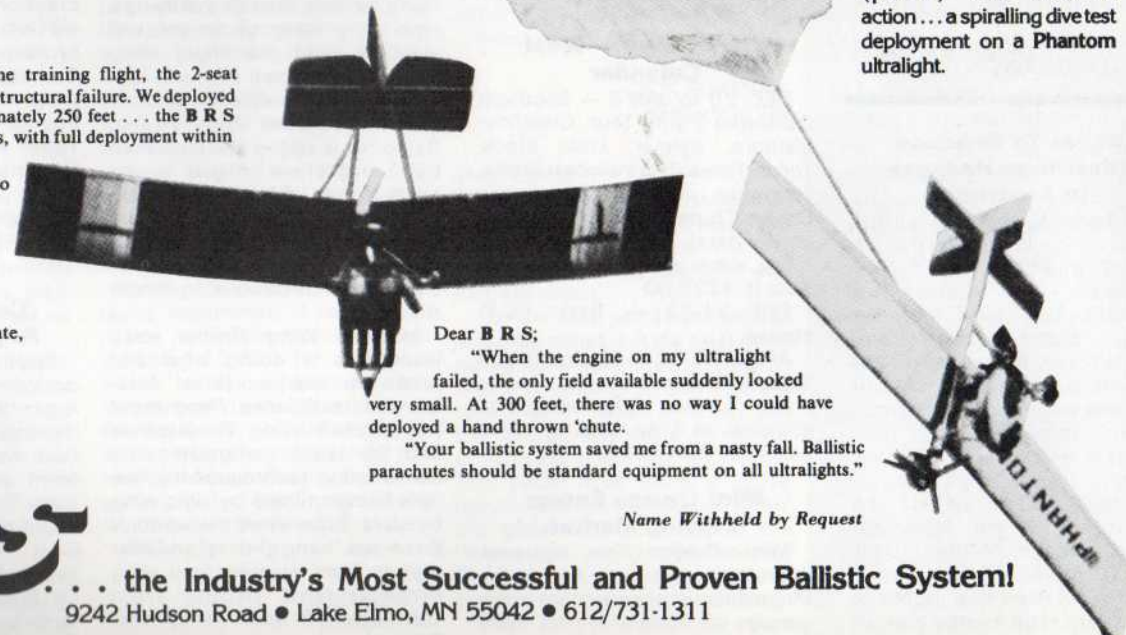
"Your ballistic system saved me from a nasty fall. Ballistic parachutes should be standard equipment on all ultralights."

Name Withheld by Request

BRS-3 NOW IN PRODUCTION

Ballistic Recovery Systems now introduces the BRS-3, a dual mechanical cartridge system that eliminates the electronic complexity of previous systems.

(photo) The BRS in action . . . a spiralling dive test deployment on a Phantom ultralight.



GO WITH



. . . the Industry's Most Successful and Proven Ballistic System!

9242 Hudson Road • Lake Elmo, MN 55042 • 612/731-1311

United Kingdom

From British Correspondent, Noel Whittall, comes a Sporting Review of 1984/photos by the author



(Left) British Champion Michael Carnet. (Opposite Page) Highly successful female pilot Judy Leden poses with her sponsored glider.

FOR ME, ONE of the most stirring sights at the Olympics was that of rocket-supported Kinnie Gibson flying into the arena during that fabulous opening ceremony. Almost like a hang glider pilot who had learned the trick of dispensing with his wings! Anyway, flying men and stand-up landings may become a feature of the Olympics in a few years time since the international governing body of our sport [on whose board this author sits — Ed.] has decided to make formal application for hang gliding to be accepted as an Olympic discipline. That will not happen very quickly — it'll probably be the 1990's before the commentators are having to learn how to describe glide angle degradation or pylon scoring systems, but it does introduce some very interesting topics for discussion. Not the least of these will be the exact format of "Olympic tasks."

EVOLVING TASKS

Although basic hang glider design can reasonably be said to have stagnated since the Comet arrived, the same cannot be said of competition tasks. Already, free distance has almost been superceded by races to designated goals: goals which are by no means always directly downwind. Then there is the interesting Hungarian specialty, the "Goulash task," which is a variation on the simple out and return idea, in that it has no limit. After the window is declared open, the pilots just have to fly between two turnpoints as many times as possible. The turnpoints may be as close together as say, 10 km, or as far as 100 km, according to conditions and terrain. The pilots use cameras to record their turns, so marshalling is kept to a minimum, and because the task is flown in a corridor, retrieval is easy. Another big plus is that on "spectator pleasing days" the turnpoints may be set at the shorter distances, thus producing plenty of action for the crowds and television cameras, but the task does not become absurdly simple like "duration and spot."

EVOLVING AEROBATIC INTEREST

On the subject of pleasing the crowd, there is an increasing interest in aerobatics both here in the United Kingdom and elsewhere. Many see this as the way to bring bigger sponsorships — currently sadly lacking — into the sport, but there have been many problems. Progress in Britain has been slow, largely because of mountain launch points, compared with Alpine countries like Switzerland and Austria. However, towing should provide the elevation which our terrain does not, and many of us hope to see good progress in this direction in 1985. Having

THE TOP TEN 1984 British League Positions

1— Michael Carnet (Magic III)	4965 points
2— Bob Calvert (Magic III)	4356 points
3— Robert Bailey (Magic III)	4130 points
4— Johnny Carr (Magic III)	4035 points
5— Phil Huddleston (Magic III)	3962 points
6— John Pendry (Magic III)	3835 points
7— Ronnie Freeman (Typhoon S4 Racer)	3558 points
8— Robin Rhodes (Magic III)	3468 points
9— Mike McMillan (Magic III)	3451 points
10— Tony Hughes (Typhoon S4 Racer)	3392 points

completed its test rig development in 1984, the BHGA should have the resources to direct more effort into safe towing development in 1985.

THE BRITISH HANG GLIDING LEAGUE

The final National League placing were decided amid the hills of the Peak District National Park in Derbyshire during September, 1984. The league consists of a number of long weekends of intense competition, and is largely responsible for the depth of contest talent which the British have. Forty pilots take part, and entry qualifications are stringent.

Michael Carnet, an expatriate Frenchman, emerged as overall champion this year, clearly ahead of Bob Calvert, four-times previous winner. British team captain, Robert Bailey placed third with the irrepressible Johnny Carr (Carnet's business partner in Sky Systems) in fourth position.

EVOLVING EQUIPMENT

A close look at the equipment the league pilots use normally produces a guide to what the regular club flyer will be launching with a season later. Assuming this is still the case, next year will see many more of us using fully-enclosed harnesses (also see "European Flight Lines" in this issue for more on the enclosed harness). Two basic designs dominate the U.K. market... the "Dart" and the "Supp." There seems little to choose between them for comfort or efficiency. The Dart is marginally more elegant, but requires additional battens which the fully flexible Supp manages without. I have flown both and can endorse the manufacturers' claims that they are easier to get into than a cocoon as well as being more comfortable in flight.

Variable geometry in the form of the so-called "overdrive" system has been around for several years, but has been rather slow to catch on in the marketplace.

It is happening at last now, with many of the Magics, Typhoons, and Shadows in the league using variations on the theme. The method is very simple — when the pilot pulls on a cord, it draws back the hinge in the center of the floating crossboom to tighten the wing and thus reduce the billow and drag. Various pulley systems have been "borrowed" from the sailboat world to make operation easier, and so far the neatest is that appearing on Bob Calvert's new Magic. I know that the simplicity of the ordinary flexwing hang glider is one of its greatest advantages, but personally I don't mind the slight complication of an "overdrive" as it means I can enjoy the speed of a tight wing when well clear of the ground and still be able to slacken off for responsive handling into a strange field at the end of a tiring cross country flight.

Gliders have looked much the same for several years now, so when something even slightly different comes along, it really gets noticed. Goldmarque's new Javelin appears to have about the highest aspect ratio wing on the hills at present — the root chord is shorter than average so that the sweepback on the trailing edge is very pronounced. The Javelin has dispensed with a keel pocket, using instead narrow fabric loops. This loss of side area does not seem to have affected directional stability at all. The aircraft handles beautifully, and does not come slicing sideways out of the sky nor proceed around corners in a succession of slipping yaws as some observers had predicted!

Quite a lot of effort is going into making a wing which holds its shape at speed. Airwave, the "Magic" maker, has an experimental system of battens which start off in the undersurface and then go up inside and over the leading edge. It is too early yet to tell if it is worth the extra problems which it presents to the sailmakers. Competition is so intense that anything which provides the slightest performance enhancement will be seized upon by the top League men.

NON-EVOLVING INSTRUMENT DECKS

Having said that, I continue to be surprised that many of the pilots are content to fit their instruments onto the control frame with a singular lack of thought about aerodynamic efficiency. It is common to see a pilot investing \$500 in a streamlined harness system but still being content to lash a cluster of instruments together with duct tape and clamp them to the uprights in a manner calculated to maximize their drag potential!

H-E-E-E-E-R'S JUDY!

I used the expression League "men" in an earlier paragraph. That is rather inexcusable really, because one of our best flyers is Judy Leden, who competes on equal terms within the League, and finished 17th. Judy is one of the most effective publicists our sport has in the U.K. Her women's world record (147 miles in the Owens Valley in 1983) and international competition results — such as 3rd overall in the Himalayas behind Gerard Thevenot (France) and Chris Bulger (USA) — are evidence of her consistent skill in the air. She also has skill on the ground in that she interviews extremely well and is patient with less intelligent members of the Press Corps! Altogether a great asset in overcoming some of the prejudices the Great British Public still has against hang gliding in general. We need more like her to help the sport grow. §

We Build Our Harnesses & Parachutes to the toughest standards we can find...our own!



OPTIONS: ★ 1/2", 1/4", or 1" Foam ★ Racing Boot No Foam ★ Steel Carabiner ★ THERMA/R™ Insulation Radio Holder ★ Ballast ★ Boot Stash Pouch ★ Extra Pockets ★ Higgins Hinge Fly Flap ★ Chevron Stripes You Name It! ★ Two Week Delivery

FLY WITH THE BEST SYSTEM AVAILABLE...FLY WITH High Energy Sports

2236 W. 2nd Street • Santa Ana, CA 92703 (714) 972-8186



The REVOLUTION CONTINUES...

From the People that Brought Aero-Towing in 1984 Comes the Most Exciting and Affordable Line of Gliders and Soaring Equipment for 1985.

The ATLAS '85. The World's Most Popular Glider Ever Built.

SAFETY RECORD?

The most envied one: Immaculate. Over 6,000 Atlases built to date! The Atlas was one of the first gliders to be certificated in Germany and Switzerland.

PERFORMANCE RECORD?

★ World Champion ★ ★ European Champion ★ ★ French Champion ★ ★ Champion of England, Switzerland, Italy, Norway, Brazil, Japan, and Argentina ★

The Atlas has bigger double surface brothers which are more sophisticated and faster, but when it comes to pure sink rate, it often remains "top of the stack." In competition, when sink rate is primary, ATLAS '85 pilots are competitors to watch.



ANXIETY-FREE FLYING

Perhaps the easiest glider to fly currently in the U. S. from the quickest set-up time and easy preflight to light and predictable handling, this ATLAS '85 will treat you to hours and miles of fun.

guaranteed by SKYLINES ENTERPRISES LTD.

(an American Corporation)

•Guarantees in writing...a full spare parts availability for a minimum of three years from the date of purchase!!

•Guarantees...ISHGA Certified Instruction through its dedicated network of schools and flight centers!!

•Guarantees...Immediate delivery after March 1, 1985 (both gliders and parts)!!

...Who Else Offers These Guarantees?

At A Shocking Low Price...!!

INTRODUCTORY PRICE --- \$1395

Dealer Inquiries Welcome. Dealer Training and Certification Available.

For further information, please contact Skylines at:

404/398-3433

or

408/422-2781

...We're Bringing Fun And Affordability Back To Hang Gliding...!



Beginning a New Excellence in Aerodynamics & Structure



IN A CLASS OF ITS OWN

FLY A **PRO-DAWN**



PROGRESSIVE AIRCRAFT COMPANY □ 4544 INDUSTRIAL STREET □ SIMI VALLEY, CALIFORNIA 93068

NEW INNOVATION REPORT

THE FIRST TIME I saw a Dawn was on a visit to the Progressive Aircraft factory in Simi Valley, California. Its appearance on the ground led me to immediately assume that with its high aspect ratio and small area, the Dawn would be fast in overall performance and have a high stall speed. I imagined the Dawn would be spirally unstable, difficult to coordinate in turns and weight at least eighty pounds.

Funny how appearances can deceive, for I soon discovered the Dawn suffers from none of the problems I had anticipated.

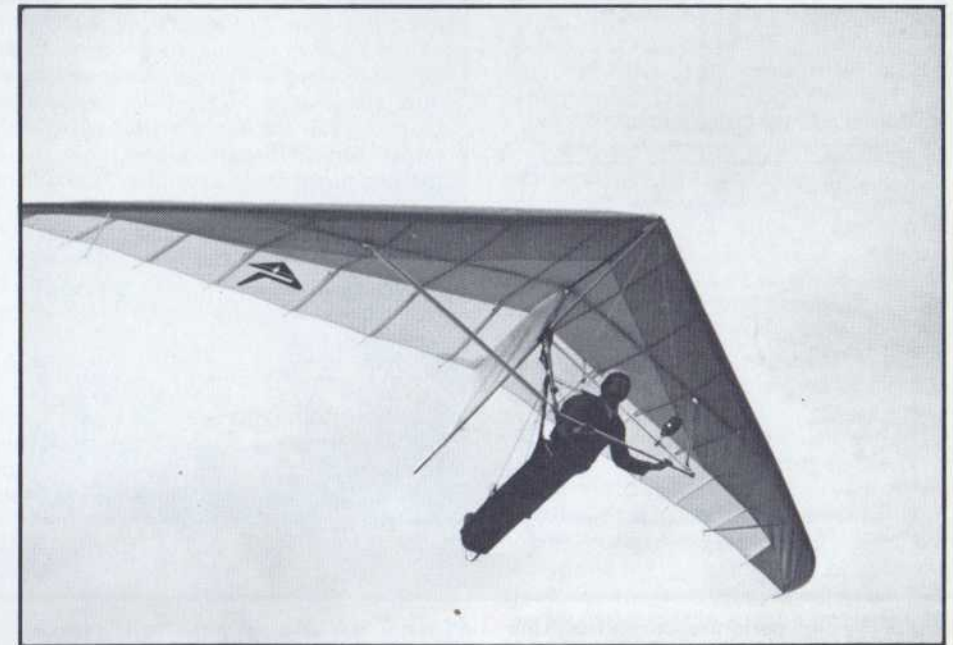
The Dawn 155 supplied by Pro Air for evaluation had been set-up and test flown by designer, Dick Boone, prior to my arrival at Torrey Pines. As soarable conditions existed, I donned my harness and helmet, and hooked in; a quick static check and I moved toward launch. I was immediately impressed with the Dawn's ease in ground handling (balance is excellent — the struts transmit a solid feel on the ground). Self-launching in fifteen mile an hour winds was no problem.

Once in the air I realized that although the appearance of the Dawn on the ground is "different," its response to control is conventional; smooth, stable and predictable.

To my surprise, the most difficulty I encountered in my first hour was in maintaining proper airspeed of 17-18 mph. At this speed the sound made by the glider is almost inaudible, prompting one to fly a bit fast. It took me a couple of hours flying to realize the low speed capabilities of the Dawn and adjust my airspeed accordingly.

At first I thought the Dawn's roll response was stiff. After adjusting my airspeed, I found the roll response to be quicker, with less bar pressure required than my first impressions had indicated. The Dawn is light in response and quick in initiation, and does not suffer from the yaw instability common to many high aspect wings.

Coordination in turns is straight forward and a minimum of pilot input is required to complete turns.



DAWN

Author Paul Burns flies the Progressive Aircraft Dawn for designer-turned-photographer, Richard Boone. Photo taken at Torrey Pines, California.

The Dawn remains comfortably yaw stable throughout the speed range. Even at top speed, the glider has no tendency to "tip-walk." Yet turns can be accomplished with a minimum of effort.

The Dawn has a two-position frame setting on the control bar base tube. The outside position allows additional dihedral, resulting in more roll stable flight characteristics. The inside position provides a slightly spirally unstable machine; in this setting, turn initiation is a bit quicker, but some "high siding" may be required to keep the bank angle constant.

Bar pressure in pitch is very comfortable at low airspeeds; pressure increases with airspeed. At top speed, the Dawn exhibits an impressive positive pitching tendency. At speeds slower than

"trim," the bar pressure also increases. To push the Dawn to a stall, a substantial effort is required to overcome this bar pressure, providing a stall warning feedback to the pilot.

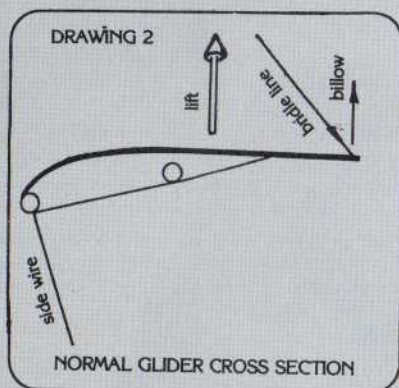
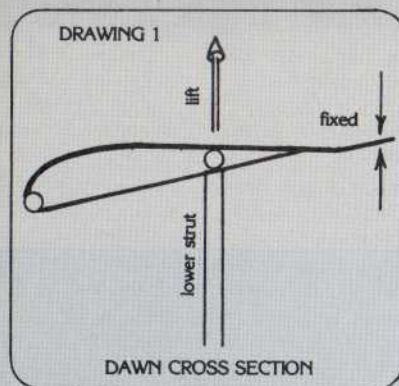
Intentionally pushing the wing to a stall reveals a mild "break" as a quick recovery ensues. A stall in a turn will result in an increased sink rate, although turn radius remained virtually unchanged. Relaxation of bar pressure allows the Dawn to quickly recover flying speed.

