

# 1982 HARRIER II

AT WILLS WING, SOME NEW IDEAS HAVE BEEN AROUND A LONG TIME.



You have probably noticed that suddenly there is a new idea in hang gliding design: a simple, economical, high performance flex-wing that's easy and fun to fly. You may have noticed that suddenly everyone is selling their version of this new idea, and typically everyone is claiming that theirs is the best.

At Wills Wing, we don't think of this as a new idea. For eight years, we've specialized in designing and manufacturing high quality, high performance gliders with exceptionally responsive and pleasant handling characteristics. We've gotten so good at it that Wills Wing gliders have traditionally set the standard in the industry for defining quality in handling characteristics.

For 1982, Wills Wing is happy to announce the release of the HARRIER II. Redesigned for this year, the Harrier II is lighter in weight, easier to fly, and easier to land. It is available with or without leading edge mylar, and offers unmatched value to the serious recreational pilot from advanced novice through expert.

## SPECIFICATIONS

	187	177	147
SPAN	34'8"	33'4"	30'
GLIDER WEIGHT (With/Without Mylar)	66/62 LBS.	57/53 LBS.	51/48 LBS.
PILOT WEIGHT	165-265 LBS.	150-250 LBS.	110-210 LBS.
PILOT SKILL	II	II	II
PRICE (With/Without Mylar)	\$1795/\$1675	\$1795/\$1675	\$1795/\$1675

March/April 1982

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# WHOLE AIR

The International Magazine for Sport Pilots

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# JAVELIN

## SPECIFICATIONS

### JAVELIN 168

Leading Edge	18 Feet
Keel	12 Feet
Span	31 Feet 8 Inches
Nose Angle	122 Degrees
Sail Area	168 Square Feet
Aspect Ratio	6.1
No. of Ribs Per Side	7
Sail Billow	0 Degrees
Pilot Weight Range	115-195 Pounds

### JAVELIN 208

Leading Edge	18 Feet 4 Inches
Keel	12 Feet
Span	32 Feet 2 Inches
Nose Angle	122 Degrees
Sail Area	207 Square Feet
Aspect Ratio	5.2
No. of Ribs Per Side	7
Billow	0 Degrees
Pilot Weight Range	160-240 Pounds

## JUST WHEN YOU THOUGHT . . .

. . . that a glider couldn't be lighter — Flight Designs releases the JAVELIN. At 54 pounds flying weight, it is 14% lighter than the very popular Super Lancer series.

. . . that new gliders were getting too hard to land — Flight Designs presents the JAVELIN. State-of-the-art in every respect except one, it lands easily. Probably more so than your old intermediate does.

. . . that gliders got more complex as they developed — Flight Designs engineered the JAVELIN. Quick(est) set up going boasts an Easy-Slide, shifting crossbar, with all pip pins and no tensioners.

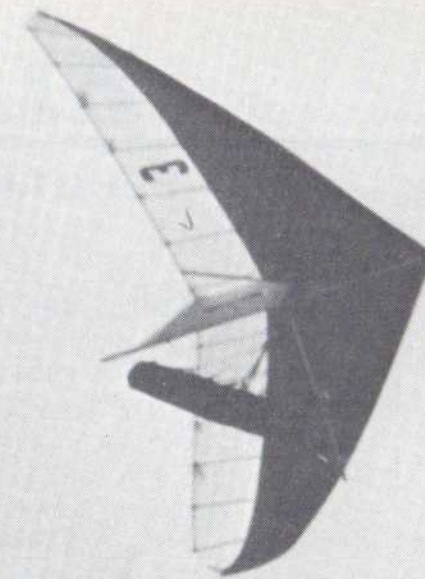
. . . that a glider which performed well could not also handle lightly — Flight Designs unveils the JAVELIN. Light as a hawk's feather, yet with a wide speed range. Optimized for sink rate performance, with its pre-formed ribs, 35% double surface, and spanwise sail cut, you'll just thermal and thermal and thermal.

. . . that new designs needed a few weeks to "get the bugs out," and even more time to reach stock levels — Flight Designs offers the JAVELIN, proven through the winter (at a number of our most professional dealers) and ready today for immediate delivery.

The JAVELIN is NOT just a cheaper version of the Flight Designs high performance glider. It IS a high performing glider that is deluxe in every way — like you have come to expect from Flight Designs.



FLIGHT DESIGNS, P.O. BOX 1503, Salinas California 93902



# U.S. NATIONALS PFEIFFER, BURNETT AND SENSOR 510



DAN RACANELLI  
WINS AT TELLURIDE.

Find out about having one built for you.

Call or write Bob Trampaneau at the Seedwings Factory, 1919 Castillo St., Santa Barbara, CA 93101 805/682-4250

SEEDWINGS

Photos courtesy of Bettina Gray. Pilot: Jeff Burnett.  
HGMA Certified.



MUEHLSTEDT  
**PRO-  
 TEC-  
 TION**  
 INSURANCE

For years, the sport aviation industry has searched for, but done without, insurance. All far-sighted businesses, individuals, and associations need protection. They need it to qualify for loans, land (site) leases, and just plain fun . . . responsible enjoyment. Now, in a word, it is available. MUEHLSTEDT is the word, and Insurance is the theme of PROTECTION.



Physical Damage/Theft; for Individuals, Professionals, and Dealers.



Liability for Dealers; covering their training sites, shops, and employees.



Products Liability; for Manufacturers and Dealers.



Accident, Health, and Loss of Life Protection; for students in training or for a whole year.



Liability for Special Events; covering Shows, Competitions, and Advertising (aerial and otherwise).



Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 \_\_\_\_\_ (zipcode)

Send to: Glenn Muehlstedt  
 701 Southgate Office Plaza  
 5001 West 80th Street  
 Minneapolis, MN 55437  
 Phone: 612/835-5365

# WHOLE AIR

ISSUE NO. 23, VOLUME 5, NO. 1, 1982

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Photo/Barnette





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ISSUE NO. 23

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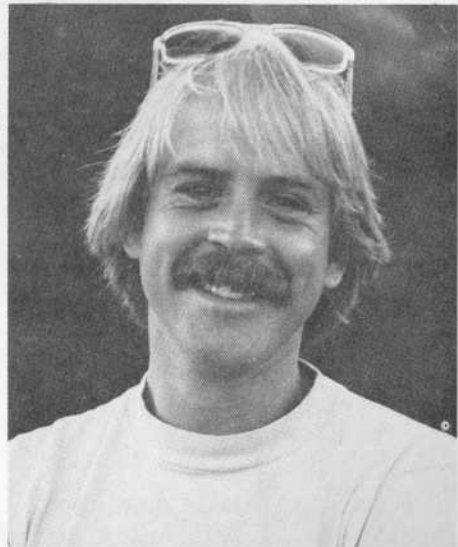
*Cover Photo*  
Doug Barnette

**On The Cover:**

Doug Barnette flies over the landmark, Stonehenge. The prehistoric, megalithic structure on Salisbury Plain, SE Wiltshire, England consists primarily of circles of dressed stones, some with lintels, the main structure dating probably from 1500 B.C. (Source: Funk & Wagnall, 1970).

# Publisher's Column

Photo by Chris Voith



Welcome to 1982 with *Whole Air*. You probably noticed that this issue is dated "March/April 1982." This date will be our first issue of each year — our Season Opener. This year, the date "January/February" was passed in favor of the new one. However, no material was omitted.

The year will still have six issues, the last dated "January/February 1983." You subscribers will still receive all the issues for which you paid. We have informed our new computer mailing service to extend all expiration dates by one issue. To determine which will be your last issue, refer to the center number group above your name on the mailing label. [0383MM means your last issue will be Mar/Apr 83; 1183MM would be Nov/Dec 83.]

To explain, we have arbitrarily changed dating systems solely to extend "shelf life" for those who "newsstand" *Whole Air*. The issue number (23) is still as it would have been for the by-passed "Jan/Feb 82" date.



Photo by BJ Schulte

As we record a growth to 60 pages in this issue, we feel legitimate in claiming the new title of America's Leading Hang Gliding Publication. Folks have told us for over a year that we were taking the lead. While we appreciated those opinions, we feel we can now justify the title as we present more editorial material than any other soaring publication — especially as our continuous surveys of our readership show that our content is well-read, and considered the industry's most desired information.

While *Whole Air* cannot yet match paid circulation with *Hang Gliding*, our pass-on readership surveys show nearly 15,000 pilots see every issue. That over three pilots read each copy of *Whole Air* is very satisfying.

Excited as we are over reaction and response to the magazine, we are still fighting uphill (as are all Americans) in the inflation battle. Our postage costs rose over 30% in 1981 alone. Our printing costs rose 20%. With more and better content in each *Whole Air*, the costs will continue to rise, all too fast.

To offset most but not all of these increases, *Whole Air* will go to \$2.00 with our Fourth Anniversary May/June 1982 issue. Our determination also increases, fortunately, and with your feedback and continued support, *Whole Air* will provide the best information to be had on our wonderful form of sport aviation . . . worldwide!

We have spoken to many pilots, dealers, manufacturers, and other interested persons recently. Nearly all feel 1982 will be one of the best years EVER in hang gliding. We at *Whole Air* feel the same.

So much for hang gliding supposedly "dying out!" We wish you many warm thermals as 1982 gets underway.