Continuing my first flight in the smooth ridge lift, the Dawn illustrated an excellent sink rate. The wing can be held at a very low bank angle allowing for efficient soaring turns. Although operating at a higher wingloading (1.6 lbs/ft²), the Dawn was capable of matching sink rate with the

D A W N

STRUCTURE & STABILITY

A Statement from the Designer



AT FIRST GLANCE the main difference is that the Dawn has side struts instead of side wires and top rigging. The struts would not be possible if not for the Dawn's totally new structure.

There is one way to explain the Dawn's structure. It is a rigid wing. Like a rigid wing flight loads are located around a central structural spar; in the Dawn's case the cross-spar. This difference is shown in drawing number 1 and 2.

The Dawn's structure prevents high loading due to sail billow. This same structure along with fixed upper and lower surface battens holds the trailing edge thus eliminating the need for bridle lines. On positive loads the lower surface battens keep the sail from billowing up. Under negative and stability loads the upper surface battens place the loads on the cross-spar. Rigid lower surface battens further help to support the trailing edge reflex.

Another difference from the normal glider is the location of the side strut. The loads being located on the cross-spar allow the struts to attach to the cross-spar about four feet inwards from the leading edge/cross-spar junction. This allows a much shorter strut length, thus making them much stronger than any previous design. In our testing, the strutted version was actually stronger than a kingpost version.

A normal glider gets its stability from its bridle reflex lines and fixed tips. During normal gliding trim flight, none of these stability devices are working. Their stability is found with a function of air speed and/or sail blow-down.

In many cases, such as pitch-overs (tumbling), you might have a considerable rotational force before your stability features come into play. The Dawn's center section stability is operating at all speeds causing a more pitch damped glider.

best of the high performance models in the air that day.

Informal glide comparisons were performed at Torrey Pines over a three mile course. The Dawn appeared to keep pace with the Ducks and Comets, but seemed to be rather at a disadvantage when matched against the new HP or Sensor 510VG.

I soon had the opportunity to fly the Dawn at Elsinore, California, a mountain site. Flying in thermal conditions, the Dawn displays a sink rate that does not seem to deteriorate appreciably at steeper bank angles. Although the Dawn has a high aspect ratio, it will perform 360° turns in a small diameter due to its slow flight speeds. With some practice the Dawn is both quick in initiation and light on bar pressure. Gliding between thermals, the Dawn's wide speed range allows excellent maintenance of altitude and very good glide performance. The Dawn transmits a solid feel, even in the turbulence associated with a convergence condition. The Dawn felt very comfortable in its stability, never scary.

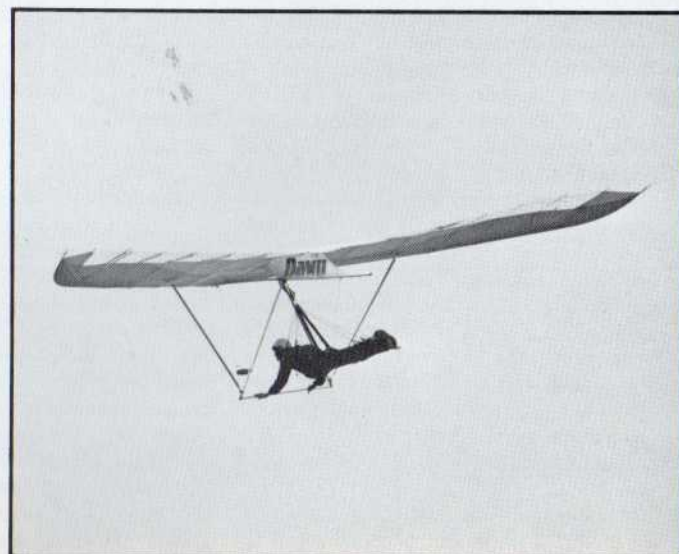
When landing the Dawn, the procedure is the same as with conventional designs. Following a straight final approach into the wind with airspeed at best L/D or slightly faster, level in ground effect. Bleed off speed to trim, and flare with hands on the down tubes.

The Dawn is surprisingly easy to land. In fact, this area of operation may illuminate this glider's most outstanding quality. I regard the Dawn's landing characteristics to be on a par with many single surface designs. Over the course of this evaluation, I completed twenty flights.

All of my own landings were "safe" (no part of the glider touched the ground). Several other advanced rated pilots demonstrated landings of equal quality, most of these on their introductory flights.

Unexpectedly, set-up procedures for the Dawn are not much different than conventional designs, but reference to the owner's manual is advisable for the first few efforts. The Dawn can be set up by one person in fifteen minutes. The control bar assembles with a bolt at the base tube/down tube junction. Stand the glider in the control bar and attach the front flying wires at the nose with a pip pin. Spread the wings only enough to remove the ribs and struts that are rolled inside the sail. Now, spread the wings to full extension.

Paul Burns pilots the Dawn, as we view the unorthodox design from the left quarter. Unusual in appearance with struts and no kingpost or upper rigging, the wing carries other more subtle differences as well.



Reaching through the keel pocket from the rear, attach the cross-spar pull-back wire to the channel with a pip pin. Attach the struts, making sure they are in the proper position (some rotation of the wing may be required here for proper alignment). The struts are marked right or left on the top side. Next insert and attach the fiberglass tips. Starting with the No. 1 rib, install the upper surface ribs, proceeding from keel to tip. Then, install the lower surface ribs and secure the wash-out struts. Moving to the rear of the glider, reach through the keel pocket and pivot the keel post to vertical; attach the rear support string, positioning it into the keel sail grommet and secure with the safety ring. Attach the king post to the cross-spar with the pip pin, and close

the bottom surface access. Finally, insert the nose rib, check the hang loop, perform a thorough pre-flight, and you are ready to go.

Air frame components for the Dawn are fabricated from 6061-T6 anodized tubing. All plates and brackets are stainless steel except for the nose plate which is made from 1/4" anodized aluminum. All frame members are equipped with lathe-turned Delron end plugs. The front section leading edges are 1 1/8" X .049 X 6 feet. The rear section leading edges are 1 3/4" X .049 X 11' 7 1/4 inches. The keel is 1 1/2" X .049 X 10 feet; cross-spar is 1 3/4" X .049 X 10' 8 inches, sleeved.

The struts are of a composite construction with 3/4" X .058 aluminum tubing serving as the inner sleeve. The outer sleeve material is a 7/8" X 2 1/4" X .049 aluminum extrusion in a symmetrical airfoil shape. This assembly is pop riveted together for rigidity. The assembly mounts to the control frame and cross-spar with clevis pins and safeties.

The control bar down tubes are 1 1/8" X .058 X 63" with 3 foot innersleeves. The base tube is 1 1/8" X .058 X 64 inches, also innersleeved.



The front to rear flying wires are 3/32" coated stainless steel cable and are the only wires visible on the Dawn in its flying configuration.

Sail construction is a chordwise layout. All Dawn top surfaces are available in white only. The bottom surface and leading edge pockets can be ordered in any color, including spectrum cloth. The sail on the glider flown in this evaluation started life with a few wrinkles. These were "ironed out" through minor tuning and thereafter the sail remained "clean" throughout the speed range.

In flight, the trailing edge of the Dawn takes on a distinctive appearance. Most observers will be of the opinion that this design has "lots of twist," and the several degrees of dihedral in the frame is one reason. Another can be found in the shape of the leading edges. Comets and similar designs use leading edge pre-loads to limit twist. No pre-load is used on the Dawn's leading edges, and they remain nearly straight in flight. This accounts for the unusual appearance.

Although the Dawn is strikingly different in looks, I found it to be both strong and stable, an opinion reinforced by HGMA Certification compliance. In-flight operation and handling of this design are "conventional" in every way; set-up and break-down are only slightly different, and can be performed in a comparable length of time to other double surface gliders.

Of the many advanced pilots introduced to the Dawn throughout the course of this evaluation, some loved it... some were not so impressed. Some comments heard from pilots inspecting the Dawn for the first time were enthusiastically positive; on the other hand, a fair percentage were basically negative in their attitudes and comments. For the record, the pilots that had an opportunity to fly the Dawn in the best conditions with the longest flights were the most impressed with this new concept. Those flying in poor conditions with short flights were not overly excited. All in all, the comment most often heard from pilots upon landing the Dawn was something like, "Nice little glider!"

Personally, I enjoyed flying this new "machine" very much. I consider the Dawn to be easy to fly, strong, stable and efficient. Aesthetically, the Dawn is unique, and to me, appealing. Structurally, the Dawn is equally unique, and may signal the start of a new era in high strength/low drag designs of the future. The Dawn is the first design in years to break through the surface tension of industry design conformity. It may prove to be the catalyst that elevates hang gliding into the thermal of more aircraft-oriented enlightenment.

Credit goes to Progressive Aircraft Company and designer, Dick Boone, for having the courage and ambition to dare to be different.

Only time — or perhaps in this case more accurately stated, "airtime" — can prove or disprove the success of this innovative design. §

BOX SCORES

PROGRESSIVE AIRCRAFT CO. DAWN
[1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent]

GENERAL CHARACTERISTICS

Set-up Times/Ease	5
Ground Handling	5
Static Balance	5
Frame Hardware/Finish	4
Sail Quality/Craftsmanship	4

FLIGHT CHARACTERISTICS

Handling — Low Air Speeds	4
Handling — High Air Speeds	4
Bar Pressure — Roll	4
Bar Pressure — Pitch	3
Roll Control Initiation	4
Roll Reversal (45° to 45°)	4
Yaw Stability	5
Turn Coordination	5
Speed Range	4
Sink Rate Performance	5
Glide Angle Performance	4

LANDING CHARACTERISTICS

Flare Authority	5
Parachutability	4
Directional Control at Mush Speeds	4

TECHNICAL SPECIFICATIONS — DAWN 155

Sail Area	147 ft ²
Root Chord Length	7' 2"
Nose Angle	130°
Pilot Weight Range	150-200 pounds
Leading Edges	16' 6"
Wing Span	33' 4"
Weight	63 pounds
Hang Rating Required	III-V

NOTE: Evaluators hook-in weight is 175 pounds, with a wing loading of 1.6 lbs/ft²
Stall Speed at 16 mph — Top Speed at 47 mph

POWER STEERING SYSTEMS

MODERN DAY SUPERSHIPS have developed better performance but this has generally been comprised by impaired handling characteristics. In this issue we'll compare and discuss several "power steering" systems that European manufacturers have developed to combat this problem. We'll also introduce you to a relatively new and very popular aerodynamic harness that is sweeping Europe. And you'll read a few new tidbits of information on developing foot-launched sailplanes here in Europe!

POWER STEERING SYSTEMS

The three systems generally used in Europe are the *Harryco*, the *French Connection*, and the *Magic Roller*. These systems do differ in some respects but they all have one principle in common: the real or effective hang point is located above the keel.

In the *Harryco* (figures 2 & 6), developed by Harry Sawatzki of Liechtenstein, the effect is exactly the same as having a bigger A-frame. On many gliders, this may not be possible, nor in the case of smaller pilot, is it desirable.

The effect of reducing control forces on a *Harryco* is not as powerful as on a *French Connection* (figure 3) or a *Magic Roller* (figure 4). The movement around the hangpoint is still on a circular line (that is, the more the pilot moves his weight out of the center, the more force is required), however, this circular movement has a larger radius. A convenient way to understand this force is to represent it by contrasting the differences in the angles in the ordinary A-frame (figure 1 -- dotted line), and in alternate hang point location constructions (figures 2 & 3).

The *Harryco* consists of two steel plates, firmly fixed to the keel by machined aluminum blocks; it is also torsion-free. You do *not* drill any holes into your glider's tubing as it all attaches with nuts and bolts. Looking at the photos, you can see that it folds easily by removing the bolt with the wing nut on it, dropping down to the level of the keel. You should probably pad it,

however, as you do have some prominent pressure points such as the keel blocks, and metal nuts to gnaw on the sail during ground transport.

The two plates are wide enough to allow the keel pocket to pass between them, which is sometimes necessary. For example, this is the situation if one uses the recommended 40 mm [1 3/4"] forward hang point on a 185 *Magic III*. It does not seem to limit the lateral movement of the keel pocket.

The *Harryco* works by lengthening the suspension between pilot and hang point, which in essence decreases the angle (figure 2) the pilot must make between himself and the center of gravity when he makes a turn. Also, the *Harryco* has a torsioning effect on the keel when the pilot shifts laterally, which is transferred to the leading edge. Depending on this length of the suspension and width of lateral shift, this can reach 15 kilopounds (Kp), making a force of up to 500 grams [18 lbs] on the tip of the leading edge. . . enough to increase the bank of a turning glider without more bar pressure. This is a similar force to what you would have if you put an eighteen pound weight on one wingtip.

The *Harryco* subjectively decreases control forces about two thirds as much as a *French Connection*, but it is simpler, has less air resistance, costs about half as much, and is not in the way in a crash. One disadvantage *may be* the shear loads it places on the keel, that could harm it in the long run. Sawatzki himself does not feel this is a problem, as he states torque is applied to the keel only at the initiation of a turn, as the pilot soon returns to center afterward. He trusts his system enough to do loops with it on a *Saphir* (crossbar-less glider somewhat similar to the old *Stratus*).

Sawatzki currently makes ten different *Harrycos* as one type will not work for all gliders. He has models for the *Streak*, *Duck*, *Sensor*, *Magic*, and *Comet*, among others sold in Europe. He has a European patent and will have one for the USA by the time you read this article. Should any

reader be interested in purchasing plans (knowing that use of incorrect design or materials could be deadly), or for dealer inquiries, you may write: Harry Sawatzki, Postfach 646 FL, 9490 Vaduz, Liechtenstein.

Some European manufacturers suspend a hang point from the kingpost when it is over the normal suspension point, saving additional *Harryco* hardware. However, there is a disadvantage in that while the *Harryco* needs only 10 cm [4"] of distance above the keel, you may need to raise a suspension point of 20 c. or twice as high above the keel to get the same effect. Apparently, raising hang points higher than this makes the gliders "too responsive" (!). Also, your range of pitch may be limited at some point by the downtubes. Of course, when the kingpost is *not* over the suspension point, you need to use a *Harryco* or other system. Systems using the kingpost must reinforce it; sometimes you may need to reinforce your keel also, as you are generally moving pressures forward along your keel. As always, you should use back-up suspension loops with these devices, as with any others.

The *French Connection*, or *PAF* (Point d'Ancre Flottant, translates to floating hangpoint) can decrease control efforts even more than a *Harryco*, but you have to be careful not to allow too great a range of movement outside of the center of gravity or the glider will be unstable, possibly tending to spiral inwards. There is no *increase* in control force input as the pilot moves out of center, because the pilot's weight is moved along a horizontal line from A to B (see figure 3). This can be combined to a "double PAF" or "PIF-PAF," for pitch and roll effectiveness. Some disadvantages are that roll *French Connections* can only be fitted to certain gliders (standard fitting on the *La Mouette Profil*), plus, it increases drag, cannot stay with the glider when folded, induces torque on the keel, and the wide A-frame is more difficult to ground handle.

Looking at figure 4, the *Magic Roller* — developed by Airwave Director, Rory Carter — has the same principle as the *French Connection*. In fact, the A-frame itself becomes the *French Connection*.