Thanks,  
Dan Johnson

## PARASENSE vs. PARASTUPIDITY

"The BRS, which I have witnessed deployed successfully at flying altitudes on an ultralight, is one of the most important safety items yet developed for the ultralight industry."

John Lasko of Eipper Formance

"I have personally deployed the BRS from a hang glider and an ultralight, and have found that it dramatically reduces deployment time. When you need the 'chute the most, you need it the quickest. The altitude lost before deployment is significantly lower than hand thrown 'chutes. All serious pilots should consider this system."

Rob Kells of Wills Wing

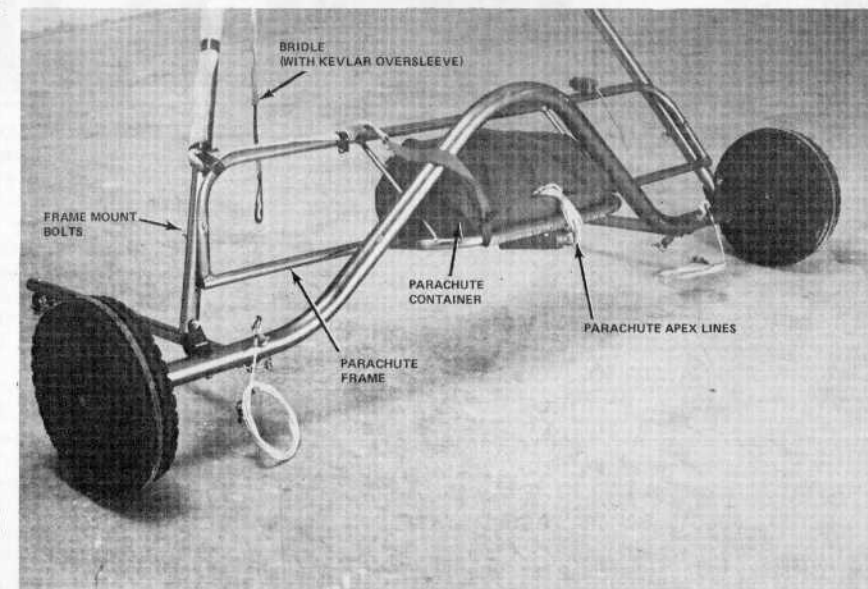
"I really like the concept of the BRS. Since it is ballistically deployed, deployment is instantaneous. When I fly with a 'chute, I want to know it will deploy when I really need it. I believe it's a must for any ultralight pilot."

Larry Newman of American Aerolights

"I'd own a parachute but I've never needed one yet . . ."

"I'd buy a parachute but they deploy too slowly, and I'd never get it clear of the glider in time . . ."

Surely, you are not the pilot making these statements? Are you?!



# BRS

## BALLISTIC RECOVERY SYSTEM

**NOW AVAILABLE**

NOW . . . you can have instantaneous deployment, with documented full deployment times under 1.50 seconds. This compares to 7.48 seconds for hand deployments (average figures from the Chattanooga Real Air Deployment Seminar).

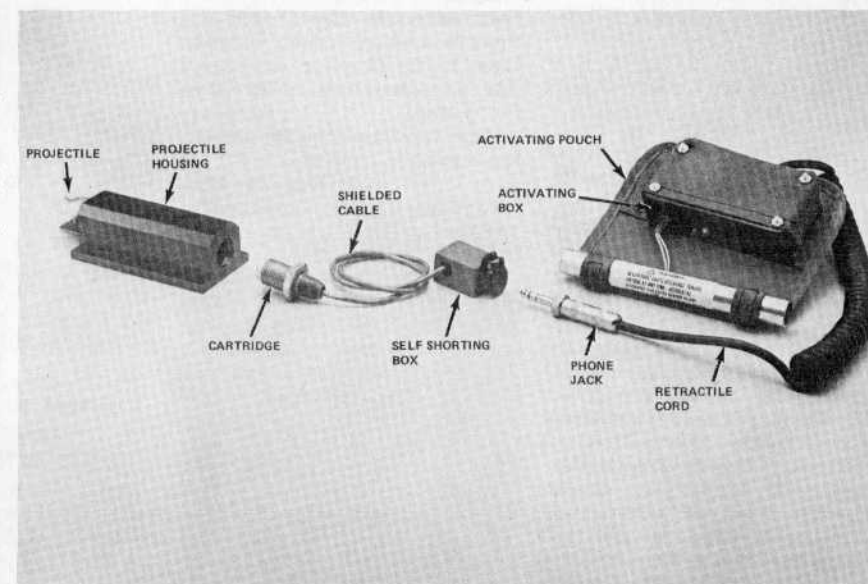
NOW . . . documented in-flight tests illustrate full deployment could occur at altitudes under 90 feet.

TODAY . . . you can own the most sophisticated life-saving system in the world. The BRS is an electronic system that greatly decreases any chance of malfunction or inadvertent deployment.

Concerns over system failure are totally resolved as you can manually deploy the BRS as well. Military contractors have been employed in the seven years of intensive development. A program of check, re-check, and check again assures that the BRS provides the highest quality and certainty of performance when you need it.

The BRS has a low weight of 6-9 pounds, depending on the 'chute and type of support frame selected. The cost? A very reasonable \$695, which includes a 24 foot parachute.

TODAY . . . contact BRS Inc., for the pinnacle in life-saving technology. Which is it for you? . . . Parastupidity or Parasense . . . the BRS, Ballistic Recovery System.



# BALLISTIC RECOVERY SYSTEMS INC.

2277 W. County Rd. C.  
St. Paul (Roseville), MN 55113  
612/633-3333





# FORUM

## Bluebook Comment

I want to say right away that I appreciate your unique approach and contribution to both Hang Gliding publications and also to service. It's much needed.

I'm writing to comment on the used glider market (at least here in Southern California) as it has been my experience over the past year of so that I've been involved with Hang Gliding Referral Service, a used glider listing service here in Long Beach.

I have noticed all along that while the prices listed in your Used Glider Bluebook are generally representative of what the gliders listed there *could* bring, and probably usually *do* bring, when sold by a dealer or school, there is a great quantity of these same gliders sitting in peoples garages, readily available for much less.

Bearing this in mind, a person shopping for a used glider could serve him or herself well to shop among local pilots as well as Dealers available to them in their area. (Of course) ...a Dealer anywhere can offer service and convenience that is not available through the independent flyer trying to sell his old wing.

Doug Hertzog  
Long Beach, CA

## Paying for Something You Didn't Get?!

The following persons have sent subscription money to *Whole Air* but failed to include their address. Please contact us so we may provide your magazine: Zoshito (Hoshito?) Oki, Bill Walter, Steven Kirchgessner, Peter Jones, John Strehl, Jon Leak, and Thompson Family Enterprises.

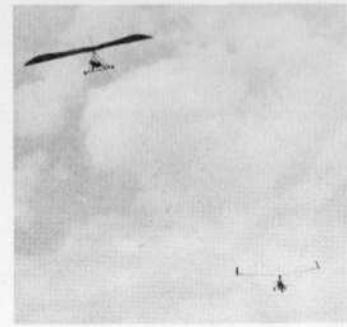
## Florida Aero Towing

Here are some photos of our progress in Aero Tows of flex-wings. No real major problems to date.

Photos: Harold Fields  
Pterodactyl pilot: Dan O' Neil  
Highster 174 pilot: Jean Audette  
Date: 12/6/81  
Site: Krome Ave (alias the Everglades)

Hope to have some air shots in a few weeks.

Doug Barnette  
Miami, FL



## Calendar Items

### KITTY HAWK KITES WEST

- April 3-4 .... Hang III Field Trip
- April 24-25 ..... Marina Steeple Chase
- ..... Flight Designs Demo Days
- June 12 ..... Parachute Clinic
- June 26 .. Hang III Field Trip & Thermal Soaring Clinic
- July 4 .....
- ..... Target Competition & Cookbook
- September 5 .....
- ..... Hang II Competition
- October 30 ... Halloween Party

November 9 ..... Blow-out

Jim Johns  
Manager.

408/384-2622

### DELTA CLUB COMO

#### ITALIAN OPEN DISTANCE CHAMPIONSHIP

May 30th — June 6th, 1982 is the time for the Third Lariano Triangle, International Cross Country Open Distance Championships organized by Delta Club Como, for top world XC pilots, invitation only. For further information, contact: Tony Masters; Via Monterosa 11; 20149 Milano; Italy; Phone (02) 49.81.446, or Gianluca Zunino; Via Stoppani 4; 20129 Milano; Italy; phone (02)49.89.461.

Gianluca Zunino,  
Delta Club Como

### HANG GLIDER EQUIPMENT COMPANY

April 17-18: Fort Funston air race Qualifier. Contact Walt Nielsen; P.O. Box 207 Daly City, CA 94016; phone 415/992-6020.

April 29 — May 2: Fort Funston Air Race World Invitational Competition. Contact: Walt Nielsen; P.O. Box 207; Daly City, CA 94016; phone 415/992-6020.

Walt Nielsen  
Daly City, CA

### GREAT WESTERN ULTRALIGHT RALLY

April 9-10-11: Easter weekend, 5th Annual "Great Western Ultralight Rally." In Porterville, California, it's the biggest ultralight event on the West Coast. Events — Party — Fun,

Tony Hanlon  
Gympie, Australia

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sponsored by EAA Ultralight Chapter No. 11. Contact Richard Avalon at 209/781-8100.

Report from  
Mitchell Wing Corp  
Porterville, CA

### Streamlined Trike

Thought I'd drop you a few lines to tell you that you have the best damned Hang Gliding publication in the world.

The reason that I have found a favoring to your magazine, is that you have the only in depth reviews of Trikes, Towing, and Aerobatics. Other publications have exclusively gone to the reporting of ultralight action. As you say in the edition that I have just received, you are catering to the hang glider pilot who has an inclination towards power but still has a stronger compulsion to soar. What you could possibly have done to your readers is to start their imaginations cycling towards the possibilities of having a self-launching, streamlined, trike system that had the minimum drag requirements for soaring flight.

Tony Hanlon  
Gympie, Australia

## Hang Gliding News Releases

### FLIGHT DESIGNS NEW GENERATION JAVELIN FROM FLIGHT DESIGNS

Flight Designs' new Hang Gliding Department announces the release of the first of a new generation of hang gliders called the JAVELIN. A 35% double surface, defined airfoil, short span, highly maneuverable glider. JAVELIN's low-speed matches or exceeds the now popular high performance gliders on the market. Featuring a foam entry section, span-wise sail cut and a quick and easy set-up procedure, the JAVELIN comes in two sizes: 168 and 208 and is fully HGMA certified to 1982 standards.

Using a new structural construction technique, the JAVELIN averages a weight savings of 14-25% over current competition models.

The combination of light weight and short span, make the JAVELIN every pilot's glider with remarkable thermalling ability.

Anticipating a high demand for the JAVELIN, Flight Designs is already building a number of stock gliders for immediate delivery.

### WILLS WING WILLS WING JOINED BY PFEIFFER & PRICE

This year Wills Wing Inc. has the pleasure of welcoming two very talented and accomplished individuals to the team: HGMA Founder, Tom Price, and top-ranked competition pilot, Rich Pfeiffer.

Tom's years of research in flexwing stability, performance, and structural design have been instrumental in the development of today's safe, practical gliders. His sailmaking skills make him a real asset as our Loft Manager. Tom's design achievements include the ASG series gliders, of which the strut-braced graphite ASG-23 is his latest.

Rich's love of competition has led him to National Championship in both parachuting and hang gliding. He is the only pilot to take consecutive wins in the elite Owen's Valley XC Classic, and last summer he became the sport's first nationally televised U.S. Champion. Rich brings his experience in harness design and innovation to Wills Wing as Manager of our Accessories Dept., guiding development of the practical, aesthetic Bulletman design.

Both Rich and Tom are busy making valuable contributions at Wills Wing, and we are delighted to have them aboard!

### 1981 HARRIER II

We are happy to announce the release of the 1982 HARRIER II,

effective immediately. The Harrier II has been redesigned to increase its appeal to and suitability for the recreational soaring pilot from novice through advanced skill levels.

Minor changes include a slightly smaller control bar for the 177 to make it easier to fly and substantially easier to land. The Harrier II is available in three sizes, the 187, 177, 147, each with its own sized control bar to perfectly suit the different sized pilots.

We have also incorporated most of the new DUCK hardware on the Harrier II, and redesigned the airframes to reduce weight and cost.

We have made leading edge mylar an option. Those pilots who opt for no mylar will enjoy the benefits of substantial cost and weight savings. The Harrier II without mylar will retail at the original 1980 Harrier price, including all the new hardware, offering an exceptional value in recreational soaring performance. The Harrier II with mylar offers slightly increased performance in an economical soaring glider optimized for pleasant, responsive handling characteristics. Production will commence on or about March 1st.

### PACIFIC KITES

#### VAMPYRS & LANCER 4s

Production enters '82 going strong on the Mk. 2 Vampyr. Pilots that hook in over 200 pounds will be pleased with the performance and handling of the 185 ft<sup>2</sup> Vampyr. The new 164 is available for average size pilots. Both the 185 and 164 incorporate a refined 80% floating double surface sail and the cleaner Mk. 2 airframe. Prices on the Mk. 2 units are \$1775 for the 164 and \$1875 for the 185.

The venerable Lancer 4, the world's most popular beginner/intermediate glider is still in production! New Lancers retail for \$1185.

### J.C. Brown Auckland, New Zealand BENNETT DELTA WING BOB ENGLAND JOINS DELTA WING

Bob England, the designer of the Super Gryphon, and more recently, the Demon, has joined the Delta Wing staff in Van Nuys, California. Bob, who flew for the English in the American Cup in 1978, 79, and 80, previously worked for Delta Wing in 1978 and will be a great assist to Mark West, the current Delta Wing Design Engineer. Prior to joining Delta Wing, Bob was employed by HiWay of the United Kingdom, where he developed the Demon, but looks forward to flying against his countrymen in the 1982 competition season.

### STEVE AYCOCK

Formally working for Soar-master in Phoenix, Arizona, Steve has joined the Delta Wing Team as manager of the Trike Division. Steve won the 1981 Ultralight Race flying a trike on a Phoenix Viper. He plans to return in 1982 to defend his victory this year as well as represent the company at other meets throughout the year. He will also be involved in team flying and certification testing.

### S. L. BACK UP SYSTEM

Delta Wing Kites & Gliders has a new S.L. (Super Lite) Back Up System. It weighs only 3 1/4 pounds and is especially designed to fit into the cocoon harness flush pocket. It has the same one-step deployment system as in existing Back Up Systems. The S.L. B.U.S. can also be fitted to the familiar double container and sewn to the regular harness in the usual manner. The new chute will be known as the S.L. Mk V and will retail for \$465.00 in the one-step Rapid Deployment Container.

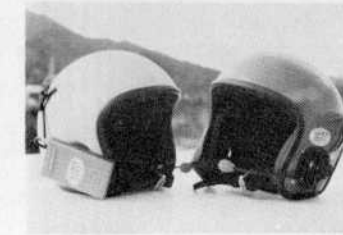
### FM HELMET-MOUNTED RADIO

A unique FM Helmet-mounted radio has been introduced by Delta Wing Kites & Gliders, for in-air communications between pilots and ground crew.

The unit only weighs ounces and is excellent for schools' use because of its voice activated transmitter. Students do not have to let go of the control bar to operate it.

Being FM, it does not have all the CB interference and has very clear reception.

The boom mike and speaker fit directly to Delta Wing helmets and the unit may be attached to the helmet or placed in a pocket on the harness, etc. The unit is only 3/4" X 2 1/2" X 4" and operates off a standard 9 volt battery. Complete unit price, less battery is \$199.00 each.



### NEW INSTRUMENT HOUSING

Delta Wing Kites & Gliders announces the release of its new instrument housing made of light weight A.B.S., weighing 1.1 pounds, it has a quick detach two position arm. It comes with a small compass and room for several regular sized instruments. Tear drop in shape, it has minimal drag and retails for \$57.00.

### Sport Flight changes hands

Gaithersburg, MD — Bob

Deffenbaugh and Margo Daniels announce their recent acquisition of Sport Flight, founded by Les King in 1974 and serving the greater Washington/Baltimore area.

The full-time shop, now Sport Flight, Inc., includes one of the few USHGA-certified hang gliding schools on the east coast, and handles all phases of both footlaunched and powered ultralight flight.

Les King is still very much in evidence at Sport Flight, where he is working on independent design and as a powered ultralight instructor.

If you're in the area, please stop by and say hello! The phone number is 301/840-9284.

### PROGRESSIVE AIRCRAFT

#### PRO BREEZ RELEASED

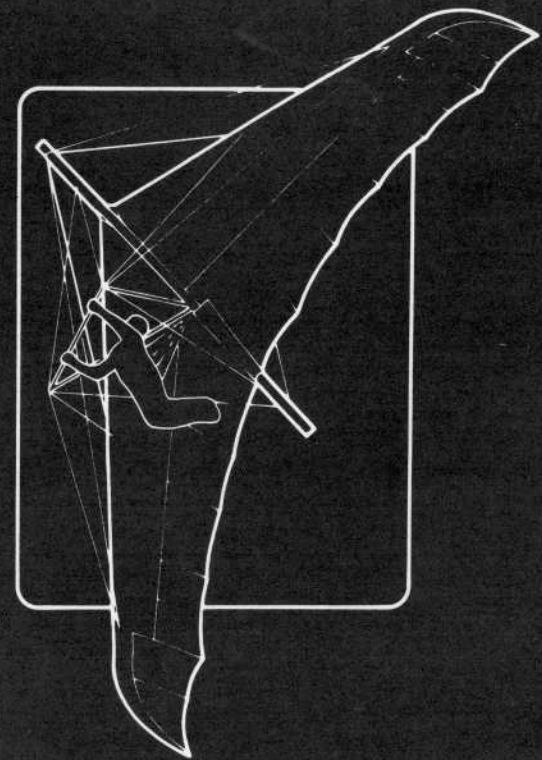
Pro Air of Simi Valley, Calif., has just released the BREEZ, designed for the discriminating hang II/III pilot. This glider was created to give the intermediate pilot the advantage of the tight sail/ fixed airfoil performance yet the ease and forgiveness of the beginning glider. This glider has all the features of the PROAIR with the exception of the lower double surface. The cross-bar is still free floating and is attached to the top surface of the sail by means of an exclusive attachment system, which keeps the spar in its lowest drag position, thus, performance is very close to our top of the line glider, and definitely better than all other intermediate ships.