The whole system itself can rotate about the keel and the down tubes are connected in such a manner that the bottom ends could move laterally or forward and backward if they were not connected to the lower rigging. Special bearings for the *Roller* had to be created to allow such movements. Additionally, the aft lower rigging must be changed when using a *Roller*, to an inverted "Y" shape, with the two rear ends connecting to a single nine-inch cable. This allows the keel to move back and forth laterally at the rear (instead of in the middle) as the pilot shifts weight, thereby inducing a forced billow shift in the sail which further contributes to reduced roll pressures. These pressures

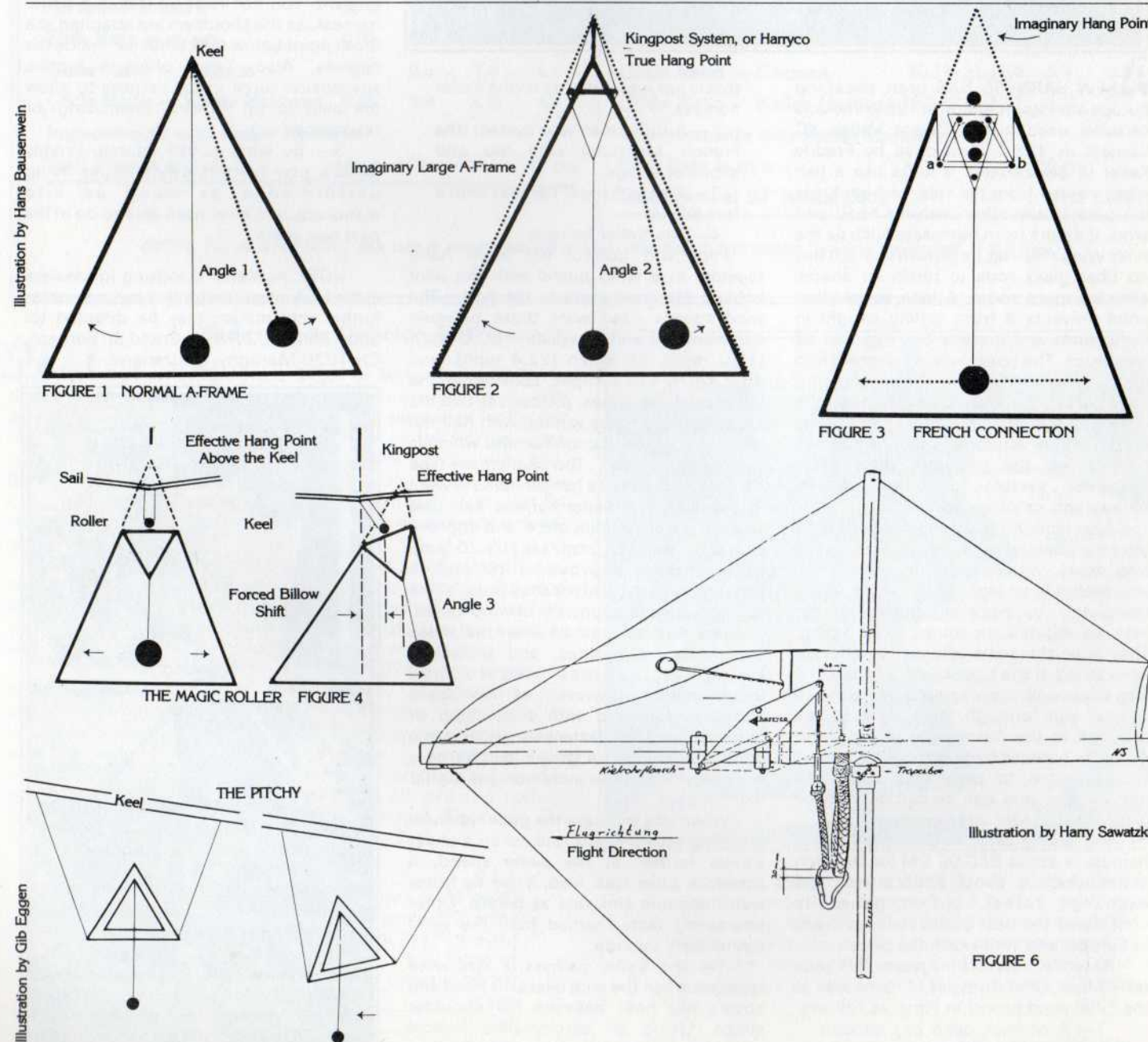
will not increase until the *Roller* has reached its lateral limits, and then pressures will not increase as much as in a normal A-frame, as you can see that the angle in figure 4 is smaller than the similar angle in figure 1.

This system is the most effective one for roll and gives the most "organic" in-flight feeling of all the power steering devices. It has the advantages of being "clean," it stays with the glider when folded, and induces no torque on the keel. A disadvantage is that one has to get used to the ground handling of the "floating A-frame." This system is only effective for reducing roll pressures.

The "Pitchy" (figure 5) is a fourth system recently developed by Michael Carnet in England, and is essentially a simplified *French Connection* for pitch only. It consists of two triangular metal plates (with the centers cut out) and a free-

swinging cable for the pilot to hook into, sandwiched between them and attached at the apex. The base of the triangle is initially parallel to the keel; it attaches to the keel with two straps, one for each corner, allowing the triangle to swing fore and aft. As the pilot moves forward or backward, the triangle tips forward or backward, moving the pilot in a horizontal plane. It easily detaches when folding the glider, but is also small enough to stay with it. It costs approximately the same as a *French Connection*.

In other systems not described above, we see further variations on the theme of *French Connections*, and the *Pitchy*. Note the *Speed Rail*, from Mission Soaring in California, and an alternative compound *French Connection*, which appeared on a Swiss *Cama* glider in the 1984 European Championships in Norway (Oct '84 *Whale Air*).





(Left) Rike Markmann demos the Keller harness with doors zippered closed. (Below) Rolf Markmann shows the harness in its carrying configuration.

the same. Keller offers an elastic attachment piece that seals around the neck and wrists, producing the ultimate in thermal protection and streamlining.

2— Raising yourself twenty degrees up from horizontal will cost you half a glide point at 60 km/h [37½ mph] (again, theoretical valuation). This does not usually happen at normal flight speeds, but when you pull forward to achieve high speed, your body will probably raise up into the air stream unless you are using a French Connection or similar steering device that allows your hang point to shift forward. You can raise up less in a Keller harness, as the shoulders are attached at a lower point below the carabiner, inside the harness. Also, Keller offers a mobile suspension point in the harness to allow the pilot to tip forward, minimizing air resistance.

3— By wind tunnel figures, Freddy Keller's new harness may improve flying performance as much as kite manufacturers have been able to do in the past two years.

NOTE: As Keller is looking for dealers in the USA, inquiries for this purpose or for further information may be directed to: Sport Keller, 63 Ave du Grand St. Bernard, CH 1920 Martigny, Switzerland. §



A NEW HARNESS HAS been sweeping Europe after its inception in 1983, and was certainly used in the Owens Valley XC Contest in 1984. Developed by Freddy Keller in Switzerland, it looks like a fish when viewed from the side, and encloses the pilot totally other than his head and arms. It differs from harnesses such as the Wills Wing/Pfeiffer Bulletman in that it has no fiber glass rods to retain its shape, allowing more room. A lone suspension point prevents it from getting caught in flying wires and thereby also has less air resistance. The parachute is integrated into the harness at the belly. Below this is a large packsack pocket. Over the parachute is another pocket with a zipper for carrying knives, safety equipment, etc. Inside the harness at the shoulder level is a suspension system for oxygen flasks, barograph, or other gear.

After launching, your feet fit easily one after the other into the harness through its trap doors, which close smoothly when you extend your legs. You shut the doors completely by zippering them together with an ingeniously-routed draw string. They open the same way with a different draw string. If the zipper gets jammed, the trap doors will open completely if pushed against with enough force, as they are attached to the harness by velcro. After flying the harness folds into itself, provides enough room to carry your vario and helmet, etc., and can be carried with an included shoulder strap.

The asking price in Germany for this harness is about 850.00 DM (or Deutsch Marks which is about \$295 at Nov. '84 exchange rates), but is generally considered the best quality harness made in Europe, and well worth the price.

Recently, *Vol Libre* magazine of France tested four different types of harnesses at the Eiffel wind tunnel in Paris, as follows:

1— A normal, open bag cocoon harness with ten suspension points, with the parachute attached outside,

that is not integrated as on the Keller harness.

2— A Bulletman-type system (the French Magnum) with hip and shoulder straps.

3— A knee hanger harness with a foot stirrup.

4— The Keller harness.

Pilot and control bar were hung together in a wind tunnel with the pilot holding his arms close to the body. The wind speeds used were those between minimum sink and best glide — 30.6 km/h [19.0 mph], 36 km/h [22.4 mph], and 43.2 km/h [26.8 mph]. Looking at the tables on these pages, you can see that the Keller harness is the winner, with half the resistance of the cocoon harness which is the overall loser! The Bulletman-type harness and the knee hanger harness were in between. The Keller harness can give you ½ to 1 glide point more, and improve your sink rate 5 to 10 cm/sec [10-20 fpm]. Performance improvements are in proportion to the glider capabilities, since air resistance is a function of wind speed. Readers must also remain aware that these are theoretical figures, and individual flying styles may negate any improvements. However, as resistance increases four-fold with a doubling of forward speed, the faster your glider is, the more improvement a streamlined harness will give you at these incrementally higher flight speeds.

When you increase the glide ratio you also decrease the sink rate; when a glider travels farther at the same speed, it therefore sinks less. Also, it can fly faster with the same sink rate as before. Other interesting facts learned from the wind tunnel tests include:

1— The Keller harness is less wind resistant when the pilot raises his head and covers the hole between his shoulder straps. Using an aerodynamic helmet with a tail on it would help, or extending the harness forward at the shoulders might do

TABLE 1
WIND TUNNEL TESTS COMMISSIONED BY VOL LIBRE MAGAZINE

(Figures Indicate Total Measured Air Resistance)

Airspeed	8.50 m/sec (30.6 km/h) (19 mph)	10 m/sec (36 km/h) (22.4 mph)	12 m/sec (43.6 km/h) (27.1 mph)	12 m/sec raised head	12 m/sec body raised by 20°
Price Cocoon Harness	1.11 kg	1.51 kg	1.98 kg	1.97 kg	---
Keller Integral (fish) Harness	0.51 kg	0.76 kg	1.05 kg	0.98 kg	---
Magnum (Bulletman-type) Harness	0.63 kg	0.89 kg	1.23 kg	1.13 kg	---
La Mouette Knee Hanger Harness	0.62 kg	0.86 kg	1.26 kg	1.29 kg	1.80 kg

TABLE 2

KELLER HARNESS IMPROVEMENTS WITH A COMET 1

Airspeed in km/h	30.6	36.0	44.0	60.0
Sink Rate in m/sec	0.95	1.05	1.60	3.80
Glide Ratio — Cocoon	9.0	9.5	7.6	4.4
Glide Ratio — Keller Harness	9.45	9.9	8.15	4.9
Improvement with Keller Harness				
Sink Rate in m/sec	+4 cm	+5 cm	+10 cm	+40 cm

TABLE 3

KELLER HARNESS IMPROVEMENTS WITH BULLET C

Airspeed in km/h	36-40	44	60	80
Sink Rate in m/sec	0.95	1.0	2.9	7.5
Glide Ratio — Cocoon	10-11	11-11.5	5.7	3.0
Glide Ratio — Keller Harness	10.7-12	12-12.7	6.2	3.3
Improvements with Keller Harness				
Sink Rate in m/sec	+8 cm	+12 cm	+30 cm	---
Glide/Sink at 20° Raised Body	---	---	5.1/3.2	2.8/8.3

(NOTE: For all three tables, sink rate in meters/second can be converted to feet/minute by using 1 meter/sec. = 200 fpm.)

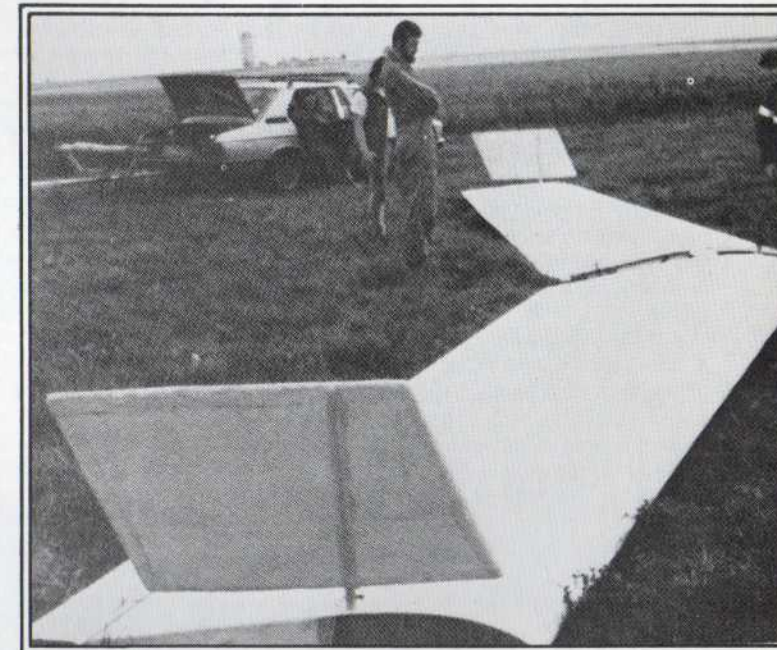
(Right) Ludwig Thalhofer's Bluff monowing

WATCH OUT AMERICA! Hans Gygax of Switzerland, UP in the States, Tim Morley and others have been experimenting with aerodynamically controlled foot-launchable sailplanes for the last few years, and with the books and articles on the Horten wings becoming available, interest has been explosive. Very early in 1984, German glider manufacturer, Ludwig Thalhofer — builder of the Cloud gliders — started designing a Nurflugel (the Bluff, see Oct '84 *Whole Air*), stemming from ideas born when he developed his three-axis Bronco ultralight.

Well, he's already flown the Bluff. It has a GFK plastic frame, coated in fabric the usual way. The pilot lies between the wing halves. In silence and away from the public, the Bluff's first flight (by tow rope) was without problems, and fully satisfactory for Thalhofer and Hans Langer, his test pilot and fellow manufacturer.

The profile for the wing — called 624-626 — was developed by Professor Eppler from the University of Stuttgart. His performance figures were partly confirmed in slow flight. Thalhofer is now ready for the test wagon, and if all is okay there, he will go for the first lengthy trial flights. The glider is aerodynamically controlled through a joy stick, and plans are to produce it in series in the spring of 1985. The word is that if his price is halfway reasonable, his shop will be attacked in Nürtingen (Germany). The production model should have the following data:

Glide Ratio.....	23:1
Sink.....	0.65 m/sec @ 50 km [130 fpm @ 31 mph]
V min.....	35 km/h [22 mph]
V max.....	180 km/h (!) [113 mph]
Wingspan.....	11.5 m [37¾ ft]
Wing Area.....	17 m² [183 ft²]
Nose Angle.....	148°
Washout Angle.....	4.5°
Aspect Ratio.....	7:1
Weight.....	40 kg [88 lbs]



I am also in contact with Dr. von Rath in West Germany, who has designed and built a modified Horten wing, which has already been flown three times in Switzerland, and is definitely foot-launchable. He has promised me a full report of the history and development of this wing for the next issue of *Whole Air!*

AUF WIEDERSEHEN!
—Gib Eggen, D.O.

MITCHELL WING

Chuck Rhodes' epic story of the "Mitchell Wing Legacy" begins Part 1 of a two-part feature covering the history of the famous high performance wing and names who first dared fly one.



SOME YEARS AGO Howard Long had a vision. Long, a medical doctor living near San Francisco, was one of those early enthusiasts of hang gliding who hung out at Fort Funston and other bay Area sites in search of flight. Yet, there was something unique about Howard as he marched to a different beat... or wished to at least. Not satisfied with being just one of the standard Rogallo pilots, he dreamed of high performance hang gliding. His fantasy was to fly a totally unique and radically different type of foot-launched glider.

During the month of February, 1976 at a farmers field near his home in Pleasanton, California, Howard Long was seen climbing into a strange new and exotic looking flying wing. With his head sticking up through a clear plastic bubble canopy on the wing's upper surface, he took a few steps down the gradual slope, lifted off the ground, and flew into hang gliding history. The first flight of the Mitchell Wing was over and the legacy of the Mitchell Wing was born!

Some time prior to this flight, Dr. Long had a patient named Don Mitchell. Mitchell was a retired aerodynamicist who had worked for Northrop and helped develop the fabled Northrop Flying Wing Bombers. Prior to World War II, Mitchell was an active homebuilt sailplane enthusiast, and had built and flown both tailless flying wing gliders and conventional gliders. When Dr. Long met Mitchell and learned of his past exploits and experience with gliders, he

asked Don if he could build a scaled-down version of his three hundred pound, foot-launch and -landable flying wing glider. Mitchell eagerly took on the task. His health began to improve significantly according to Dr. Long, as he now had a fascinating project to occupy his time and interest.

Within six months, Mitchell completed the wing and notified Long that it was ready. The prototype Mitchell Wing was a seventy pound version of the 300-pounder. Sporting a 34 foot span, the 132 ft², cantilevered wing was built of spruce and doped fabric covering in the classic wood aircraft construction style that Mitchell knew so well. He chose a 230-15 airfoil which would add great strength in the spar and still be light enough for foot-launching. It also allowed a wider speed range both top and low end, thus yielding a gentle stall characteristic so necessary for the safety of the foot-launched pilot at the low speeds typical of foot-launching and landing.

He also chose a swept wing planform with a nearly straight trailing edge because it promised the best stability and control with his "stabilators" or "elevons" (combination ailerons and horizontal elevators). These control devices were hung below the trailing edge of the outer wing panels so that pitch and roll authority could be realized even in stall situations.

Long desired that the pilot be up inside the wing supported by hang tubes which would allow rapid running and excellent

center of gravity control. His clear vinyl canopy also served as a means of supporting the wings weight by resting it on his head until he had enough speed through running for the wing to support itself. "About three steps..." according to Howard, is all it took to launch. Twist grips on the hang tubes activated the saw-toothed differential spoilers used for roll initiation and L/D reduction. A right-hand stick activated the elevons.

On the first day of test flying, seven flights were made including one by Steve Patmont. Steve was another local pilot who had taught Howard to fly his Icarus II tailless flying bi-wing glider to familiarize him with hang tube type flying. All the Mitchell Wing test flights exceeded Mitchell's expectations for performance and Long's eight millimeter movies of the initial flights frequently show Don grinning from ear to ear. Obviously, he was happy about the way his wing was flying! Long was even able to kick his feet up on the forward axle the first day demonstrating the great 16:1-plus glide of the prototype.

By the second weekend, Howard demonstrated no-wind takeoffs, the use of the seat, and was making flights off the 1,000-2,000 foot Pleasanton Ridge, confirming the great glide, stability, and control of the wing. Patmont also made a flight that day off the 2,000 foot site, additionally confirming the great performance of the wing.