### Western Flyer/Ultralight Flyer ARV Design Competition Fly-off Date Changed to June — Site Announced

Tacoma, Washington — The Flyoff date for the *Western Flyer/Ultralight Flyer ARV Design Competition* has been moved to June 10-12, 1983. The announcement was made by Contest Director, Dave Sclair.

"We've received numerous requests for contest entry forms and with them have been a number of suggestions that additional time be allowed for finishing prototypes and flight test programs. The extra six months should be adequate for everyone. We definitely do not want to rush anyone and compromise safety," said Sclair.

Moving the contest from winter to summer also had a positive impact on the Fly-off site selection. EAA President, Paul Poberezny, Honorary Chairman for the ARV Competition, was quick to offer EAA's Oshkosh headquarters for the Fly-off. "We have all the necessary facilities for the judging," Poberezny said, "and we'd be pleased to open our convention grounds for this exciting competition."



The Stratus V-B has had over five and one half years of creative research and design manufactured into the structure and sail.

Possessing the most esthetic planform on the market, the V-B brings the pilot the opportunity to experience a truly responsive and exceptionally high performing hang glider.

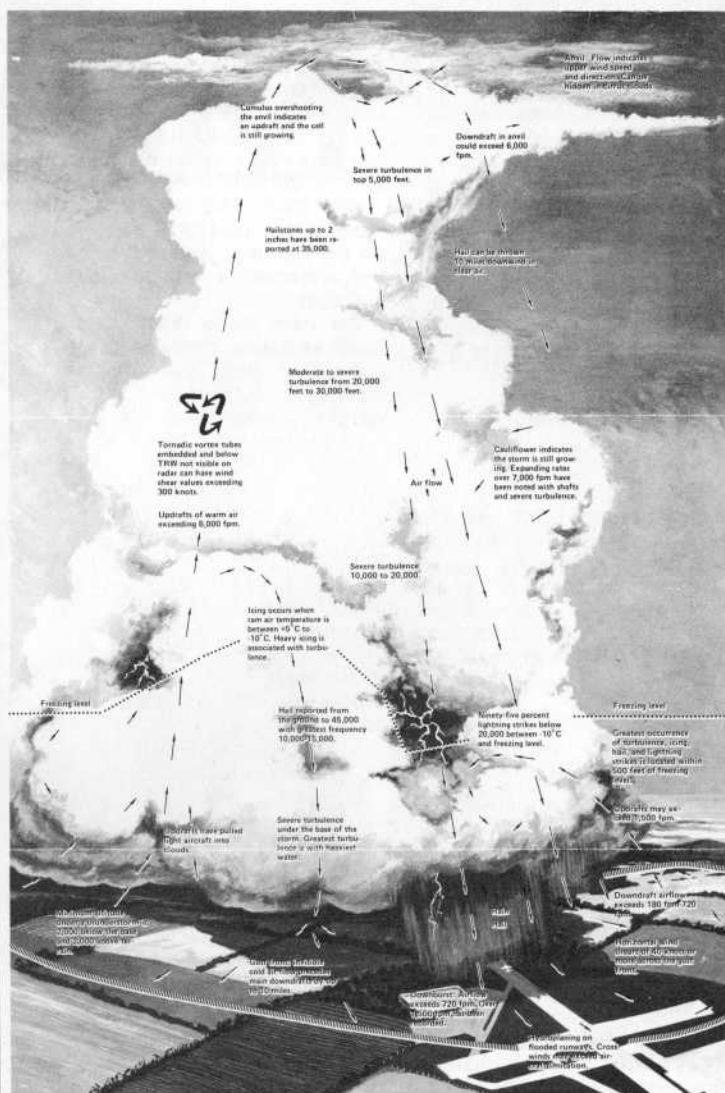
Flying a Stratus allows the pilot to enjoy the total freedom associated with the fantasies of flight.

Being of a non-cloned status, the Stratus is the only choice for a flex wing glider.

## Stratus

Old Schoolhouse  
(415) 728-7655  
Montara, California 94037

## FORUM



### AMERICAN AEROLIGHTS EXPANDS

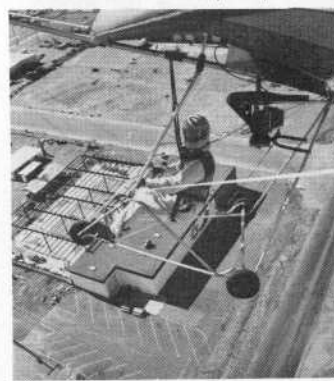
American Aerolights, Inc., builder of the Eagle ultralight, is expanding its manufacturing, sales and dealer training facilities by approximately 200%. Present production figures of over 180 Eagles per month will be boosted to over 400 per month by spring. New dealer training and sales offices have recently opened at Coronado Airport in Albuquerque. These offices with their adjoining hanger also serve as the center for all research, development and testing of new prototype aircraft.

With its increased production levels, American Aerolights has reopened its dealer program and is again accepting orders for its worldwide dealer network.

Each of the canard-equipped

Eagles is completely assembled and test flown and priced at only \$4395. Aircraft delivery times are running at less than one week.

Bryan Allen  
Vice President,  
Public Affairs  
Albuquerque, NM



# THIS PACKAGE CAN SAVE YOUR LIFE. WILL YOU FLY WITHOUT IT?



Life saving technology from Flight Designs is backed by Pioneer. What does it mean to you?

Pioneer is the builder of the very advanced and demanding recovery systems for the highly technical space exploration vehicle, Columbia. That same engineering expertise goes into every Flight Design Emergency Hang Gliding Parachute.

A tri-conical gore shape with bias construction gives the Flight Designs parachute the flatest profile (for high drag per square foot of fabric), circumference "give," and tremendous radial seam strength. The threads are interlocked and cannot "comb out." With the remarkable F-111 fabric and this strong support construction, it's no surprise that the parachute system has been real-tested with a 250 pound weight at 100 miles an hour!

### KEVLAR... MORE STRENGTH/LESS WEIGHT

The very low bulk dacron lines boast 300 pounds tensile strength. A Kevlar bridle now holds the chute to you with twice the strength of the more common nylon bridles. This truly bullet-proof material is much more abrasion and cut resistant, yet is lighter in weight and has less bulk. Contact with sharp metal parts of your glider is less of a problem. This is why a Kevlar skirt band is also employed.

But it all weighs in at a mere 4.75 pounds. Amazing technology from the World's Parachute Leader - Pioneer - distributed around the globe by Flight Designs.



Will you fly without it?

FLIGHT DESIGNS, P.O. BOX 1503, Salinas California 93902

## COMING NEXT ISSUE . . .



A "Spring Face Off." **WHOLE AIR** initiates a new standard in evaluating gliders, as three pilots each check out three new Supershops... the Wills Wing Duck, Progressive Aircraft ProStar, and Bennett Delta Wing X-

Series. Also next issue . . . read about the latest in life-saving systems development, as **WHOLE AIR** presents the **BRS — Ballistic Recovery System**. And much more! **Subscribe today. Don't miss an issue!**



## Swiss Alp Hang Gliding Safari

During the Summer of 1982 we again take to the road in our Safari Bus so that you may encounter the rapture of soaring the Swiss Alps; each day bringing new challenges and peak-experiences.

From the summit of carefully selected mountains, a view of 1000 snow covered peaks, sun drenched granite walls, glimmering mountain lakes, spectacular water falls, and peaceful alpine meadows.

I invite qualified pilots to join us in 1982, on one of our exceptional Swiss Alp Safaris.

*Ron Hurst*  
Ron Hurst, Zürich

For complete documentation of our high adventure Swiss Alp Hang Gliding Safaris send \$ 5.00 to cover airmail postage to:

Ron Hurst, Kurfürstenstr. 61, 8002 Zürich, Switzerland, AIRMAIL



## Ultralight News Releases

### STATE OF THE ULTRALIGHT INDUSTRY

Released December 1st, 1981, Michael Markowski's "State of the Ultralight Industry Report" says that "...most respondents predict their 1982 sales will double the 1981 figures."

Markowski continues, "The 21 respondents showed a total retail sales amount of nearly \$41,000,000 with unit sales approaching 10,000. It is 'guesstimated' that the non-respondents (14) probably can account for an additional 500+ units with a retail value of over \$2,000,000."

"The top five companies accounted for 67% of total industry sales, while the second five companies accounted for 17% of total industry sales. The remaining 11 companies did 16% of total sales. Sales appear to be heaviest in the midwest and sunbelt, indicating much of the country remains virtually virgin. The 21 respondents are represented by over 1,100 dealers."

Based on numbers given to Markowski by each manufacturer, the following ranking could be made. Please keep in mind that no claim of accuracy is intended or implied.

Ranking Table (by dollar volume)

1st .....	Eipper Formance
2nd .....	Weedhopper
3rd .....	American Aerolights
4th .....	Rotec Engineering
5th .....	Ultralight Soaring
6th .....	Mitchell Wing
7th .....	Pterodactyl
8th ..	Motorized Gliders of Iowa
9th .....	Goldwing
10th .....	Ultralight Flight

### EIPPER QUICKSILVER MX FLYING OVER COLUMBIAN JUNGLES

San Marcos, Calif. — Soaring across Columbia at an average altitude of 10,000 feet, nine men marked the opening of Eipper-Formance, Inc.'s newest ultralight aircraft dealership, this one in South America.