Howard went on test flying and amazing the hang gliding world with the

performance of his Mitchell Wing. At the 1976 Escape Country Hang Ten World Open Hang Glider Championships, Howard was the star of the show. There he flew the wing ten miles north from Saddleback Mountain, his longest flight in the prototype, launched and soared in 30+ mph winds when rogallos were unable to fly, and proved the wing could be spot landed, although not always gracefully. The thirty mile an hour wind flight is interesting as it really demonstrated the high wind penetration ability of the wing. At one point he flew way downwind from the landing area. Pilots were placing bets that he would never make it back to the landing area under the high headwind conditions. The Mitchell Wing did, easily, to the "... cheers of the spectators for the future of hang gliding," reported Dr. Long.

Howard went on flying until the prototype was fatally damaged after an unseen rock caught the tip at Mt. Hull, cartwheeling the wing and breaking both main spars. It now rests quietly in Long's garage, half rotted and mildewed, but still able to hold any present day Mitchell Wing pilot in awe when contemplation of its past is pondered.

The prototype was gone but the legacy of the Mitchell Wing had just begun.

Steve Patmont went on to fly Mitchell Wing #2 and more, eventually becoming the first to put an engine on one. Thus the famous B-10 ultralight was born. Patmont pretty much abandoned Mitchell Wing hang gliding after that and devoted his full

time to promotion of the ultralight B-10.

Brad White of Anaheim, California was probably the most well-known of the early Mitchell Wing pilots before George Worthington. He built two wings between 1976 and 1978 and served as the Mitchell Aircraft factory demonstration pilot. His talents as an artist were readily evident upon viewing his intricately and beautifully painted Mitchell Wings. White won the 1977 National Hang Glider Championships at Heavener, Oklahoma flying his Mitchell Wing and was frequently seen flying the wing throughout Southern California. This factor combined with his Nationals win further established the performance and legacy of the Mitchell Wing. Brad also eventually turned to motorizing his Mitchell Wing which ended in near disaster for him. While engine-off thermalling at approximately 18,000 feet ASL in the Owens Valley, his wing underwent structural failure apparently resulting from excessive G-loading during a spiral dive, after he succumbed to hypoxia. Luckily, he had just purchased a parachute the day before from Jim Handbury which lowered him safely back to earth with only minor injuries. He quit flying hang gliders and ultralights for several years after that, but is now an active Lazair ultralight pilot.

The true impact of the Mitchell Wing was not felt until the late, great George Worthington started flying his in search of records (which would finally be chronicled in his book titled: "In Search of World

Records"). Worthington, a former Naval aviator and champion sailplane pilot, heard of the Mitchell Wing and became very intrigued with the stories of its performance. Then he was fortunate enough to watch Dr. Long fly the prototype Mitchell Wing at the 1976 Escape Country meet and was so fascinated with it that he ordered one immediately. Six months later it was ready and George took delivery of Mitchell Wing #3 in late 1976. George's wing came as the other original Mitchell Wings, without rudders, and employing only differentially-activated spoilers for yaw/roll coupling. However, during the time that George was waiting for his Mitchell Wing, most of the other original Mitchell Wings, including Long's, had experienced stall/spin accidents on takeoff or near the ground on final.

George felt that the use of the spoilers only for initiating roll had actually caused the accidents. He figured that the outboard wing panels stalled due to the gross interruption of the air flow over the outer wings resulting from spoiler activation, at low speeds typical of takeoff and landing. At first wishing he had not ordered the wing but not wanting to backout on the deal, he reluctantly took delivery of the wing and waited. Finally he convinced Mitchell to build wing tip drag rudders for yaw/roll coupling and armed with this new control method, Worthington proceeded to set every available F.A.I. official hang gliding record with his Mitchell Wing while flying in the Owens Valley. Those records

photo by Bettina Gray

Mitchell Wing pioneer pilot Brad White flies one of the models after the addition of drag rudders

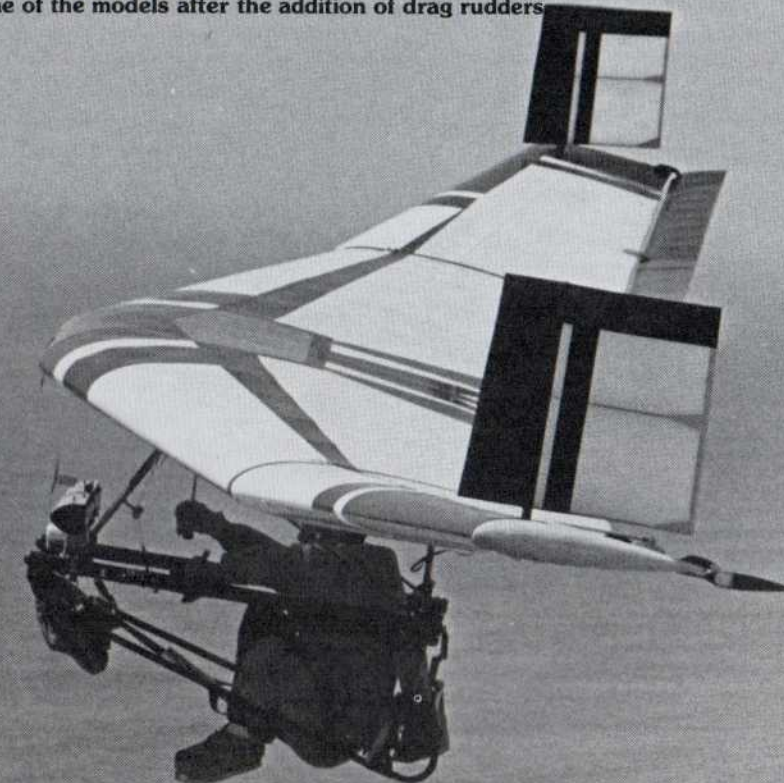


photo by Bettina Gray

still stand today for the rigid wing class!

By 1980 when Worthington set his last record with the wing, he was the only one in the world flying a Mitchell Wing as a hang glider. All the other foot-launched pilots had converted to motorized Mitchell Wing flying or were out of flying altogether. Howard Long had experimented some with his Sky Ski (pilot semi-enclosed) Mitchell Wing and Brad White had quit flying after his accident in the Owens while thermalling his motorized B-10.

Why?

The foot-launched Mitchell Wing faded out of the scene for a number of reasons. Rogallo gliders were finally

the Mitchell Wing, with only one flying as a hang glider, very few people had ever encountered the opportunity to watch one fly and thus the "...out of sight; out of mind..." concept aided lost interest. Also the thought of three-axis control was just too radical and foreign to most hang glider pilots to develop any real interest. Then came George...!

"He flew the Mitchell Wing because he was a super pilot with abilities way beyond the vast majority of hang glider pilots. When pilots talk turned to the Mitchell Wing the feelings of most pilots could be summed as, "...only he was able to safely fly and set those world records because of

As a former Icarus V pilot who in 1980 was sitting on an aircraft carrier in the middle of the Mediterranean Sea, my frustration for flying was at an all-time high. Having joined the Navy to get an education, not necessarily to see the world, my hang gliding time was severely cut back. However, my love for rigid wing hang gliders was still incessant ever since the Icarus V days of 1975-1976.

There was something unique about their design, aerodynamic controls, and performance that fascinated me more than rogallo gliders. Having seen the prototype Mitchell Wing fly at the hands of Dr. Long at the 76 Escape Country meet, like George

photo by Bertina Gray

greatly but total three-axis control was still foreign to me. The joy stick was not being used for the early training flights as I was using weight shift for pitch and rudders for roll as the only two control mechanisms. On August 28, 1982, my first high flight in the Mitchell Wing occurred at Crestline. Lasting about an hour and a half, using full three-axis control, and with other pilots flying and competing in the U. S. Nationals, the outstanding performance of the Mitchell Wing was amazing to me. Its vastly superior cruising speed and L/D were all too evident.

"What a wing!" Excited beyond belief, I attempted to regain the lost interest in the

areas.

The fact that my flying skills were far less than those of Worthington's also helped others interested in the Mitchell Wing to become convinced that the wing could be flown safely without having the thousands of hours of powered aircraft and sailplane experience which Worthington's logbooks showed.

The Mitchell Wing continued to thrill me with some really outstanding flights which further fueled the fire of interest in flying it. Letter and calls began coming in from all over the world inquiring about the Mitchell Wing and soon the exciting news came of 7-8 wings actually under

second version of his original prototype; and the latest arrival, brain child of Tim Morley...the prone Mitchell Wing.

It is important to note here that the much-talked-about Morley/Mitchell U-2 is still in the final construction phase. It has never been flown. It is near completion, however, and may be flying by the time this is read. The wing Tim Morley used to perform his original flight testing was his standard B-10, modified with prone flying mechanisms. Using this wing to test and prove the feasibility of Prone Mitchell Wing flying, Tim quickly realized that the pilot not trained in full three-axis controlled aircraft flying could make a much easier

Expert George Worthington pilots his Mitchell Wing at Torrey Pines in August of 1976



Author Chuck Rhodes pilots his Mitchell Wing at Crestline in 1983/photo by Randy Milbrath



getting some decent performance, equalling or bettering the performance of the early rigid wings. Rigid wings were harder to transport and more fragile, plus they were more difficult to repair, let alone you had to build it in the first place, there being no "used Mitchell Wing market."

So flyers felt, "Why hassle with them?" Cross country flying was just starting to gain big interest while most hang glider pilots were content to just be flying. Who needed super cross country ships? As for

all his tremendous sailplane experience."

No doubt Worthington was a super pilot, but misconceptions that only a man with his ability could fly a Mitchell Wing appeared to prevail, thus further discouraging any *real* desires to learn to fly one. The Mitchell Wing seemed doomed to obscurity, as a hang glider too far advanced for its time.

RENAISSANCE OF THE MITCHELL WING

Worthington, I also knew I had to get one. Six years later after moving to San Pedro, California and finally getting back into flying, I was looking for a combination hang glider/ultralight. After reading George Worthington's ad in *Hang Gliding* magazine that his wing was for sale, the renaissance of the Mitchell Wing hang glider began.

Purchasing the wing in April of 1982, learning to fly it occupied most of July 1982. The Icarus V experience helped

Mitchell Wing by writing articles about its performance and telling all who cared to listen. It quickly became apparent that by 1982, cross country fever was at an all time high and great new advances in rogallo hang glider performance were at an all time low. Flyers wanted all-out cross country performance and suddenly interest in the Mitchell Wing was on the rise. Additionally, some of the myths about the difficulty in flying the Mitchell Wing and landing it were disappearing. Making consistently good landings in 3-4 mph winds and utilizing both rudders as dive brakes, or spoilers simultaneously, the Mitchell Wing was able to land in very small landing areas. Worthington had everyone scared into thinking that you needed a large, open, flat area to land, yet he never used rudders or spoilers as dive brakes to get him down into such small

construction for use as hang gliders. Almost every pilot who wrote and/or was building a wing also flew a rogallo glider, yet each one expressed boredom with the limited performance of their "state-of-the-art" double surface rogallios. A widely increased speed range, especially top end and L/D cruising speed with a significant increase in L/D was what they sought. The knew the Mitchell Wing could offer them that advantage and they were willing to sacrifice the rogallo ease of portability and put up with the other rigid wing disadvantages to obtain that performance.

THE MITCHELL WINGS

At present there are three main versions of the Mitchell Wing hang glider or foot-launched sailplanes: the standard B-10 which has been around since the beginning; Howard Long's Sky Ski, a

transformation to the high performance Mitchell Wing.

Now a level 4 rogallo pilot with a few hours in a Fledgling could fly a prone Mitchell Wing using his or her existing skill and not have to worry about a joy stick actuated three-axis control system.

TO
BE
CONTINUED

In March's installment of Chuck Rhodes' "Mitchell Wing Legacy," read about all the details and spec's of each model of the incredible Mitchell Wings. Enjoy actual flight accounts for all versions, as Rhodes' epic "Mitchell Wing Legacy" continues. . §

UPDATES... GLIDER UPDATES... GLIDE

Can't muster the bucks for that new double surface super ship? Then update the old one! Incorporate these current glider stock features into your vintage model D.S. glider and improve its performance, appearance and resale value.

Half batten pockets 4/side (batten stock not included) \$150.00	Lower Surface Zippers \$45.00
Nose Cones \$45.00	Tip Strips \$45.00
		(Helps prevent and eliminate tip panel flutter)	

Plus other features to fully update your make of glider. Typical package price for all of the above **\$250.00**

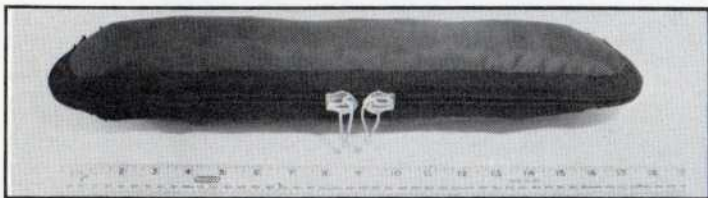
Also! - TRAILING EDGE REPLACEMENTS

Replace your tired 3.8 oz. T.E. with one of 4.5 oz. Dacron for revitalized performance and energy retention. **\$250.00**

Whether your needs are sail repair, updates or both, for a prompt response deal directly with the sailmaker who works on your valued glider.

Dennis van Dam-Owner/Sailmaker

Aerial Dynamics SAIL REPAIR FOR HANG GLIDERS
P.O. Box 151 Wildwood, GA 30757 (404) 820-1962



SELF-CONTAINED CROSS COUNTRY GLIDER BAGS

A must for the serious minded X-C pilot! This glider-brand tailored innovation weighs only 1 1/4 LBS and measures 17" long by 3" diameter when zippered into itself. Made from 1.9 OZ ripstop (white only) with a UV coating. Comes with ripstop batten bag and 8 OZ Pak cloth doublers and pads where required. Stows conveniently on glider or harness. **RETAIL PRICE - \$59.00.** Dealer Inquiries Invited.

Perfect Pitch.



Looking for simple, compact, stowable pitch control? Get a Speed Rail.™

Light pull-in, flat body attitude for improved performance. Landing flare-out without 'Lockup.' Static load tested to 10 G's.

Speed Rail

INTRODUCTORY PRICE: **\$68.00***

Mission Soaring Center

43551 MISSION BLVD., FREMONT, CA 94539
(415) 656-6656 * + \$3.00 Shipping, California residents add 6% tax.

dealer inquiries invited



Now get the complete book!

Hang Gliding According to Pfeiffer: Skills For the Advancing Pilot

Now available... the most comprehensive guide around for pilots seeking to expand their knowledge and skills. With 244 pages, 125 illustrations and photographs, loads of TRUE stories, and a complete subject index. You'll learn...

About soaring: Ridge, thermal, wave and other types of lift. Locating likely lift sources. "Reading" clouds. Soaring techniques for various kinds of lift.

About cross-country flying: XC potential of your area. Training and supplies for your ground crew. Advance planning. When THE day arrives. During the flight.

About competition flying: Competition formats and scoring systems. Psych-out techniques. Evaluating opponents. Strategies. Specific flying techniques.

About equipment: Choosing, caring for, and making best use of a glider, harness, parachute, instruments, and other equipment. Sail cloth tips.

About speed-to-fly calculations: Dolphin vs. classic flight. Your glider's polar. Techniques for gliding furthest, fastest. Speed rings.

Please rush me _____ copies of **Hang Gliding According to Pfeiffer: Skills For the Advancing Pilot** at \$9.95 each, including postage. (Californians please add \$.60 sales tax per copy.) Total enclosed: \$ _____

Name: _____

Street: _____

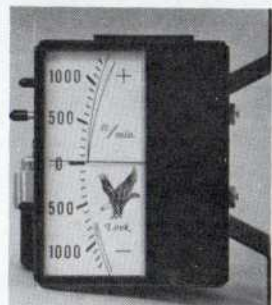
City: _____

State/Zip: _____

Make check payable to Publitec and mail with form to: Publitec Editions, P.O. Box 4342-20A, Laguna Beach, CA 92652, USA.

*** Dealer inquiries invited ***

THE LITEK VE-7 VARIOMETER



THE PRIMARY INSTRUMENT CARRIED BY PILOTS, WORLDWIDE

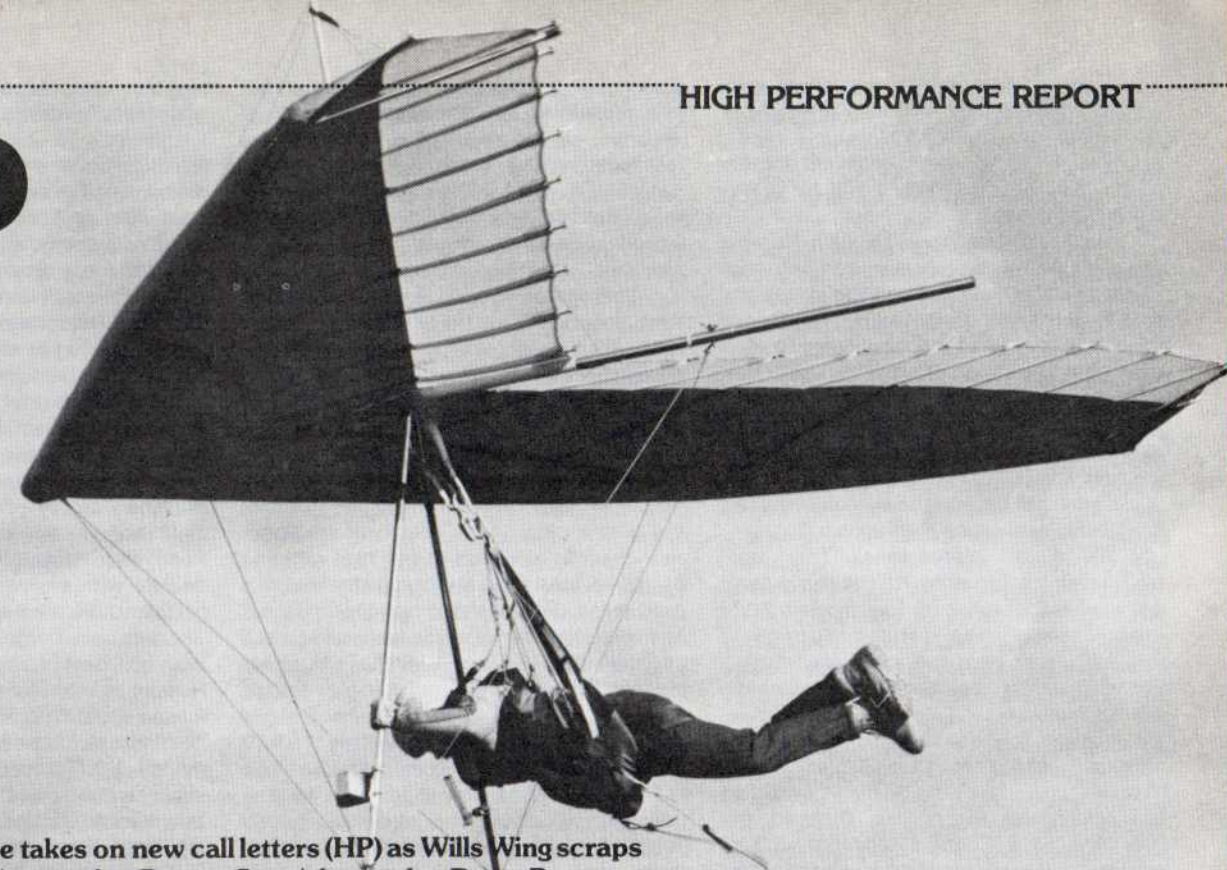
- IT HAS THE SAME PROVEN CIRCUITRY AND PERFORMANCE AS ITS PREDECESSOR THE VE-10, BUT IS SMALLER AND LIGHTER.
- SENSITIVITY IS NOW SCREW-DRIVER ADJUSTABLE.
- BY CASE DESIGN, THE VISUAL READOUT IS PROTECTED FROM SIDE-SWIPING BLOWS, A CAUSE OF MANY VE-10 REPAIRS SENT BACK TO US.
- AVAILABLE FROM YOUR LOCAL DEALER — \$198.00

LITEK

4326 FISH HATCHERY RD • GRANTS PASS, OR • 97527

HIGH PERFORMANCE REPORT

HP



High Performance takes on new call letters (HP) as Wills Wing scraps the keel pocket/report by Bruce Case/photos by Doug Barnette

I SIT DOWN to write this evaluation amidst much fear and trembling. I have just finished reading some of the correspondence between Dense Pages and Airwreck Fear, and I have come to realize that my literary skills are somewhat lacking. I have neither the wit of Mr. Pages, nor the nerve to enter the dark underworld of gonzo-journalism with Mr. Fear.

Make that "Mr. Fear, SIR." (I don't want any gorilla with one eye and steel teeth getting mad at me.)

Anyway, I seem to find myself much more comfortable with the style of *Dagnet's* Jack Webb: "Just the facts, ma'am." Well, the fact are these. I've been flying Wills Wing gliders in competitions for the last four or five years. I've flown quite a few other makes and models in that time, but Wills is the only brand I've owned lately or used for competition. So for those of you that think this kills any chance I ever had of writing objectively... well y' all can just go read the phone book or the road atlas, or where ever it is you go for "objective" information. Me? I'm just gonna sit down in front of this blasted typewriter and pound keys till I'm done. And along the way I'm gonna slide in a few editorial comments that I've just been dying to see in print, and there better not be any meatball editors with no thoughts of censorship. If I took this time to write it, they can darn well find the space to print it.

There. I feel better already.

Let's get the important stuff out of the way first. Just what the heck does "HP" stand for anyway? At its unveiling at the recent Nationals, there was no shortage of speculation, mainly from pilots on other brands. "High Priced? Habit Pforming? Handling Problems? Howard Pearson?" Kevin Kernohan has, to date, the best offering. He put on his best, totally mindless, made-for-television smile, and said, "Wills Wing pilots are Happy Pilots." If anyone can top that, I've got a lunched Thomen altimeter that's worth about three dollars. It's yours.

The truth is far less entertaining. Seems WW made up their mind to pursue the development of a truly High Performance glider, and the project just kind of got dubbed "HP." I think they should

have the lady on TV rename it. You know, the one that wants to change the name of "Almost Home" cookies to "Majestic Interlude?"

I got hold of the HP used in this evaluation the old fashioned way. I bought it. I arrived at the Nationals without any glider at all, but with plans to borrow Kernohan's 180 Attack Duck. The day before the meet, though, I managed to get a thirty minute ride on one of the prototype HP's. I liked it. A lot. However, there were only four HP's in existence at this time; two prototypes that were used in certification (and both spoken for), and production #s 1 and 2, which belonged to Steve Pearson and Rob Kells. Number 3 was the first available HP, and it wasn't slated to be done for several more days. So I did what

any mature, seasoned competition pilot would do. I sniveled.

"Come on, Uncle Rob, just this once? I promise I'll never even look at another glider. All the other kids have HP's; why can't I have one?"

Alas, the sniveling was in vain. Number 3 wasn't going to be ready until Thursday (2/3rds of the way through the meet), and that was that. So I went with Plan B, and tried to bribe a sail loft employee to work over the weekend. What love can't buy, money can. Tuesday morning saw me driving out to Crestline with number 3 strapped to the roof. Yes, Virginia, there is a Santa Claus.

Better get back to the evaluation. (This is a glider evaluation, remember?)

So. First impressions. The most obvious thing about the HP (on the ground anyway) is that it has no keel pocket. Aft of the crossbar, the keel is attached directly to the sail, just like the old "standards." Forward of that point, it is buried in the double surface.

I know the question in everybody's mind is, "How does it turn?" Very nicely, thank you. Seems the team of Pearson/Meier discovered that, in the presence of a floating crossbar, a keel pocket becomes largely superfluous. My, that's a big word. Can you say "superfluous?" I know you can.

Anyway, I found the absence of a keel pocket enhanced the visual appeal greatly. Even sitting on the ground, the HP looked

fast. The aesthetics are somewhat compromised, though, by the presence of an unusually tall kingpost (54 inches). This is because the crossbar/leading edge junction is eight inches further outboard than on the Duck. (A shorter kingpost would tend to overload the crossbar in negative loading situations.)

The sail on the HP is tight, very tight. With approximately thirty hours on mine, I have found no wrinkles, either on the ground or in flight. The hardware is typical Wills, and the overall impression is one of clean.

Set up is straight forward. The control frame is assembled with a single bolt/wingnut/safety combo; the kingpost fits over a plug on the keel, and the upper rear cable is attached to the keel with one of the keyhold tang attachments that Wills pioneered. The washout tips are installed, and the upper surface ribs are inserted and secured. The HP has eleven (11) upper surface ribs per side, including one "half rib" and the plug-in number 1s. Special care must be taken when inserting the #10 ribs (nearest the keel). They are quite close to the keel, and can easily have the camber reduced if they are indiscriminantly jammed in. I have found it best to insert these first, with the wings spread only about half way.

Now you get to tension the crossbar. This is the really fun part. What you do (at least on ole #3) is take the length of 505 leech line that is attached to the apex of the

control frame, route it forward through the shortest of three cables that connect to the crossbar, go back around the apex, through the short cable a second time, and tie a loop in the end big enough to put your foot through. Got that? Good. Now inhale deeply; clench the crossbar retaining bolt in your teeth; grasp both uprights firmly; place right foot in the loop; emit your most blood-curdling primal scream, and extend your right leg to draw the crossbar back. Ideally, this scream should resemble that of a man about to smash a cement block with his forehead. (If you're a Hang III, grunts are okay, but somewhat less impressive.) Assuming the bolt hasn't dropped out of your mouth, you insert it first through one cable, then through the keel, then through the final cable, and secure with a wingnut and safety.

Actually, the whole process can be accomplished with little or no effort, and with both feet planted firmly on the ground. But what you need to realize is that this whole ritual has been done for the benefit of the poor, bug-eyed owner of the 13-to-1, VG/VB/Tempercoat/Whizbang blade wing that's parked next to you. You want that sucker to know you're *mean!* (This is at the Nat's, remember?)

So anyway, you stuff a few undersurface battens (four per side), insert the plug-in #1s, add the nose rib and nose cone fairing, and you're done. For those of

you not quite ready to meet God, you may also wish to include a thorough preflight.

Ground handling is a snap. Static balance is very good, and the glider is lighter than one might expect. Certification weight is 66 pounds. My HP weighed in at 66½ pounds on my bathroom scale. That's honest weight, folks, which is not found in all of the ads out there. Willi Muller tells of visiting a certain manufacturer and stepping on the scale in the shop. It read 165 pounds. Willi weighs 190 pounds. "No vonder your gliders are so light!" crowed Willi. No vonder indeed.

Launch is typical of any state-of-the-art double surface. Hold the wing at a flying angle of attack, and run. If there ain't no wind, run harder. If you need more instruction that that, you're not ready for an HP.

So now you're in the air. Just what do you get for your \$2,500, anyway.

First, surprisingly good handling. With no keel pocket, I was genuinely concerned that the HP would turn out to be a board. Not so. I would rate the roll pressure/roll rate as being equal to or slightly lighter than most of the 180 Ducks I have flown. Don't ask me *why* this is so. I only know that it is so.

There are some differences though. For instance, when entering a thermal in a

Duck, I would normally slow the glider down almost immediately. However, with the HP, I found it best to make sure I was centered in the core for about half to three quarters of a turn before slowing it down noticeably. When I failed to do this, I found myself getting dumped over the edge more often than usual. Whether this is due to the craft or my inexperience on it, I don't know. Them's just the facts.

Once established in a thermal, though, the HP can be slowed down to a speed that has to be experienced to be believed. I won't test your credulity and tell you that I flew around in thermals with my arms fully extended, because I didn't. But I was able to slow to speeds I thought were the exclusive realm of single surface ships. At these speeds, roll authority is reduced but still present. There seems to be little tendency to drop a wing, and only minimal high-siding is necessary. The HP is certified as being capable of spinning only with the hands on the uprights. From what I experienced in the realm of slow flight/tight radius turns, I would concur.

The HP has another handling "quirk," albeit a minor one. At speeds between 35-40, it becomes quite sensitive to both pilot input and/or turbulence. More than once I found myself trying to dampen a minor oscillation, only to find that I aggravated it.

The odd part, though, is that at either a faster or slower airspeed, it becomes rock-solid. I eventually learned, when the yaw/roll oscillation began, to simply adjust speed 3-4 mph in either direction, and the HP would begin to track automatically. I think with a few more hours, I might learn to make it track in the 35-40 range also. Until then, I'll simply cruise between thermals at 41 instead of 34.

Which brings us to the next consideration — performance. First the bad news. In climb, the HP seemed only equal to or slightly better than any other pilot/glider combination that I encountered at the Nationals. That is to say, in the 12 to 15 hours that I got to thermal with the other pilots, no one climbed through the HP, and, on occasion, I would be able to climb through other gliders. Admittedly, such a comparison is subjective, and is affected as much or more by how well the glider is centered in the thermal, how much sleep the pilot got the night before, et cetera, than it is by pure sink rate. Nevertheless, all my experience at the Nat's leads me to conclude that no glider has an advantage over the HP, and in some cases, the HP may even have a slight edge. (One top pilot good-naturedly suggested that the reason the HP's were flying the course so fast and so low was that they couldn't climb. Kells then good-naturedly climbed through that boy twice on the same flight. The jokes ended.)

Realistically, though, the HP isn't magic. If you're at the bottom of the thermal in your present state-of-the-art craft, the HP won't make you King of the Hill. But if you're as good as the next guy... well, you won't have to worry about him climbing through you.

Glide is another story. I am thoroughly convinced that there is only one other glider that even comes close to the HP in glide and high speed performance, and that is the Tempercoat Magic III. Everyone else, including those with "measured" 13 to 1s, get left in the dust (or vortex, as the case may be). I know that sounds like an extravagant claim, but I put a couple thousand dollars of my money where my mouth is to get hold of one. The HP also took 1-2-3 at the Chattanooga Great Race, setting a new course record in conditions that were considerably lighter and less conducive to a course record than those existing for the previous record. The glider is fast. Period.

So who needs all that speed and glide? Who needs to cruise at 40-plus miles an hour? I do, for one. I made a lot of judgement errors at the Nats, and the extra speed and glide of the HP were the only things that kept me from looking like a total meatball. For instance, I was always climbing out too high before leaving a thermal, and heading for the pylon. The smart pilots flew the course as low as possible. The only thing that kept them from timing me with a calendar was the fact that I could cruise between the pylons at a

SPECIFICATIONS and CASE'S BOX SCORES

HP 170 SPECIFICATIONS:

Sail Area	168 square feet
Wing Span	34 feet 4 inches
Nose Angle	128 degrees
Leading Edge Length	19 feet 4 inches
Aspect Ratio	7.0:1
Glider Weight	66 pounds (without coverbag)
Pilot Weight Range	150 to 250 pounds
Suggested Hang Rating	USHGA IV
Suggested Retail Price	\$2,500.00
	(\$2,600.00 with optional streamlining)

HP 170 BOX SCORES:

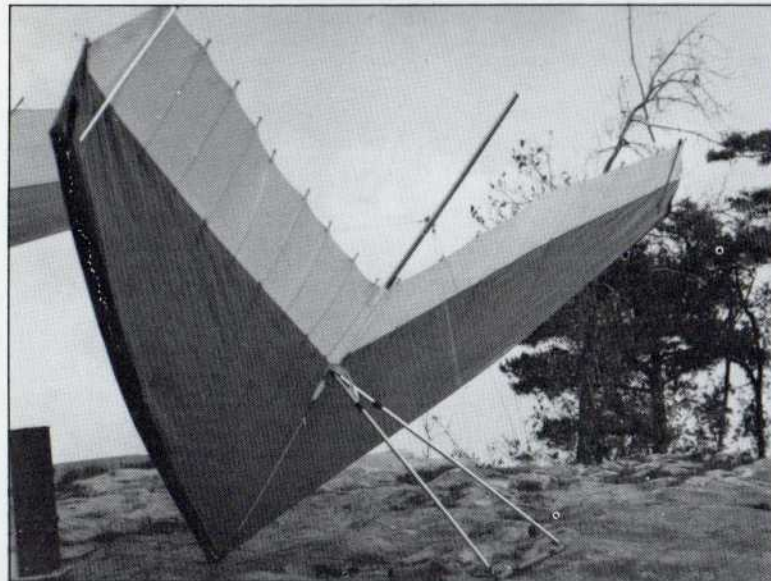
[1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent]

GENERAL CHARACTERISTICS

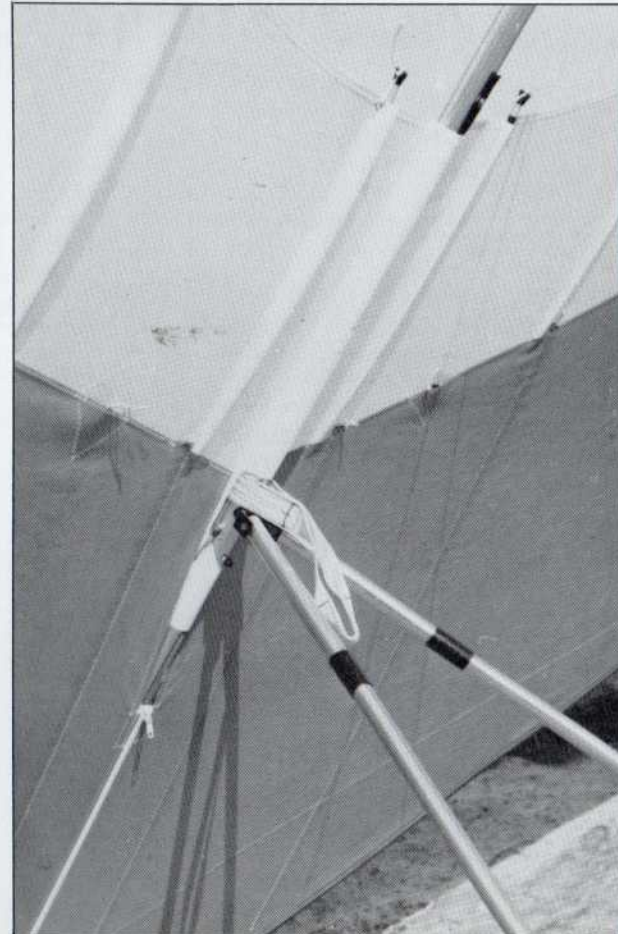
Set-up Time/Ease	4
Ground Handling	5
Static Balance	5
Frame Hardware/Finish	4
Sail Quality/Cleanliness	5

FLIGHT CHARACTERISTICS

Handling — Low Air Speeds	4
Handling — High Air Speeds	4½
Bar Pressure — Roll	4
Bar Pressure — Pitch	5
Yaw Stability	4
Turn Coordination	5
Speed Range	5½
Sink Rate	5
Glide Angle Performance	5



(Opposite page) The subtly unorthodox Wills "HP" launches during the famous Great Race at Lookout Mountain in October of 1984. (Above) A close-up of the "keel pocket-less" HP reveals a keel pocket reminiscent of the days of so-called standard gliders. Designers Pearson and Meier discovered that in the presence of a floating keel/crossbar, the familiar tall keel pocket was unnecessary. (Right) A broader view of the HP's underside; the sail is very tight on both upper and lower surfaces.



clearly advantageous speed. It kept me from embarrassing myself, and that's worth a dollar or two to me.