The cross country flight took Eipper-Formance Field Representative, Jerry Sanderson, and eight others over 235 miles of Columbia's rugged, sparsely populated terrain. The ground below the pilots was mostly mountainous jungle with tiny villages tucked into the lush vegetation.

The cross country trip lasted three days. The biggest difference between flying a powered ultralight in the U.S. and Columbia is the altitude pilots seek, according to Sanderson.

"Here in the U.S. most pilots cruise at 200 to 1,000 feet. In Columbia, the fliers would climb 3,000 to 5,000 feet before starting to cruise and they would continue to gain altitude in flight."

The altitude presented no problem for the sturdy Eipper Quicksilver MX's. Once at about 10,000 feet they ran into some rain and sleet, recalled Sanderson, but they just descended to a lower altitude to escape the inclement weather.

Based in Medellin, Columbia, the dealership was bought by Andre Botero, who expects to sell 50 to 60 Eipper ultralights in the next six months. Eipper also has dealers in Japan, Sweden, England, Australia, and others.

### CGS AVIATION

#### CGS AVIATION FORMS A LIMITED PARTNERSHIP FOR R & D

CGS Aviation announces the formation of a limited partnership, with Truline Bearing Company, for research and development of CGS Aviation's ultralight, the Hawk.

Frank Durkalski, President of Truline Bearing, said he believes the ultralight manufacturers, "will enjoy considerable growth as the industry realizes the commercial applications of a structurally sound ultralight." What impressed Mr. Durkalski to CGS Aviation is its designer, Chuck Slusarczyk. "He has an impressive aviation background, a patent for the reduction system, and an ultralight whose design has the potential for commercial application."

Truline Bearing Company, a Cleveland based manufacturer of precision bronze and aluminum bearings and seals, has expertise in the aviation field, providing precision parts to such commercial aircraft manufacturers as TRW, Sunstrand Aviation, G.E., Pratt & Whitney, Boeing, and Cessna.

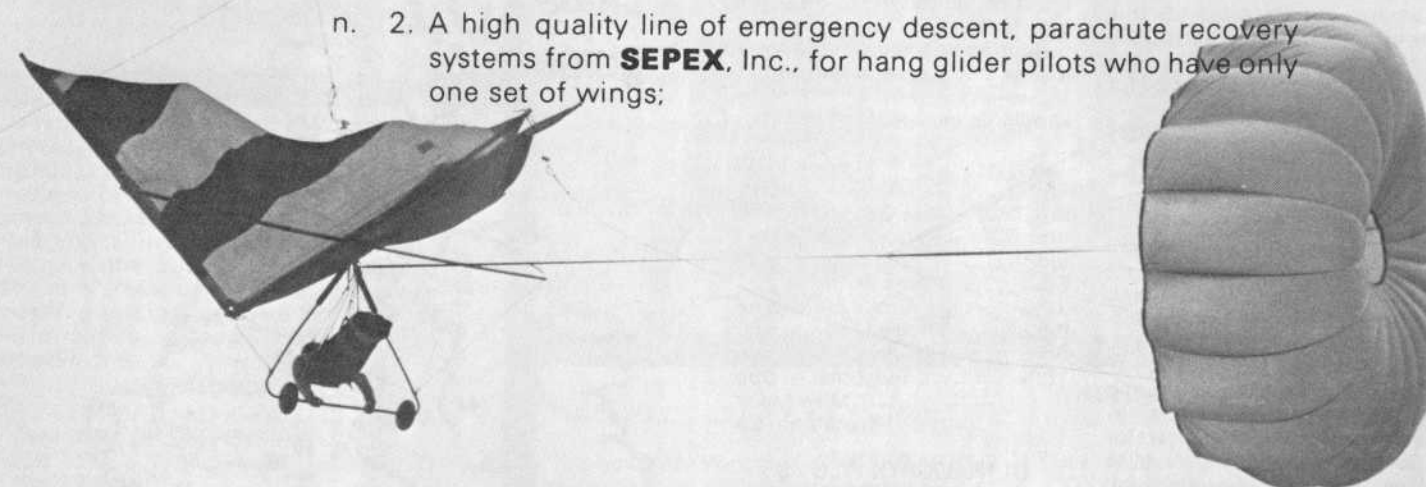
### MITCHELL AIRCRAFT SCHOOL PROJECT

Mitchell Aircraft Corporation, based in Porterville, Calif., has developed a kit specifically designed as a classroom building project. Using their popular B-10 as a basis, the kit includes all of the necessary materials to build the complete airframe. The 'D' tube leading edge and truss ribs are constructed in the traditional manner using aircraft quality Douglas fir. Ceconite (2.7 oz.) dacron is used as the covering fabric. Special price for schools and clubs is \$1175, the project takes between 300-400 man-hours to complete, and is considered an excellent training project for new builders.

# SERAPH\*

SERAPH (ser'ef) n. 1. A celestial being of the highest order having more than one set of wings;

n. 2. A high quality line of emergency descent, parachute recovery systems from **SEPEX, Inc.**, for hang glider pilots who have only one set of wings;



All **SERAPH** hang glider recovery systems from **SEPEX** feature:

- Pulled down apex with centerline for fastest filling time, more stability, and increased projected diameter.
- Positive container closure system which prevents accidental deployment during high G maneuvers, yet remains easily accessible for activation by either hand.
- F-111 fabric (1.0 oz./yd.<sup>2</sup>) for high strength, low bulk construction (4.5 lbs.). Custom colors available at no extra charge.
- Suspension lines are finger trapped throughout. Kevlar optional.
- Hand crafted construction by certificated parachute riggers in our loft at the eastern capital of soaring — Chattanooga.

The **SERAPH** hang glider recovery systems are designed and manufactured to exceed all requirements set forth under FAA TSO C23b.

For information regarding our exceptional dealership programs, contact:

**SEPEX, Inc.**  
Post Office Box 303  
Signal Mountain, Tennessee 37377  
(615) 886-6417

# FORUM

## Associations

### HGMA ANNUAL MEETING

On December 14, 1982, the annual membership meeting of the HGMA was held in Santa Barbara, California. At this meeting the airworthiness standards were revised and the board of directors was elected for 1982.

Revisions to the airworthiness standards included the standardizing of procedures and requirements for vehicle testing. Elected to the board of directors for 1982 were Bill Bennett's Delta Wing Kites & Gliders, Flight Designs, Progressive Aircraft Company, Ultralight Products Inc. and Wills Wing, Inc.

Following the general membership meeting, a meeting of the new board of directors was held to elect the HGMA officers for 1982. The new officers are: Mike Meier, President; Roy Haggard, Vice President; Richard Boone, Secretary/Treasurer.

### PUMA

#### ULTRALIGHT FOOT-LAUNCH CRITERIA UPHELD

With regard to what, if any, new rules to impose on ultralights and ultralight pilots, the official FAA stand on the matter was presented to me on October 20, 1981, during the meetings I held with FAA representatives in Washington, DC. It is as follows:

"WHEN CONSIDERING THE PURCHASE OF AN ULTRALIGHT, SELECTION SHOULD BE BASED UPON PRESENT FAA REGULATIONS. ANY CONDITIONS OR OPINIONS OF THE NPRM SHOULD NOT BE CONSIDERED AS THESE ARE NOT REGULATIONS."

The present criterion for defining an ultralight aircraft is that such craft be foot-launchable. If the ultralight aircraft (you are considering for purchase) meets this criterion, is foot-launchable, and this capability has been demonstrated and documented before appropriate authority, its use will not be restricted in the future concerning foot-launchability or weight restriction.

Lyle Byrum  
President,  
PUMA

#### USHGA COMPETITION COMMITTEE

(Presented here) is a list of the final competition standings for the 1981 season (see below).

There are ways in which the points system itself might be improved, in terms of the way in which it calculates the value of a meet. However, I'm sufficiently satisfied with it at this point that I'm not going to rewrite the program unless someone else feels strongly enough about some aspect of it to expend some effort showing me why and how it should be changed.

- |            |                |        |
|------------|----------------|--------|
| 1st .....  | Rich Pfeiffer  | — 1183 |
| 2nd .....  | Jeff Burnett   | — 1014 |
| 3rd .....  | Mark Bennett   | — 894  |
| 4th .....  | Sterling Stoll | — 894  |
| 5th .....  | Jeff Scott     | — 822  |
| 6th .....  | Gene Blythe    | — 802  |
| 7th .....  | Mike Arrambide | — 756  |
| 8th .....  | Mike Meier     | — 750  |
| 9th .....  | Bruce Case     | — 740  |
| 10th ..... | Ted Zinke      | — 698  |
- Mike Meier  
Santa Ana, CA

#### ULTRALIGHTS PILOT'S ASSOCIATION U.P.A.

The Ultralight Pilot's Association, Inc., was incorporated in Maryland as a non-profit organization separate from AOPA but with full support of the parent organization.

A Board of Trustees (elected yearly by the membership) follows:

- |                |              |
|----------------|--------------|
| Dave Broyles   | Vic Powell   |
| Dick Turner    | John Harris  |
| Bill Raisner   | Al Godman    |
| Jim Theis      | Dennis Pagen |
| Jack McCornack |              |

U.P.A. plans to offer these services in conjunction with AOPA (Aircraft Owners and Pilots Association): Instructor Certification; Rating of Pilots; Insurance; Competitions; Washington Lobby (AOPA); Titles for Ultralights; Accident Evaluation & Prevention (ASF, or Air Safety Foundation); Magazine; Records; Awards; Ground Schools (ASF).