I know there must be at least a few wise guys out there asking, "If the HP is so hot, how come it didn't win the Nationals?" Well, up until the last scored flight, the HP's were in 1st (Pearson), 4th (Rawlings), 5th (Kells), and 8th (me). Places 2 and 3 were occupied by Pendry and Brown on Magic III's. The things turned a bit sour, not only for the HP's but for almost everyone. Sixteen pylons (64 miles) were called. The wind began to cross out from the left, and approximately 2/3rds of the pilots got flushed without achieving Pylon One. Of those that stayed up, only four finished the course, and they all had agonizingly slow times. When all the dust had settled, six out of the top eight pilots were sunk. Pfeiffer, previously 6th, had moved into First. Kells moved from 5th to Second. Smith and Moyes moved from 9th and 13th to 3rd and Fourth. Pearson, Pendry, Brown, Rawlings (places 1-4!) all bit the big one.

So that's the sad story of how HP's lost the meet. All the credit in the world must be given to the four pilots who finished the course. They worked hard and flew brilliantly, and nothing should be taken from them. But... on the basis of what I saw on the first six days (and 250 miles) of competition, the HP was a markedly faster glider.

Which means that it can also be a bear to land. Now my "arrivals" are noted for

being less than picturesque, so perhaps I should defer this section to one possessing more grace than I. But since I got the job, I better finish it.

Actually, landing the HP presents no unusual problems, except for the fact that it likes to convert a few extra miles an hour on final into a few hundred extra feet in ground effect. I would recommend against carrying excess speed into tight landing areas. In this case the old adage might better be rephrased, "Keep down thy airspeed, lest the trees at the edge of the landing zone rise up and smite thee." Now don't do anything silly, like stall the poor beast on final; just be ready for it to keep flying a bit longer than you planned. Other than that, landing is as straight forward as launch. Bleed off what little extra speed you may have in ground effect, and when you're sure the glider is ready to quit flying, count to three... then flare. Hard. If all goes well, you'll be rewarded with a perfect, no step landing. If not, you'll pound in just like me. This is no fault of the glider. It's just that I land, in the words of Mike Meier, "...like an old woman."

In drag racing, an old saying goes, "Speed costs money. How fast do you want to go?" In the case of the HP, you're going to have to want to go about \$2,500 worth of fast, \$2,600 if you want the optional streamlined kingpost and downtubes. But you get quite a lot for your money. The HP, commensurate with Wills Wing policy, was fully certified before the glider was even

announced, much less produced. The hardware is clean and simple. The glider is visually quite pleasant, and the performance is excellent.

As with all Wills products, the HP comes with a *comprehensive* owner's manual; a delivery checklist assuring the dealer did his job for you; a customer response form sent direct to Wills; a Wills hat; a Wills poster; a spare parts kit; a quality bag with velcro sail ties, and wear points protection items like caps on the kingpost (for packing), pads for the keel and control bar, and bungee retainers for "loose" parts; plus (with the HP) a multi-color sticker for the glider which goes a bit beyond the familiar WW letters. In short, it lives up to the reputation of a Wills product.

For those of you who think that I've landed on my head one too many times, and am now looking at the world through Wills-colored glasses... well, you can go back to the phone book now. Or send me hate mail. I don't care. I call 'em like I see 'em. And the way I see it, if you want what is arguably the highest performing hang glider on the market today, ya oughta get yourself an HP. Or maybe three, one for each day of the week. If you don't, don't be surprised if sometime, somewhere, when you least expect it... some wet-behind-the-ears Hang III on an HP beats you to the pylon. (NOTE: The HP is recommended only for Hang IV pilots.)

Happy landings. §

COMMENTS. . . Part II

FOLLOWING CASE'S CUTE COMMENTARY (a la Dense & Fear), and considering Bruce's long and successful competition record, and as I've a mere eight minutes logged on the HP in a single crummy sled run... my thoughts seem rather unimportant. But of course they're not. As Publisher of this little rag, I get to say what I want (thoughts of "meatball" editors notwithstanding).

So...

First, either Case's #3 HP is quite different than #10 which I flew, or indeed he *has* landed on his head one time too many. At least I *suppose* "old women" land on their heads (!?!).

The static balance is *not* "very good." The darn thing is tail heavy. Not badly so, but definitely so. Course even if all us near-to-skygod Hang IVs have no sweat over a bit of tailheaviness, it is nevertheless present.

But the trade-off for that less-than-perfect static balance is wonderful landing character. The HP flares to touchdown with more ease than any other double surface gliders I've flown so far. I thought, and the factory confirms me, that this comes due to the tail heaviness. Now, approach to landing, with the typical turn lag present in *every* double surface glider I've flown, is the same. But, oh that nice flare. If I flew an HP regularly I might never slam dunk the nose, nor even drop the bar.

If Case landed this one on his head, he must've been doing loops half under ground.

Another thing Case didn't wax eloquent over was the standard HP cloth. Neat stuff.

The Howe & Bainbridge 3.9 ounce UV was developed for the ultralight industry where ultraviolet degradation is a big-time problem. (Those guys leave their wings out all the time!) Done in a slightly firmer finish for Wills Wing, the coating on the cloth is reputed by H&B to stand up to ultraviolet wear *twice* as well as H&B's usual hang glider cloths.

Somebody will alledge the stuff is stretchy-looking, and will probably "bag-out" in time. The factory says, yup, it is not as structurally stout — especially on the bias — as 4.4 HP cloth, but due to the HP's high batten density (ribs are only 22-23 inches apart), stretch is not a significant likelihood. Plus, where this problem is the greatest due to load — at the tip — sail designer Steve Pearson used very heavy 3 mil sandwich cloth with 9 ounce double cloth and a 7 mil mylar film all sandwiched together. Plus, per H&B, the tear strength of the 3.9 UV stuff is actually *greater* than 4.4 HP. Pretty important. While Pearson feels the 4.4 HP cloth is still the premium fabric for an all-out competition pilot, it is more fragil, more stiff, and *feels* thinner and more brittle. All that can translate to, "... will not wear as well." Both 3.9 UV and 4.4 HP cost Wills a bundle more than "normal stuff."

The last point about which Bruce and I disagree is crossbar set up. Though his humorous review does back up and say it's pretty easy, he didn't have the benefit of the heavier cord (than 505 leech) plus special grommated tang (added a couple of production numbers later). Now, one can pulley the crossbar back with relative ease, in fact the job is every bit as reasonable as with any other double surface craft.

CLOSING THOUGHTS ABOUT CASE

Number One, I *loved* Bruce's article. Maybe he's not a pro writer, but he made me a reader... and he made me chuckle... all the way to the end. With my publisher's mentality, that makes him a plenty good writer. What else *really* matters, dear reader? Did you read it? *All* of it? Did you like it? Case dismissed.

And (Bruce) Case *is* dismissed, or will be missed, at least, as he takes a hiatus from competition to pursue his studies. Best of luck on those efforts, Bruce.

And thanks.

— Dan Johnson

The Magazine of Hang Gliding and Ultralight Soaring

WHOLE AIR

WE'VE GOT YOUR NUMBER

OUR BEST YEAR-LONG PRICE

NEW SUBSCRIBERS!

or... Add A Year... at

\$8.88 per year (6 issues)

HOT WITH COLOR — ALL THE RIGHT READING!

WHOLE AIR Magazine
Sign Me Up... What a Good Deal!

I am a present subscriber; add this year to my current subscription, (present subscriber # _____ see mailing label)

NAME _____
ADDRESS _____
Zipcode _____

FOREIGN SUBSCRIBERS:
Canada -- Add \$4.00
All Other Countries -- Add \$8.00
U. S. FUNDS ONLY PLEASE

Mail to:
P. O. Box 144
Lookout Mtn., TN 37350



AIRWAVE GLIDERS is the name and the **MAGIC III** is the glider that has consistently proven that it has a lower sink rate and is faster, with a better glide. But the most important secret of our success is in the **MAGIC III's HANDLING**. All **MAGIC III** pilots **ENJOY** rather than endure their flying.

Proven thru competition to be #1. Prove it to yourself with a test flight from one of the following dealers. They have a Magic III for you to fly.

The MAGIC III Has Placed No. 1 In These World Class Meets:

- | | |
|-----------------------------|--|
| Australian Nationals | Austrian Masters |
| French Nationals | U.S.A. Masters |
| Italian Nationals | Swiss Cup |
| Canadian Nationals | Spanish X-C Female Distance (65½) |
| Danish Nationals | European Distance (130 mile Record) |
| Hungarian Nationals | Region I/USA (107 mile Record) |

- | | |
|--|--|
| Windsports S.F.
San Francisco, CA
415/731-7766 | Morningside
Claremont, NH
603/542-4416 |
| The Hang Gliding Center
San Diego, CA
609/450-9008 | "Magic" Johnson
Duluth, MN
218/724-2387 |
| Lookout Mtn Flight Park
Lookout Mtn., TN
404/398-3541 | Boulder Flight
Boulder, CO
303/555-5455 |
| Crystal Air Sports
Chattanooga, TN
615/825-1995 | Leading Edge
Dallas, TX
214/231-5835 |
| Aerial Voyages
Seattle, WA
206/347-3844 | Treasure Valley
Boise, ID
208/465-5593 |
| Barry Bateman
Vancouver, B.C.
604/856-5920 | Aerial Techniques
Ellenville, NY
914/647-3344 |

MAGIC SPECIFICATION

MAGIC III	155	166	177
Optimum Pilot body weight	140-160 lbs	155-175 lbs	175-200 lbs
Aspect ratio	6.72	6.8	6.84
Wing span	32.8 ft	34.12 ft	34.8 ft
Packed length	19.23 ft	19.81 ft	20.36 ft
Optional breakdown length	19.23 ft	12.81 ft	13.36 ft
Glider weight	64 lbs	66 lbs	71 lbs

Dealer Inquiries Invited

P.O. Box 1153, Mercer Island, WA 98040 — (206) 232-7466



FIRST PURCHASE REPORT



DREAM

California Dreamin' with Evaluator Paul Burns, as you read a PiRep on Delta Wing's successful Soaring Class Glider, the Light Dream 185/aerial photos by Pork/detail photos by Paul Burns



MY INTRODUCTION TO the Delta Wing Light Dream 185 came at Edwards Bowl launch site on the Ortega Mountains overlooking Lake Elsinore, California. For familiarization purposes, I had made arrangements to meet a few fellow pilots for an early morning sled run. Upon our arrival at launch at 10:00 AM, we were greeted with a low inversion and calm winds. Although not ideal conditions, the rising sun warmed our optimism as we moved our equipment to the set up area. The Light Dream's foam-backed leading edges combined with a modest 58 pounds in-the-bag weight made the task of carrying tolerable.

Set up procedure is simple and conventional in every way. The assembly task can be completed by one person in fifteen minutes. Any questions regarding assembly will be answered with a reference to the owner's manual. New Bill Bennett-designed hardware is featured at the flying wire to noseplate attachment point. This mechanism is clean, lightweight, and provides quick attachment with built-in safety.

Sail layout on the Light Dream is the spanwise configuration. All sail colors, including spectrum, are available. Sail construction is top quality, with many reinforcement points, and a liberal use of webbing at the wing tips. The attention to detail in this area should mean extended sail life for the consumer. The sail on the glider flown in this evaluation remained clean throughout the speed range.

A close inspection of the airframe reveals strength with an economy of weight. All structural frame components are 6061-T6 seamless drawn and anodized aluminum tubing. The Light Dream 185's keel is 1 1/8" X .049 with innersleeves at nose, heartbolt, and flying wire attachment points. Leading edge front sections are 1 7/8" X .049 innersleeved. Rear sections are 3/4" .049. Crosstubes are 2" X .049 with innersleeved ends. All rigging is 3/32" stainless steel 7 X 7 construction cable; lower flying wires are continuous coated, upper wires are uncoated. Reflex bridles are continuous coated 1/16" stainless steel 7 X 7 construction cable as well. All brackets are either stainless steel of 6061-T6 anodized. Inboard ribs are 1/2" aluminum tube with flexible ends for reflex. Outboard ribs are 3/8" aluminum tube. All ribs are preshaped to airfoil shape. The overall frame finish is very nice.

Having completed a thorough pre-flight inspection of both glider and harness, I proceeded toward the take-off point. As I carried the Light Dream through a wind-shadowed area, I discovered the wing to be slightly tail heavy in calm air. However, with the addition of the slightest headwind, the Light Dream balances with little effort.

The wind on launch gusted to a peak of about five miles an hour as began my take-off in the marginal conditions. Seconds after becoming airborne, I encountered

some weak lift. I initiated a left turn and was surprised with the near-zero lag response to my control. The extremely light bar pressure further caught me by surprise, as I overcontrolled the wing badly. Sensing that I was about to fly out of the lift, I reversed my control, with less force this time. The Light Dream's impressive sink rate had allowed me to gain some precious altitude, in spite of my over banking. I found a solid core and began a series of 360° turns. Reducing my control input, I began to appreciate the handling qualities of this design. Gliding between thermals, the Light Dream provides a smooth ride through slow flight speeds. Glider performance in this area of operation seemed more than adequate.

The windstreamer hung limply as I set up my landing approach. A light, near zero speed touchdown was easily accomplished; a bit of force is required to complete a good flare.

Uncooperative weather set in for the next few days, giving way to good post-frontal soaring conditions at Torrey Pines, California. Operating in stonger winds (to 15 mph) tended to only reaffirm my first impressions of ground handling and launch qualities. Although a wire assistant is always recommended in stronger winds, self-launches in moderate velocities were performed with confidence. A wings-level attitude was easy to maintain, as no yawing or pitching tendency was apparent.

In pure ridge lift, informal performance comparisons revealed an impressive sink rate, which enabled the Light Dream pilot to compete for air space with some double surfaced models. Add a bit of unstable air, and the Light Dream displays an ability to effectively work small thermals which may elude the double surface models. Here's a case where good performance is enhanced by great handling qualities.

No comparisons were conducted to determine L/D performance. But it's safe to say the Light Dream will not compete with a Streak in this area of operation. This design is comparable to many of its contemporaries, and performance in this area is respectable.

Pushing the wing to a stall from level flight requires some effort to overcome increasing bar pressure, which provides obvious stall warning feedback to the pilot. A further and more dramatic warning is apparent through mild buffeting which occurs at an angle of attack slightly lower than full stall. Pushing the glider to a stall at a bank of about 30° results in an increased sink rate as the wing tends to level itself, and recovery ensues quickly. This glider will not spin.

Use of mush speed on landing approach can achieve a very steep yet very controllable descent. . . an admirable quality for short field landings, or to adjust an error in judgement. Steep approaches,

BOX SCORES

BENNETT'S DELTA WING LIGHT DREAM

[1 = Poor; 2 = Fair; 3 = Good; 4 = Very Good; 5 = Excellent]

GENERAL CHARACTERISTICS

Set up Time/Ease	4
Ground Handling	4
Static Balance	4
Frame Hardware/Finish	4
Sail Quality/Craftsmanship	4

FLIGHT CHARACTERISTICS

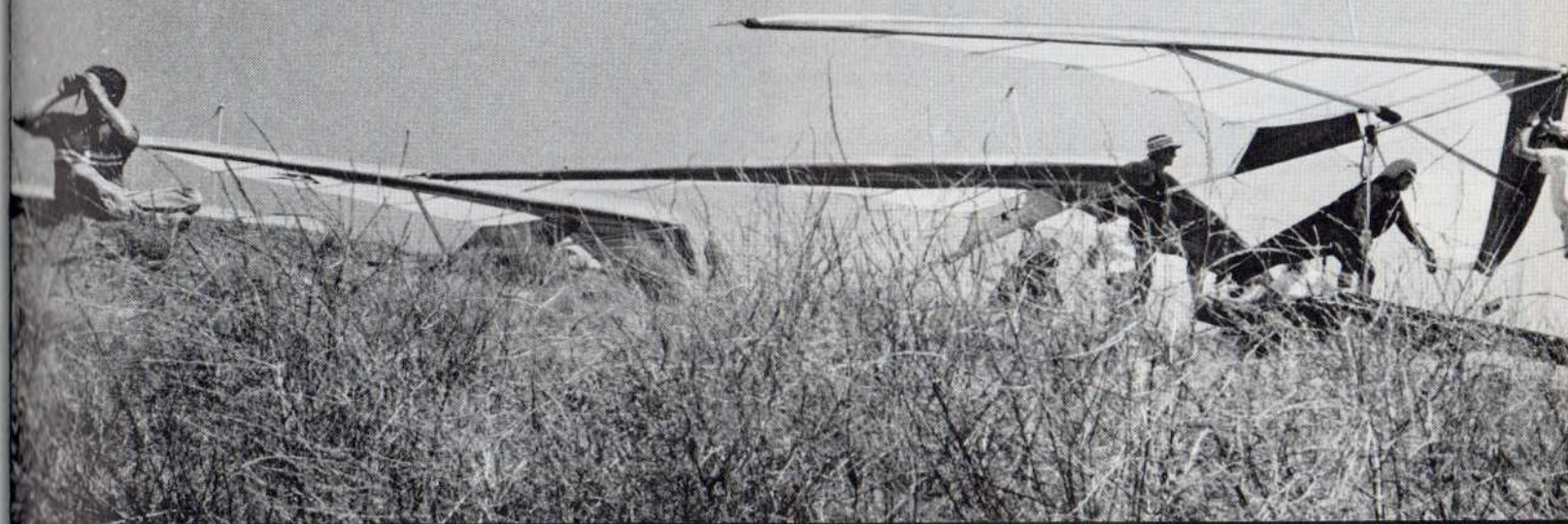
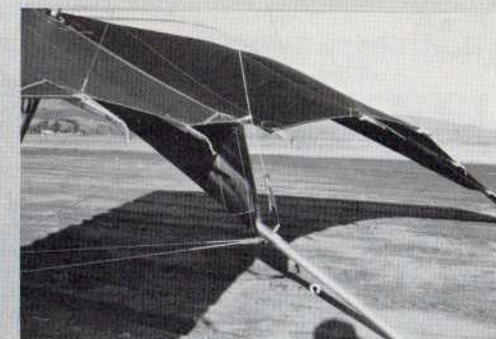
Handling — Low Air Speeds	5
Handling — High Air Speeds	4
Bar Pressure — Roll	5
Bar Pressure — Pitch	4
Roll Control Initiation	5
Roll Reversal (45° to 45°)	5
Yaw Stability	5
Turn Coordination	4
Speed Range	3
Sink rate Performance	4
Glide Angle Performance	3

LANDING CHARACTERISTICS

Flare Authority	4
Parachuteability	5
Directional Control at Mush Speed	5

LIGHT DREAM 185 SPEED RANGES

Light Dream 185 (55 lbs) — 170 lb pilot = 1.2 lbs/ft ² wingloading:	
Stall Speed	16 MPH Indicated
Top Speed	33 MPH Indicated



even those a bit crosswind, resulted in easily controlled stand-up landings, as the Light Dream displayed no tendency to tip stall, or drop a tip. These low airspeed approaches also illustrate the Light Dream's ability to remain directionally controllable, even at speeds which produced mild buffeting.

The Light Dream owes its superior handling qualities, in part, to the exclusive "ball tip" which allows the sail free rotation at each wingtip. This freedom in movement provides the lightest, most responsive roll control this pilot has ever experienced. Given this ease of operation, the Light Dream pilot can enjoy extended duration flights without suffering the pain of physical exhaustion. A swiveling crosstube arrangement also contributes to the Light Dream's handling qualities. Two attachment positions are provided to further adjust sensitivity.

Students will like the Light Dream for its simplicity, easy set up and ground handling, slow take-off and landing speeds, and low speed characteristics. Advancing pilots will enjoy the soaring performance, and certified strength and safety of this intermediate design.

The Light Dream 165 and 185 are both HGMA Certified. The 205 model is currently in development. Glider design being somewhat of a trade off between handling and performance, the Light Dream draws a fine line in its distinction.

Very good sink rate and a respectable glide performance, enhanced by superior handling qualities, provide an impressive soaring capability for beginner and advanced pilot alike.

Add all that to perhaps the industry's best retail price from the industry's oldest manufacturer, and you'll find a package

worthy of your serious purchase consideration. §

(Insets) Detail views of the Light Dream/photos by Paul Burns. (Launch) Preparing the Light Dream for flight/photo by Pork

BENNETT DELTA WING LIGHT DREAM

SPECIFICATIONS:

Model Identification	165	185
Sail Area	161	185
Wing Span	31'6"	34'5"
Nose Angle	120°	120°
Leading Edge	18'6"	20'6"
Keel Length	11'0"	12'10"
Aspect Ratio	6	6.4
Glider Weight	50 LBS	55 LBS
Pilot Weight Range	130-200 LBS	140-240 LBS
Ribs Per Side	7	8
Suggested Hang Rating	II	II
Price	\$1,595.00	\$1,595.00

photo by Bettina Gray



WE HELP YOU FLY!

We're the United States Hang Gliding Association. Join us and get *Hang Gliding* magazine, the world's leader in the sport. We cover foot-launch hang gliding exclusively! Beautiful color photography, technical articles, contest results, feature stories, new products, equipment evaluations, how-to articles — all written by the sport's top names — fill our pages.

I include my check or money order as follows:

- \$29.50 FULL MEMBER (\$32.50 foreign) — as a full member you receive 12 issues of *Hang Gliding* magazine, pilot liability insurance, USHGA membership benefits.
- \$22.50 SUBSCRIPTION (\$25.50 foreign) for one year.
- \$40.00 SUBSCRIPTION (\$46.00 foreign) for two years.
- \$57.50 SUBSCRIPTION (\$66.50 foreign) for three years.

Name _____ Phone _____
 Address _____ Age _____
 City _____ State _____ Zip _____

Send check or money order to:
 USHGA, Box 66306, Los Angeles, CA 90066

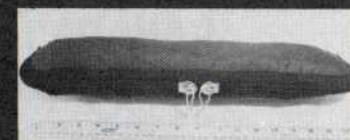
- \$500,000 pilot liability insurance
- Site insurance for chapter clubs
- Local, regional and national competition
- Pilot rating program
- Tandem and ultralight insurance
- and much more!

PHOTOGRAPHY CAN BE FUN AND SIMPLE WITH THE

SUPERCLAMP and KONICA FT-1 35mm CAMERA



Complete **SUPERCLAMP** Assembly - with Clamp and Extension arm — \$59.95.
 The Swivel Clamp Only — \$26.50 (makes a great base for counter weights).

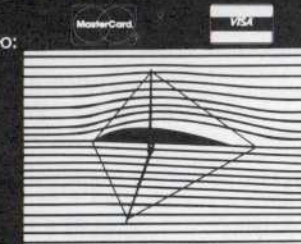


Just in time for **Christmas** -- Self-Contained X-C Bags. Less than 2 pounds; only 17" long by 3" diameter. Custom fit for your glider. Why keep that bulky bag any longer? Order Now! **ONLY \$59.00!**

- FT-1 — Body \$180.00
- FT-1 — Body & 50 mm 1.7 Lens \$229.95
- FT-1 — Body & 28 mm Wide Angle \$249.95
- 16 foot Electronic Cable Release — \$32.00

Contact me for full line of camera & video:

C. W. PHOTOGRAPHICS
 Cliff Whitney
 Work: 615/875-9003
 Home: 615/265-1539
 700 Colville Street
 Chattanooga, TN 37415



ALSO DEALERS FOR BALL VARIOs WHEN ONLY THE BEST WILL DO

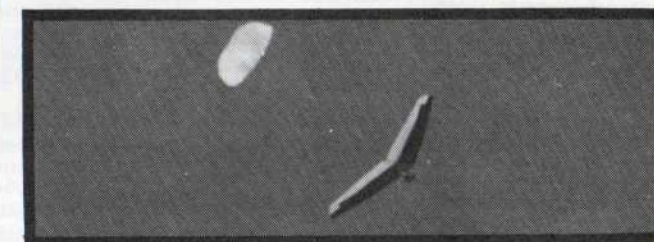


!PARACHUTES!

S-26

INSURANCE PACKAGE

The Only Certified Parachute You Can Buy!!
 Available Through All Qualified Dealers
 At Great Winter Prices!!



Contact Pacific Windcraft or Skylines
 For The Nearest Qualified Dealer Today!!
 Dealer Inquiries Welcome.

Pacific Windcraft Ltd. Skylines Enterprises Ltd.
 408/422-2299 408/422-2781

We're Bringing Fun and Affordability Back Into Hang Gliding

RIGID WING READER

★ The Newsletter for the Rigid Wing Hang Gliding Enthusiast



A must for the serious rigid wing hang glider/foot launched sailplane pilot/builder. An open forum for the exchange of information, flight stories, hot building tips, and fellow worldwide rigid wing enthusiasts locator.

Put yourself in the pilot's seat of these exotic craft as you read the stories of their high flying adventures!

SUBSCRIBE TODAY!

Six Issues Per Year • \$10.00 USA
 (\$15.00 Foreign)

Contact:

Chuck Rhodes — Publisher
 27670 S. John Montgomery Dr.
 San Pedro, CA 90732
 213/514/3056

LEAF has the best selection of Anodized Aluminum Tubing available in the nation.



LEADING EDGE AIR FOILS

331 South 14th Street
 Colorado Springs, Colorado 80904-4096
 Phone (303) 632-4959



Boris Popov

Northern Sun, Inc.

612/731-1311

9242 Hudson Road
 Lake Elmo, MN 55042

THE ORIGINAL WHOLE AIR T-SHIRT

Guaranteed to be around forever . . . letting people know what your favorite magazine is.

If a hang gliding fashion statement is to be made . . . this shirt will do it. (Great Christmas Gift!) **\$9.95** plus postage/handling

Our Tee is 100% Fruit of the Loom cotton. Sizes S—M—L—&—XL are available in the following colors: Yellow • Khaki • Sea Green • Sky Blue Light Blue • Lavender • Hot Pink.

ORDER EARLY -- SUPPLIES ARE LIMITED

Qty.	First Color Choice	Second Color Choice	Size	Price	Amt.

Subtotal _____
 Handling & Shipping \$1.50
 TOTAL _____

Name _____

Address _____

Zipcode _____

Please Allow 3-4 Weeks for Delivery

Send Order to: WHOLE AIR T-SHIRT; Box 151; Wildwood, GA 30757
 Make Check or Money Order Payable to: Starr Tays Designs

DIRECTORY

READER NOTICE

This source listing is provided by **WHOLE AIR** and all participating dealers. It will provide your with a **geo** or-**ganized listing** (by north or south time zones) of reliable businesses with which to deal, and from whom everything from lessons to equipment can be obtained.

NORTH EASTERN

AERIAL TECHNIQUES

Route 209
Ellenville, NY 12428
914/647-3344
Come visit Ellenville. Learn to fly at our new training facility or challenge the mountain with your thermalling and X-C skills. Complete inventory of gliders, accessories, and replacement parts. Quicksilver ultralight sales and instruction. Open all year.

SPORT FLIGHT
9041B Comprint Court
Gaitersburg, MD 20760
301/840-9284
We're the pros in the mid-Atlantic area. Representing the most major brands. Complete line of accessories. Repairs. Beginner through Advanced foot launched instruction.

MOUNTAIN WINGS
Box 1022/Main Street
Kerhonkson, NY 12446
914/626-5555
Ellenville area's most complete HG shop. Mtn & Training hills for all winds. Exclvs drs for: WW, Bennett, Pac. Windcraft, Manta, Seedwings, Cosmos trike. Also dr for: Airwave & Pro Air. USHGA Cert. Instr., towing, repairs, parts, access., ultralight instr. Phantom sails, camping, tours, bunkhouse.

AIRWISE, INC.
15 Long Ridge Road
West Redding, CT 06896
203/938-9546
Stormville (NY): 919/226-6712
Hang gliding equipment by UP, Manta, Pacific Windcraft, Delta Wing, Moyes. Ultralight line: Mitchell A-10, Kasperwing, FoxBat, Phantom. Quality service, certified instruction.

MORNINGSIDE FLIGHT PARK
Rt. 12, RFD #2
Claremont, NH 03743
603/542-4416
Complete flight facility with camping and swimming. Top notch instruction, USHGA Certified. Precision repairs for airframe and sail. Glider & Accessories in stock. Dealer for Bennett, Moyes, UP, Wills, Wizard. Powered ultralight instruction available.

SOUTH EASTERN

KITTY HAWK KITES (EAST)
P. O. Box 386
Nags Head, NC 27959
919/441-4124 (in N.C.)
800/334-4777 (outside N.C.)
Learn to fly safely over soft sand dunes through gentle Atlantic breezes. Beginner, Novice packages and rating available daily. Complete inventory of new glider, accessories, and parts in stock.

CRYSTAL AIR SPORTS
RACCOON MTN FLIGHT RESORT
Rt. 4, Cummings Hwy.
Chattanooga, TN 37409
615/825-1995
Flight instruction on the World's Only Full Flying SIMULATOR. Completely safe for ages 5-81, thousands served already. Crystal offers the finest brands, with large accessory stock. Two-seat powered ultralight training, on-site Bankcards accepted. Since 1974!

LUBON ULTRALIGHT AIRCRAFT
Rt. 8, Enoree Hill Circle, #17
Greer, SC 29651
803/244-5886
Sales, Service, Instructions for entire line of UP products, featuring the Comet and the Gemini. Serving the Greenville, Spartanburg, and Piedmont area of South Carolina.

MOUNTAIN WINGS
Box 1022/Main Street
Kerhonkson, NY 12446
914/626-5555
Ellenville area's most complete HG shop. Mtn & Training hills for all winds. Exclvs drs for: WW, Bennett, Pac. Windcraft, Manta, Seedwings, Cosmos trike. Also dr for: Airwave & Pro Air. USHGA Cert. Instr., towing, repairs, parts, access., ultralight instr. Phantom sails, camping, tours, bunkhouse.

SIMPSON MID-WEST ULTRALIGHTS
Rt. 1, Box 114WA
Fisk, MO 63940
314/686-3578 or 785-9236
Ultralights — Panda Cub, Panda Trike, SKYbird, Little-Bi; Weedhoppers — new and used; pod for ultralights; aircraft tubing, hardware.

NORTH MOUNTAIN

GOLDEN SKY SAILS
15912 W. 5th
Golden, CO 80401
303/278-9566
USHGA Certified school including power and towing. Complete airframe and sail repair facilities, custom fabrication. Distributors for Wills and Golden Prone Harness.

WASATCH WINGS, INC.
700 East 12300 South
Draper, UT 84020 (near SLC)
801/571-4044

Hang gliding instruction beginning through mountain flight. Motorized ultralight pilot check-outs and instruction. Dealers for the Quicksilver MX. Custom harness manufacture and repairs.

HIGH SIERRA SPORTS
286 E. Winnie Ln.
Carson City, NV 89701
702/885-1891
Northern Nevada's complete hang gliding and windsurfing shop. All major brands available. USHGA Certified Instructor, Observer, and Region 2 Examiner. Sales, Service, Rentals, and Lessons.

CRYSTAL AIR SPORTS
RACCOON MTN FLIGHT RESORT
Rt. 4, Cummings Hwy.
Chattanooga, TN 37409
615/825-1995

Flight instruction on the World's Only Full Flying SIMULATOR. Completely safe for ages 5-81, thousands served already. Crystal offers the finest brands, with large accessory stock. Two-seat powered ultralight training, on-site Bankcards accepted. Since 1974!

LUBON ULTRALIGHT AIRCRAFT
Rt. 8, Enoree Hill Circle, #17
Greer, SC 29651
803/244-5886
Sales, Service, Instructions for entire line of UP products, featuring the Comet and the Gemini. Serving the Greenville, Spartanburg, and Piedmont area of South Carolina.

MOUNTAIN WINGS
Box 1022/Main Street
Kerhonkson, NY 12446
914/626-5555
Ellenville area's most complete HG shop. Mtn & Training hills for all winds. Exclvs drs for: WW, Bennett, Pac. Windcraft, Manta, Seedwings, Cosmos trike. Also dr for: Airwave & Pro Air. USHGA Cert. Instr., towing, repairs, parts, access., ultralight instr. Phantom sails, camping, tours, bunkhouse.

SIMPSON MID-WEST ULTRALIGHTS
Rt. 1, Box 114WA
Fisk, MO 63940
314/686-3578 or 785-9236
Ultralights — Panda Cub, Panda Trike, SKYbird, Little-Bi; Weedhoppers — new and used; pod for ultralights; aircraft tubing, hardware.

CANADA

FLY-WEST HANGLIDING, LIMITED
2207-42 Street, SE
Calgary, Alberta
CANADA T2B 1G4
403/235-4653
Exclusive dealers for Progressive Aircraft Co. Sales, service, rentals, and accessories. Certified Instruction: Radio-equipped, beginner to mountain flight. Towing, too.

HANG GLIDERS WEST
20-A Pamaron Way
Ignacio, CA 94947

CHANDELLE SAN FRANCISCO
198 Los Banos Avenue
Daly City, CA 94014

SOUTH PACIFIC

MAUI SOARING SUPPLIES
RR 2, Box 780
Kula Maui, HI 96790

HANG FLIGHT SYSTEMS
1202-M East Walnut Street
Santa Ana, CA 92701

WINDSPORTS INTERNATIONAL, INC.
16145 Victory Blvd.
Van Nuys, CA 91406

HANG GLIDING EMPORIUM
613 North Milpas Street
Santa Barbara, CA 93103

WILLS WING
1208-H East Walnut Street
Santa Ana, CA 92701

ORIENT

JAPAN SURFING PROMOTIONS
3-1-4 Tsujido Nishikaigan
Fujisawa City, Kanagawa,
JAPAN

EUROPE/ Scandanavia

WINJE & COMPANY
Postboks 462
Lillehammer
NORWAY
CARNET SKY SYSTEMS
143 Loder Road
Brighton, BN1-6PN
ENGLAND

CANADA

VOL LIBRE OUTAOUAIS
135 Louis Hebert Street
Hull, Quebec
CANADA J8Y-3S7

MULLER KITES, LTD.
5-1303-44th Avenue NE
Calgary, Alberta
CANADA T2E-6L5

AVIA SPORT
1655 Ave Lise
Granby, Quebec J2G-8C8
400 Racine est
Chicoutimi, Quebec G7H-1T4
CANADA

PRAIRIE WIND FLIGHT SCHOOL
978 Lindsay Street
Winnipeg, Manitoba
CANADA R3N-1H9

HIGH PERSPECTIVE
RR #3,
Claremont, Ontario
CANADA L0H-1E0

SOUTH EASTERN

LOOKOUT MTN FLT PARK
Rt. 2, Box 215H
Rising Fawn, GA 30738

HAWK AIRSPORTS
3743 Martin Mill Pike
Knoxville, TN 37920

NORTH CENTRAL

NORTHERN SUN GLIDERS
9242 Hudson Blvd.
Lake Elmo, MN 55042

SOUTH CENTRAL

GLIDERS & GADGETS, INC.
Liberty Landing Airport
Route #3, Box 197
Liberty, MO 64068

LONESTAR HANG GLIDERS
2200 "C" S. Smithbarry Rd.
Arlington, TX 76013

AUSTIN AIR SPORTS
5508 Parkcrest
Austin, TX 78731

SOUTH MOUNTAIN

ARIZONA WINDSPORTS
5245 S. Kyrene
Unit #4
Tempe, AZ 85283

DESERT HANG GLIDERS
4319 W. Larkspur
Glendale, AZ 85304

NORTH PACIFIC

KITTY HAWK KITES (WEST)
P. O. Box 828
Marina, CA 93933

MISSION SOARING CENTER
43551 Mission Blvd.
Fremont, CA 94045

AEROSAILS
800 Mercer
Seattle, WA 98109

CLASSIFIEDS

SAIL WORK

HUMMINGBIRD SAILS

HUMMINGBIRD SAILS
12 MAIN STREET
DANIELSON, CT 06239
Tel. 203/774-2355
PROFESSIONALLY-MADE SAIL REPLACEMENTS AND REPAIRS, WITH YOUR CHOICE OF COLORS. REASONABLY PRICED — 7 TO 10 DAYS DELIVERY! IF YOU HAVE HUMMINGBIRD SAILS, YOU HAVE ADVANCED!