AOPA will provide managerial services and will handle funds with Board approval. A tentative budget has been proposed recently for \$100,000.00.

Dave Broyles  
Plano, TX

#### BRITISH HANG GLIDING ASSOCIATION

#### BRITISH CLUBS GUIDE — CONTACTS FOR VISITING FLYERS

The BHGA is publishing in *Wings!* every six months a complete list of Site Controlling Clubs and the names and phone numbers of contacts.

You are welcomed to make

contact with Clubs if you intend to come and fly in the U.K. Clubs are not commercially involved in the sport, but run by volunteer enthusiasts who look after sites in their local area.

Those wanting a copy of the article may send a Sterling

International Money Order for £1 (surface mail) or £2 (air mail) for a copy of *Wings!* containing the most recent Contacts List.

Chris Corston  
Secretary,  
BHGA

## British clubs guide



#### STARFLIGHT, INC.

#### STARFIRE & TRISTAR ON MARKET

The Starfire (weight shift control) Ultralight and the 3-Axis Control TriStar are available on the market. The public is invited to contact Dick Turner for information. (Watch *Whole Air* for an upcoming mini-feature on the Starfire. —Ed.)

The 33 foot span Starfire uses a 20 hp Cuyuna engine and 54" X 24" hardwood propeller. Fully assembled it weighs 150 pounds, qualifying just under the

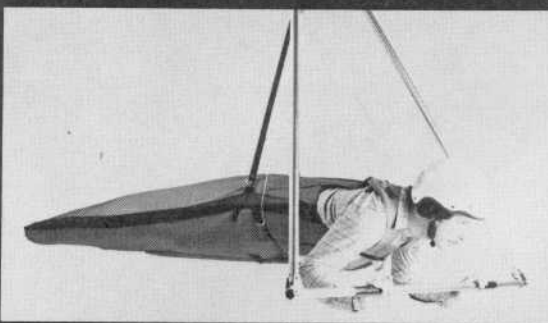
proposed 155 pound weight limit of the NPRM. It has a recommended weight range of 110-300 pounds, sets up without tools, has a partially double surfaced wing, and boasts all aircraft quality locking devices on connections and junctions.

Contact the factory at: Starflight Mfg Inc; Rt 3, Box 197; Liberty, MO 64068; phone 816/781-2250.

Report from  
Ted Gilmore  
Mission Hills, KS



# WILLS WING ACCESSORIES



#### BULLETMAN HARNESS.....\$349

The new Wills Wing BULLETMAN harness provides a practical solution to the problem of pilot body drag. Using a minimum number of low drag suspension lines, and fairing the parachute container internally, the BULLETMAN encloses the pilot in a smooth, aerodynamically clean sheath providing an extra measure of performance through reduction of parasitic drag.

#### FEATURES

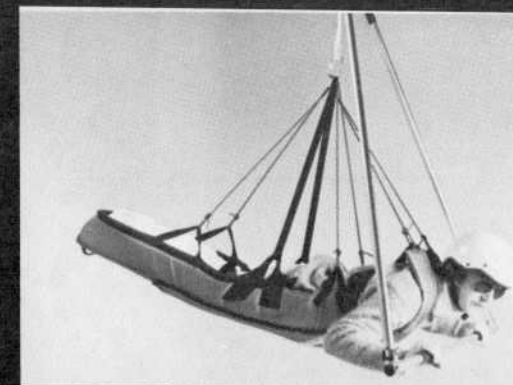
FULL SUPPORT AND COMFORT WITH A MINIMUM OF SUSPENSION LINES. EACH LEG STRAP SHOCK TESTED TO 2400 POUNDS. LANDING GEAR DOOR OPERATES AUTOMATICALLY. INCLUDES BAG DESIGNED TO CARRY HARNESS, HELMET, INSTRUMENTS, AND BATTENS. PROVIDES SPACE FOR YOUR GLIDER BAG.



#### BACKPACK GEAR BAG.....\$25

The new Wills Wing BACKPACK GEAR BAG provides a convenient, economical solution to your equipment storage and transport problems. The backpack design allows you to carry all of your gear comfortably without requiring the use of your hands. It packs up small, and can be conveniently stowed on board and carried while you fly.

## NEW PRODUCTS



#### ENCLOSED 'CHUTE CONTAINER FULL LENGTH HARNESS.....\$230

The Wills Wing ENCLOSED 'CHUTE CONTAINER harness provides the benefits in drag reduction of an internal parachute container in a conventional full length harness design. This harness offers the optimum combination of comfort, convenience and performance. Available in a selection of colors and stripes and other options available on request.

## OTHER ACCESSORIES

#### MISCELLANEOUS

- |                              |                    |
|------------------------------|--------------------|
| T Shirts and Jerseys .....   | \$7 — \$11         |
| Wills Wing Team Hats .....   | \$5                |
| Bell Helmets .....           | \$59.95            |
| "Manbirds" book .....        | \$17.95            |
| SMC Locking Carabiner .....  | \$7.50             |
| Steel Carabiner .....        | \$12               |
| Tie Downs 4', 6' & 10' ..... | \$5 — \$6          |
| Quick & Easy Racks .....     | \$26.37 (set of 4) |
| Hang Loops .....             | \$3 — \$10         |

#### HARNESSES

- |  |       |
|--|-------|
| Wills Wing Prone Stirrup Harness ..... | \$115 |
| Wills Wing Knee Hanger Harness .....   | \$100 |
| Wills Wing Full Length Harness .....   | \$165 |

#### GEAR BAGS

- |                             |      |
|-----------------------------|------|
| Backpack Bag .....          | \$25 |
| Small Harness Bag .....     | \$30 |
| Large Harness Bag .....     | \$35 |
| Padded Instrument Bag ..... | \$15 |

#### PARACHUTES AND TRICKS

- |  |       |
|--|-------|
| 20 Gore Chute — Pilots under 200 lbs. .... | \$349 |
| 22 Gore Chute — Pilots over 200 lbs. ....  | \$384 |
| 24 Gore Chute — For Ultralights .....      | \$419 |

- |  |       |
|--|-------|
| 20 Gore Kevlar — Lower Volume/Weight ..... | \$387 |
| 22 Gore Kevlar — Lower Volume/Weight ..... | \$422 |

- |  |        |
|--|--------|
| Chest Pack Container — Ultralights ..... | \$7.15 |
|--|--------|

- |                           |         |
|---------------------------|---------|
| Parachute Container ..... | \$25    |
| Double Container .....    | \$35    |
| Deployment Bag .....      | \$12.50 |
| Ballast Bag .....         | \$20    |
| Glove Bag .....           | \$15    |

#### INSTRUMENTS

- |                           |         |
|---------------------------|---------|
| Thommen Altimeter .....   | \$169   |
| Hall Wind Meter .....     | \$21.50 |
| Hall Prone Bracket .....  | \$6     |
| Hall Seated Bracket ..... | \$5     |

WILLS WING, INC. 1208-H East Walnut  
QUALITY•SERVICE•INTEGRITY Santa Ana, CA 92701  
714/547-1344

SEE YOUR WILLS WING DEALER  
FOR ALL YOUR FLYING NEEDS.





Designer Yoshiki Oka checks out the static balance of a new Falhawk Blazer 2 before a test flight at Mount Tsurume/photo: Noel Whittall

## Flying the FALHAWK...

Text and photos by Noel Whittall

Around twenty years ago I rode one of the first Japanese motorcycles to be imported into Britain. It possessed styling which could at best be described as quaint, and handled with all the precision of a macrame bag full of Jello. It took them several years to get the product right.

A decade later the same comments could be applied to Japanese automobiles, but now the only problem seems to be that almost everyone drives about in one!

If the "Blazer 2" from the Tokyo based firm of Falhawk is anything to judge by, Japanese hang glider manufacturers are not going to make similar mistakes; they seem to have got their product into shape already.

I admit that one flight off a mountain is scant evidence upon which to judge a glider, but during my descent of Mount Tsurume after the World Championships, I was able to feel completely at home on the Blazer. There is nothing "foreign" about it. In planform it is close to the Demon, but with extra battens more accurately defining the undersurface. Static balance is excellent, and a run off Tsurume's formidable launch ramp presented no problems whatever in spite of an almost

total lack of wind. It is no criticism of the glider that my first experience of a cocoon harness was less than glorious. Lacking my normal stirrup model, I had borrowed the cocoon from Yoshiki Oka, the Blazer designer. Yoshiki is maybe a couple of inches shorter than I. What I did not realise was that he in turn had borrowed the harness from a colleague who was a foot or two shorter than he. Consequently the flight was mainly executed in a sort of "kneeling praying prawn" position!

My impression is that the Blazer is really nicely coordinated. Hands off — no problem. Lazy flat 360's — no problem. Wind it up to eye-watering speed, then crank in a wingtip-standing 360 — no problem. Flare out on landing — quite predictable. The only thing I am not so sure about is top speed. Without instruments or another glider alongside, it is very difficult to judge, but the machine just did not *feel* as quick as say a Comet or a Sabre.

The Japanese home market is quite large, and the Blazer, selling at the equivalent of about 1300 dollars, enjoys a good position in that market.

The quality of this glider in respect of hardware, finish and performance, compares very favorably with any clubman's model I have encountered in the States or Europe.