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

HANG GLIDING BUCKLES
Photoengraved, solid brass, depicting soaring birds of prey. Exceptional quality. Send for free brochure! Massachusetts Motorized, P. O. Box 542-W, Cotuit, MA 02635.

CIRRUS 5B
Cirrus 5B, like new, prone harness, wheels — \$485. Call 912/264-4881 or 912/264-8811.

PARACHUTES SERVICED

PARACHUTES: ALL MAJOR BRANDS Sold-Repacked-Repaired. Bridles replaced, used chutes wanted. S. F. Windsports, 3620 Wawona, San Francisco, CA 94116; 415/753-8828.

UP CONDOR 151
151 U.P. Condor, spectrum split panels. Very good condition. \$350., includes sturdy shipping container. Julie — 916/241-7599.

PROSTAR II 160
ProStar II 160. Excellent condition. One hour airtime. Blue L.E., white sail, rainbow DBL surface. \$1,400.00. Call Chuck Rhodes at 213/514-3056 after 5:00 P.S.T.

SENSOR 510 & 210
Bunner Bros. H.G. Sensor 510 VG 165, 20 hrs. — \$2,000. Orange L.E., very clean. Sensor 210 — \$300. C5B — \$400. Call 815/234-5388 evenings.

EIPPER FLEXI III
Eipper Flexi III, with harness, helmet, wheels — \$400, or best offer. Call 615/432-5617.

ATTACK DUCK 160
Attack Duck 160. Excellent condition. Clean sail. Black L.E., red and white. \$1250., or best offer. 404/820-9269.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

180 OLYMPUS
For Sale: 1980 180 Olympus. Excellent condition. Applied leading and trailing edges. Rainbow sail, clean, no fading. UP 26' parachute, new condition, sewn to harness. Made for large pilot. Bell half helmet. Equipment bag, and misc. parts. \$1,100., negotiable. Call after 6:00 PM 703/346-3514.

HIGH PERSPECTIVE

LEADERS IN HANG GLIDING AND MICRO-LIGHT AIRCRAFT. 12 year, full-time professionals. Developers of the Chart of Reliability method of instruction. Sales and service of most major brands. High Perspective, Inc., RR #3, Claremont, Ontario, CANADA L0H-1E0, or call Toronto phones: 416/294-2536 or 416/294-9665.

HELP WANTED
Instructors for Kitty Hawk Kites — East & West. Can train and certify. Direct applications to Steve Wendt at Kitty Hawk Kites — East, P. O. Box 340, Nags Head, NC 27959, or to Jim Johns, P. O. Box 828, Marina, CA 93933.

PROSTAR II 160
PROSTAR II 160. Excellent condition — 1 hr. air time. Blue L.E. Rainbow double surface — white upper surface. Must sell — \$1300. Call Chuck at 213/514-3056.

COMET 185
1981 Comet 185. High Performance, Low Price. 615/454-9563 nights; 615/455-1984 days. Erik Ringnes, 1300 Cedar Ln., #J-6, Tullahoma, TN 37388.

OLYMPUS 160
160 Olympus 1979. Rainbow 12' breakdown. Will ship. Very good condition. \$450 O.B.O. Med. spaghetti harness, very good condition — \$50. 502/781-4786.

COMET 185
Comet 185. Very clean, rainbow, white sail with red leading edges. New cover bag. Atlanta area — \$1,100. 404/445-1365.

MINI OWENS TOW SYSTEMS
Mini Owens Tow Release Lightweight, small, strong Internal pulley for smooth rope movement. Nickle plated \$35. With 5/16 bridle and rings \$42.
Mini Owens Tension Gauge Hydraulic, compact, lightweight. 0-200 lbs - ready to use \$150.00
PAUL LUNDQUIST: 2409 E. Golf Course Rd., Alexandria, Mn. 56308 - 612-763-5712.

SEAGULL 10.5 METER
Seagull 10.5 Meter. Very Clean, yellow with red trim, 194 squares — \$450. Call 419/471-1621.

HANG GLIDERS & ULTRALIGHTS
Exclusive Central Indiana FlightStar dealer. Ground school with orientation flights available. Certified training free with purchase. Dealer for the Shadow ultralight, U.P. hang gliders and accessories. Write 145 E. 14th St., Indianapolis, IN 46202, or phone 317/636-4891 or 317/291-6406.

STREAK 180
180 Streak. Excellent condition. Rainbow lower surface. Low air time. Only \$1,195. Call 619/286-5604.

SEAGULL 10.5 METER
Seagull 10.5 Meter. Very Clean, yellow with red trim, 194 squares — \$450. Call 419/471-1621.

HANG GLIDERS & ULTRALIGHTS
Exclusive Central Indiana FlightStar dealer. Ground school with orientation flights available. Certified training free with purchase. Dealer for the Shadow ultralight, U.P. hang gliders and accessories. Write 145 E. 14th St., Indianapolis, IN 46202, or phone 317/636-4891 or 317/291-6406.

STREAK 180
180 Streak. Excellent condition. Rainbow lower surface. Low air time. Only \$1,195. Call 619/286-5604.

SEAGULL 10.5 METER
Seagull 10.5 Meter. Very Clean, yellow with red trim, 194 squares — \$450. Call 419/471-1621.

CALIBRATED WINDSOCK

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube. All hardware, instructions, and calibrated chart included. Check or C.O.D. Shipping paid on pre-paid orders. Dealer pricing available. Carolina Ultralight, Rt. 6, Box 473B, Boone, NC 28607, or call 704/264-9351.

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube. All hardware, instructions, and calibrated chart included. Check or C.O.D. Shipping paid on pre-paid orders. Dealer pricing available. Carolina Ultralight, Rt. 6, Box 473B, Boone, NC 28607, or call 704/264-9351.

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube. All hardware, instructions, and calibrated chart included. Check or C.O.D. Shipping paid on pre-paid orders. Dealer pricing available. Carolina Ultralight, Rt. 6, Box 473B, Boone, NC 28607, or call 704/264-9351.

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube. All hardware, instructions, and calibrated chart included. Check or C.O.D. Shipping paid on pre-paid orders. Dealer pricing available. Carolina Ultralight, Rt. 6, Box 473B, Boone, NC 28607, or call 704/264-9351.

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube. All hardware, instructions, and calibrated chart included. Check or C.O.D. Shipping paid on pre-paid orders. Dealer pricing available. Carolina Ultralight, Rt. 6, Box 473B, Boone, NC 28607, or call 704/264-9351.

015 WS — Indicated 0-15 mph; \$27.50. 325 WS — Indicated 3-25 mph; \$33.00. Dacron and mylar professionally sewn into handsome 4' windsocks. Portable; attaches to any tube.

PRODUCT LINES

CHATTANOOGA, TENN. — Here at the end of the season, when the hang glider world generally goes thru some anxiety pains over the onset of winter, we've a couple **SMASHING GOOD**. . . make that **GREAT NEWS ITEMS**. Seriously, in some ways, these two tidbits are among the best news stories of the year. . . so without further ado. . . 1st is **Tim "Mr. Determined" Morley** was slated to walk out of Santa Clara Valley Medical Center!! Yep, not in a wheelchair, not on crutches, but on his feet. Oh, don't let's get this out of whack. The boy's still got a mess of recovery, and some trying times ahead (as behind him) but walking out was a goal he reached, and we're so proud of him, it gives us goosebumps. **ATTABOY, Timbob!** Now, he was to gain some extra satisfaction out of those steps. Many know of his challenge to friend and ex-boss, **Rob Kells**. In a typical Kells move to encourage his buddy, Kells vowed to quit smoking forever if Tim indeed walked out of the hospital. So, with one of those important steps, Morley was going to smash out Kells' last cigarette. Hurray for the both of 'em! The 2nd hot item is the FAA's quiet but definite approval of **USHGA's petition for exemption to permit ultralight aero towing of hang gliders**. **YEP!** During a time when the entire ultralight industry is being evaluated for what appears certain additional regulation, the Fed' has nevertheless approved the exemption. "Discovered" by ex-Pterodactyl builder-turned-writer, **Jack McCormack** while working in the offices of *Ultralight Flyer* in Tacoma, a call to the FAA's Mike Zachary confirmed the exemption had passed. . . over a month ago on Oct 26th!! Seems Zachary had left the document on his desk after his OK, and went off on vacation. When he returned it was gone. Ironically, the bureaucracy worked efficiently and with unusual speed, and the powers that be sent it back with their seal of approval. How come no one knew, the revelation being over a month old?!? Well, in these cases, the FAA notifies *only* the Petitioner — who was **Steve Hawxhurst** as prez of USHGA. And apparently Steve figured everyone else was notified, so he told no one. Thus, the curious tale of hang gliding getting what amounts to a special favor from the FAA, and no one was aware of it! This, in our opinion, breathes a whole new blast of life into aero towing, which — also in our opinion — holds terrific promise for some growth in our sport. These stories are a tough act to follow, but at season's end, we've a few words left on our industry and some media successes that have come to our attention. Bob Trampenau's **Seedwings** is claiming '84 to have been their best year yet. Somewhat short of the prediction we heard in Jan. 84, but still 30% better than '83 — should calculate to over 160 units — sales brought the number of 510s ever sold to over 500 units. All this while the company relocated itself and took over the sewing of 100% of its sails. Trampenau is also reviewing licensee applicants from Europe. We were told — by sources in Europe close to the applicants — of three such interested outfits, so a European 510 may be close at hand, given Bob's approval. In preparing certification of their 160 size 510, they made some changes resulting in a new sail cut, extending the half ribs to the double surface line. Plus they added faired tubing to kingpost and downtubes using a construction of tubing that permits retrofitting from round stock used on older models. Speaking of retrofitting, Seedwings announced the availability of retrofit kits for cable sets on the 160 510VGs that will bring those earlier models up to present certification standards. Matter of fact, things are generally good enough there in Santa Barbara that they'll be looking for sail loft and fabrication help by Jan 1st, '85. Contact 'em for retro cables (old hardware must be returned for the new FREE set) or if you'd like a job in Santa Barbara. If you're looking for west coast work, we also know Kitty Hawk Kites — West is looking for a person to fill a responsible position. It's good to hear of employment in the industry. The **Delta Wings** are pleased enough with 1984 as well, selling carloads of their very popular **Light Dream** Soaring Glider Series. They're nearly finished with the certification package of the L. Dream 205, planning to present the package at the HGMA's Dec. 12th meeting. We'll have a report on the big Light Dream in a later issue (see pg. 31 for a PiRep on the 185 size). But now that they've completed the soaring glider series, they'll turn full attention to a new X-C glider. Factory rep, **Luigi Chiarani** called it "very trick," and threats on his life would pry no more info from him on the new diver. They plan to reveal it in March '85 and. . . "we'll be on the scene for you (of course)." **Dick Boone's** Pro Air has turned the **Dawn** spark into a flame as the idea catches on steadily. We're not surprised based on the unusually high number of requests we've received for more information. The folks at **Windsports Int'l** (Rich Grigsby and Joe Greblo) have sold a number of Dawns to their more apt students, we heard. Evidently their interest is strong. Pro Air reports Grigsby — a past

editor of *Hang Gliding* magazine — will be handling the company's ad program for '85. Those're good hands as Rich's got good experience and Pro Air can use it. **Pacific Windcraft** is another of the smaller big guys saying 1984 was a good year. In fact PWC says business is so steady going into the winter that they're quoting eight week delivery at the end of Jan. '85. To keep you up on the Salinas outfit, we'll have a PiRep on their **Vision** double surface intermediate in our MAR 85 issue. The company will now involve itself as partner in Skylines as they begin a process of importing hot European gear. We'll keep ya posted on that, too. Speaking of imports, the **Bulger and Brown** duo apparently had a banner first year bringing in the Magic III glider. No business is without its ups and downs, especially at first, but they're looking forward to 1985. **Airwave USA** has also begun stocking all the clothes doodads that pilots love to wear — T-Shirts, Sweatshirts, Jackets, and Hats. Get 'em while they're hot, chum! While we're trying foreign accents, we heard **UP's 50 Mile Award** was given to **Ognian Ourgrinov of Bulgaria**. Having bought Comets from UP for their international team pilots, Ourgrinov set the mark within days of the glider's arrival in his country. Not much news comes from the Socialist Bloc nations (tho we may have a Soviet report for you soon). UP also sadly reports the death of Brad Harris, who, with Jim Zeiset, made the longest (170 mile) distance marks in the Owens in 1984. Brad was killed doing aerobatics near SLC. Pete Brock writes, "Brad usually flew a C2 with a French Connection, but removed it and the special hang straps to fly aerobatics. A non-stock hang loop was substituted and evidently parted, flinging Brad out. He did not use his 'chute." Our condolences to Harris' loved ones. Wills Wings is doing very well with their **HP**, already (early Dec 84) backordered four weeks, with double that expected. (See report this issue, pg. 25.) Their **Flylite** harness production has now finally developed some units "in stock," after a long time with 8-12 week delivery. The harness has been TSO pull-tested, they report, and tho it could qualify as a TSO Sky Diving harness, it won't be sold that way. Company prez, **Rob Kells**, is back on the road again doing his public relations magic. Former road man, **Jim Shaw**, will be taking a much-needed break from demo-ing, spending some quality time in Aspen. To close out this last "Product Lines" of 1984, we've some last media successes to pass along. On "The Best Joke I Ever Heard," a Wills Duck was shown soaring Hawaii's Makapuu, at the hands of an unidentified female pilot. The **ABC network show** aired at 9 PM near the end of November. The scene followed a series of similar situations, the last before the Duck flight being one where a fellow told viewers his best joke while (supposedly) sailing his sailboard. We figure the pilot might've been **Loni Akioni**, a friend of ours who flies Wills, and does so in Hawaii. Next was Hang Glider West's **Jeff Mott** flying a modified Delta Wing Light Dream in the Lucasfilm TV show, *the Ewok Adventure*. The L. Dream looked like it had a scalloped trailing edge, created by Mott's clever extension of the batten tips. He also strutted the glider, dispensing with upper rigging. The Delta Wings had added a beefy, extra-high wash out tip for extra stability. The white glider was finally sent to Lucas Studios for an out-of-this-world custom paint job. The early scene gave nice smooth flying footage as a Dad-Ewok searches for his errant Kid-Ewok by hang glider. We liked that part, tho the show was pretty ho-hum subsequently. **Eric Raymond** earned himself and the sport some good points as he notched up a page and a half long, 3 full-color photo story in the Dec 84 issue of *Outside magazine*. The "Dispatches" section article deals with Raymond finally achieving something called **Sky Camping**. Outside liked the idea a lot (some \$15,000 worth of space if you tried to buy it), but we wonder about the activity. In the positively-written piece, Eric finally reveals, "To be honest, it's not really that much fun. You see the lights down in the villages and you think about the food and wine in the cafes. Nobody likes to sleep all alone in the snow." The *Ultralight Flyer* was a powered ultralight newspaper that is changing with the times, renaming itself **Sport Flyer**. They will now begin reporting all kinds of sport aviation news and stories, from ultralights to sky diving and including good ole hang gliding. It's more mileage for our sport, and more good reading for our pilots. 'Course we could be a bit biased, as some early pieces will come from yours truly. Still, their people found out about the aero towing exemption first, and so we can expect more benefits for our sport. Finally — it's "Miller time" here at the *Product Lines* desk — we came across an ad featuring photogenic **Donna and John Harris**, owners of the Kitty Hawk Kites empire. Seems they admit to enjoying flying kites on the beach and guzzling white rum screwdrivers. At least that's what the **Rums of Puerto Rico** folks would like us all to believe. The ad was in an airline publication. Got news or opinions? Send 'em to "Product Lines," Box 144, Lookout Mtn., TN 37350.

the success



Photo John Heiny — Design Andrew Harper

continues!

- Exclusive, high density foam L.E. insert guarantees precise air foil definition.
- Unique, midchord interfaced velcro system / an industry first.
- Functionally advanced detached sail surfaces.
- Spectrum and rainbow patterned dacrons, and the new Surfcode now in 5 colors, are available.

DELTA WING
P. O. Box 483
Van Nuys, CA 91408
(213) 787-6600