## INTRODUCING THE JET WING ATV.

SEE ONE AND YOU'LL UNDERSTAND WHY IT'S NOT CALLED A TRIKE

Cruise at 37 mph, range 150 miles, climb 700 feet a minute, dive like a hawk or just switch off the engine and soar

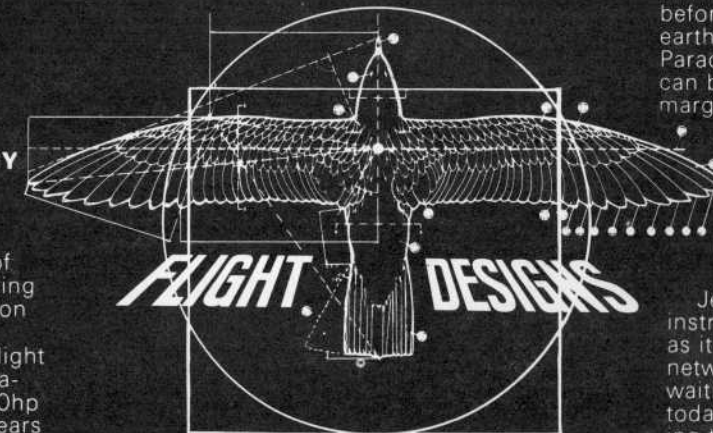
This is Jet Wing-ing. It is altogether different from flying a trike because a Jet Wing ATV is neither a trike nor just a motorized hang glider. The Jet Wing ATV (All Terrain Vehicle) is a totally new high-performance aircraft designed for the serious sports enthusiast.

A MARRIAGE OF LOW-SPEED AIRFOIL TECHNOLOGY AND ULTRALIGHT POWERED FLIGHT.

Jet Wing ATV has been developed after 2½ years of extensive research and testing by the Flight Designs division of Pioneer International Corporation. It combines Flight Designs' sophisticated delta-wing design and reliable 40hp engine with Pioneer's 50 years of technological superiority; expertise culminating in the manufacture of recovery systems for NASA's Space Shuttle.



As you sit in the contoured Jet Wing seat, you're struck by the precision with which the aviation tubing and aircraft-quality hardware are put together: to stay together.



A DIVISION OF PIONEER INTERNATIONAL

Dealer Inquiries Invited

## JETWING

A NEW DIMENSION IN SPORTS THRILLS.

Switch on. Start the engine. Lift-off comes after a roll of only 50 feet. Suddenly you're airborne and climbing, flying with total freedom to places previously inaccessible to fixed-wing aircraft.

Because the Jet Wing ATV maneuvers so predictably, you can switch off the engine confidently, experiencing the thrill of unpowered flight before gliding gracefully to earth. (An exclusive Aircraft Parachute Recovery System can be deployed for an extra margin of safety.)

A GROUND SUPPORT SYSTEM TO MATCH.

Jet Wing sales, service and instruction is as professional as its manufacture; a national network of qualified dealers is waiting to serve you. Write today. You could be Jet Wing-ing tomorrow. Flight Designs, PO BX 1503W, Salinas California 93902

# SKYTING

A proposal to make towing safer by  
Donnell Hewett/Illustrations by  
Donnell Hewett

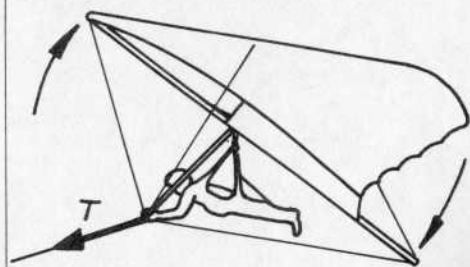


Figure 1

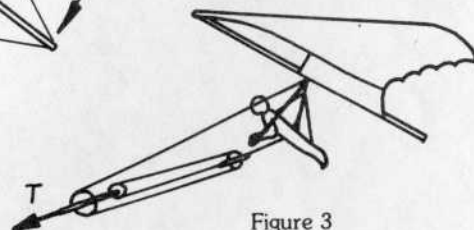


Figure 3

Although towing was the original form of hang gliding and many hundreds of people have learned to tow successfully, towing is still considered to be one of the most dangerous forms of hang gliding — primarily because of the dreaded "lockout." Doug Hildreath, in his 'Preliminary 1981 Accident Review,' pointed out that there were five towing accidents reported so far this year, that essentially every one of them was associated with a lockout, and that some of them involved very experienced pilots. In fact, the only reported towing fatality was that of an advanced pilot unable to release from a lockout. I feel so frustrated when I think of the many pilots unnecessarily endangering their lives by towing with the current "proven" systems (proven to produce lockouts), without even considering the "unproven" alternative.

Now, before you get the idea that I am some kind of "self-proclaimed expert" in the field of lockouts, please understand that I have had almost *no* first hand experience with lockouts. Almost all of my knowledge of lockouts had been obtained second handed (through the experiences of others) and through theoretical analysis. What little experience I have had was obtained more than two years ago when I was learning on my own how to fly a hang glider under tow. But it did not take very many experiences with lockouts to convince me that I never did want to become an "experienced lockout expert." As far as lockouts are concerned, I am quite content to remain on the "theoretical" side. So this article considers the theoretical aspects of lockouts, and if you want "experimental confirmation" of the theory,

consult any experienced conventional towing pilot. By the way, the theory presented in this article is greatly condensed in order to save space, and is somewhat oversimplified in order that the reader might gain more of an "intuitive understanding" of the lockout phenomenon.

So what is a lockout, what causes it, and how can it be prevented? If you have ever done much (string) kite flying, you have surely seen the case where the kite starts arcing over sideways and noses into the ground. This is a lockout, and it does not really matter whether the kite is an inexpensive toy or a costly hang glider with a man on board — the result is the same — *smash!*

The reason for this phenomenon is fairly obvious if one stops to think. If you attach a rope to the base tube of a hang glider and start towing (See figure 1), the forward pull of the towline on the control bar causes the nose of the glider to rise (unless the pilot pulls back harder than the tow force, which is frequently more than 100 pounds). As the nose rises, the glider offers more resistance to the air and the tension increases in the towline. This causes the nose to rise even more, and the cycle repeats itself until something gives. Even if nothing breaks (and the forces can easily and rapidly exceed a thousand pounds), the pilot finds himself in and "uncontrolled climb."

Now if during this uncontrolled climb, the glider gets turned crossways to the towline, then the sideways force on the bottom of the control bar causes the glider to bank in the opposite direction (See figure 2). The glider, therefore, tries to turn in one direction while being towed in the

other. Again the forces rapidly increase and soon exceed the limits of the pilot's control. But whereas an uncontrolled climb simply forces the glider to higher and higher altitudes (unless something breaks), a lockout causes the glider to continue turning and banking until it is eventually rammed into the ground. This is not my idea of fun!

The solution to the lockout problem should be just as obvious as its cause, namely *NEVER ATTACH THE TOWLINE TO, OR ALLOW IT TOUCH ANY PART OF, THE CONTROL BAR OR THE FLYING WIRES OF THE HANG GLIDER!* The only safe place to attach the towline to the glider is on the keel as close as possible to the heart bolt of the glider (the point of suspension of the pilot). Any other place causes torques about the glider's center of mass and makes the glider try to pitch, roll, or yaw. Since conventional two and three point bridle systems violate the above condition, it follows that they are subject to lockouts.

But heart bolt towing has its own problems. Because the tow force is applied above the center of mass of the combined pilot-glider system, it produces a torque which tends to rotate the whole pilot-glider system nose down. Attaching the towline only to the pilot has the opposite effect (although not as dramatic because of the larger mass of the pilot). The solution to this problem is: *USE A BRIDLE SYSTEM WHICH PULLS ON THE HEART BOLT OF THE GLIDER AND THE CENTER OF MASS OF THE PILOT WITH FORCES PROPORTIONAL TO THE WEIGHTS OF EACH.*

As an example, consider the case of a typical 180 pound pilot flying a typical 60 pound glider. The ratio of these weights would be 180 pounds to 60 pounds, or 3 to 1. Therefore, a bridle is needed which distributes the towline forces between the pilot and glider with a similar ratio of 3 to 1. Figure 3 illustrates a Skyting bridle, consisting of a system of pulleys which accomplish this goal. (For reasons beyond the scope of this article, we have found that a 2:1 Skyting bridle will generally work just as well in actual practice.)

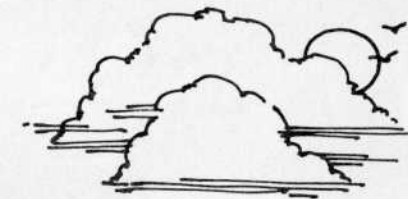
By distributing the towline forces the same as gravity distributes the weights of the pilot and the glider, the craft has no way of knowing whether it is under tow or simply flying freely under an increased gravitational pull. Its performance under tow, therefore, is essentially identical to its performance under free flight. This is the principle behind the Skyting bridle system and explains why we have had no problems associated with lockouts.

As mentioned previously, the above discussion has deliberately been kept simple. A more extensive treatment of the problems associated with towing, along with a description of the Skyting tow system is presented in a short publication entitled "Skyting No. 1," available for \$2.00 from Skyting, 315W North Wanda, Kingsville, TX 78363.

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# STATISTICS

Photo/Barnette



Some rather interesting information was taken from our Sep/Oct 81 Reader Response Cards. One hundred seventy-two of you returned your cards, and 97% of you filled them in completely. We appreciate this as these cards continue to tell us about our readers. As a result of four years of bi-monthly surveys, we think we may know more about our reader/pilots than most other magazines in the sport. To you, this means we have a much clearer idea of what you would like to read.

To the question, "Which kind of flying is your main interest/activity?" 64% of you answered "Soaring." Another quarter fly both power and foot launch as a "Regular Mix." Eleven per cent fly "Power" more or less exclusively. Five per cent "Tow," and of course some of you over-lapped, answering two modes. That a quarter of you fly whichever way gets airtime is not surprising anymore. Altogether, however, it is fair to say about one-third of our readers will fly with power and two-thirds presently have great preference to soaring.

"Do you now fly or ever intend to fly ultralight power?" was the second inquiry. Just under half (48%) said "Yes, for soaring." If this sampling of about 4% of our paid circulation is expanded to the full *Whole Air* audience (of nearly 15,000 pilots) a powerful invitation is being made for *someone* to build a true "motor glider" — which, in time, might sell 7,500 units or

more! This vote probably explains the very high interest in trikes.

A quarter said, "Yes, ultralights only" for them, and we interpreted this to mean that those who wish to fly power will stick with what is already on the market. In other words, when they soar, it will be powerless; when they "motor," it will be in the emerging "little airplanes."

A solid 29% said "No" to flying with power. To this "Quiet Corps" we at *Whole Air* want to say, "Stick with us then, as we will NOT abandon the pure soaring flight which is responsible for much of the current ultralight design technology.

Aero towing is still in the uncertain stage. Sixty per cent *would* care to be towed aloft by an ultralight. But 38% still say "No," primarily citing the following reasons: "Safety...Too new...Not proven...Needs more work...Not practical...Too many variables...Don't want to be a test pilot." Only 2% of you remain undecided as to how to answer the question.

Aerobatics is a hot subject. Ultralight and Hang Gliding leaders are all warning pilots to be careful. Our question was, "What is your interest in aerobatics?" You said:

- 1) "Doing it now" ..... 7.6%
- 2) "Wish to" ..... 15.2%
- 3) "Like to be trained" ..... 25.7%
- 4) "Just watch" ..... 37.1%
- 5) "None" ..... 10.5%
- 6) No answer given ..... 3.9%

That 48% express some desire to be involved with aerobatics, and that over a quarter desire training, suggests that schools should evolve to provide correct, safe aerobatic instruction. This in turn requires aerobatic craft, zero/negative-G harnesses, and knowledgeable instructors. Half of the readers are less likely to take up aerobatic flying.

Our last request was, "Name your ONE favorite article in this Sep/Oct 81 issue." Sixteen per cent just could not make up their minds, but the rest voted like this:

- 1st--Demon Pilot Report ..... 33%
- 2nd--Trike Update ..... 15%
- 3rd--Chattanooga Deployment Seminar ..... 13%
- 4th--Oshkosh 1981 ..... 6%
- tie--Product Lines ..... 6%
- 6th--Golden Age (by Noel Whittall) ..... 3%
- 7th--V-Bridles ..... 2%

Again, we want to say "THANKS!" for your input. YOU decide what we print by this voting... so *do not* stop. Fill out the Reader Response Card this time; it's free. And watch for a follow-up accident report (no fatalities) based on the strong response to the Nov/Dec 81 survey cards. These are being analyzed by Doug Hildreath of the USHGA Accident Review Committee. Also read Doug's official report on page 26 of this issue.



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## COCOON HARNESSSES??

OPINION by Jim Shaw

**WARNING:** Cocoon harnesses may be dangerous to your health and that of those around you. This is a true and false question to be answered by you at the end of this article.

The cold season is just leaving us as attested by the layers of clothing we are all putting on at the top (or bottom) of the hill. One way to stay warmer? Possibly a cocoon harness. You might ask, "Aren't they hard to get into? To get out of? Don't they limit your run? Expensive? Are they warm? Comfortable?" I might answer you "Buzz off, I want to fly," or I might tell you what I'm about to tell you now.

For those in the dark, a cocoon harness is a harness in which the supporting material reaches from the shoulder pads to a "boot" into where your toes disappear in flight. The fabric also reaches up the sides of your body leaving the back of you as the only part exposed to the elements. This does add a lot of warmth since your legs and feet are now covered. If anyone has set up on a dew shrouded morning in tennis shoes, you know how cold those wet feet get once in the airstream.

How about comfort? Properly

adjusted, the cocoon supports the body along its entire length. You don't have the constriction of the knee hangers (which, incidentally, restricts blood circulation), cold feet nor the droopleg syndrome of the stirrup harness. You also have the versatility to kick one leg out of the cocoon to stretch it, shake it to get the blood flowing, or reposition the car keys which are permanently inscribed "kwiklok" in your thigh. They are comfortable to fly in.

Ease of ground handling and taking off? The cocoon is doubled up (the boot is folded up toward the shoulder pads) so there should be no material restricting the movement of your legs. This makes the takeoff and ground handling easy. Kicking into the cocoon is much easier than the stirrup, especially without looking down, (taking concentration away from the basic skill of getting away from Mother Earth safely) once an easily learned technique is mastered. With a stirrup you have a single bar to land your feet on; with the cocoon you push one foot forward until you hit fabric, then push the foot down into the boot. Landing should be as easy as the takeoff, although every once in a while you hear of a pilot stepping on the boot while

running to save his down tubes and/or his pride. (I have stepped into the boot once in a whole lot of landings.) I will admit that I was almost killed lately stepping into it while running on flat ground trying to save my kite from flipping.

Takeoff technique: The first thing one must do is to make some sort of loop to attach to the bottom of the boot to hook around your thumb during the takeoff run. Flight Designs' comes with a handy plastic snap, one half on the boot, the other half just under the neck yoke, to hold the boot up while walking around figuring out why you just landed and everyone else is still up. I simply bought another snap to which I attached a nylon loop. This snaps to the boot just prior to launch, giving me something to hold in my hand (or teeth as some pilots do). Personally, I twist my cocoon 1/2 turn as I double the boot up which I feel snaps the boot down under your feet preventing the fabric from binding causing a hang up. (personal taste, it usually works either way). I hook the handy boot loop on my thumb as I grab the downtube, which pulls the cocoon up and away from those fast and furious feet. Some people put the loop in their mouths. I feel (a) when people get excited they tend

to grip tighter (the cocoon stays in place and open their mouths. You don't want that boot to drop too soon. (B) I don't know where that loop has been and I surely don't want it in my mouth.

You are running, once in the air simply open your hand (like you do to fly with a light touch, right?) and the boot drops. Now comes the technique, the goal is to put your toes into the boot. If you bring your knee straight up toward your chest, you actually push the boot away from you, making it impossible to get into. If, on the other hand, you brought your knees out and up like a frog, and your feet straight up (in a word, bowlegged), well, the problem is solved. Knees go out, feet come up and forward until they hit something, then down into the boot (usually one foot at a time). If, by chance, you get into the air and are suddenly eye level with the base tube and the boot is even with your belt buckle, your leg loops are too loose. Tighten them up so they are snug but free to move. One last point on the takeoff — all of the above is much easier if you stay on the down tubes until you have at least one toe in the boot. It is very hard, if not impossible to get in the cocoon while holding on to the base tube.

Landing? Simple, ease both feet out of the boot until just the toes are on the edge of the fabric, then pull one out. Pull the

other out just prior to sitting up. If you don't ease both feet out, you risk the chance of having the boot bind around the foot still in, leading to spectacular aerobatics at 30 feet while the pilot forgets about flying, paralyzed with the thought of hopping along on one foot. Once you get both feet out, tuck up and land normally.

Which cocoon to buy? As with any harness, try them and see what feels good. Once fitted properly, I haven't heard a complaint about the Robertson or the Flight Designs. The Robertson has more adjustments you can make, and is also cheaper at around \$170. It only comes in small, medium, large, and extra large, making the fine adjustments necessary. The Flight Designs does more of a custom job, asking for measurements with the order. It sells for around \$190. Of the two, Flight Designs will do extras such as faired parachute containers, pockets, radio pockets and ballast containers. Ask those with them how useful they are. There are other harnesses on the market (Eric Raymond, UP, Wills) which I am not familiar with so I will withhold comment.

As a wrap up, I find the cocoon warm, comfortable, easy and vital on extended flights, especially when things get a bit chilly. As with any other harness they must be adjusted properly. Also as with every harness, old and new, you must check the

knots and ropes. Are they tied securely? Do you have confidence in the types of knots used? Knots can and do loosen up. I see almost everyone preflight their gliders; when was the last time you did a preflight on your harness? A broken shoulder strap could ruin your whole day.

Do you need a cocoon? Knee hanger harnesses are easy and safe; there is nothing to distract you from flying — the harness does it all. With the cocoon and stirrup, there is one extra thing to distract you during a very critical part of flying, the takeoff. Too many people have something hang up on them and divert their attention to the harness as the glider is seeking the shortest path to the earth. For six minute gliding flights (common at our local site, Ed Levin), a knee hanger is all you really need. The more complicated harnesses come in handy when you are getting extended flights (i.e., 1/2 hour or more). At least hold off on the cocoon or stirrup until you have enough takeoffs in different conditions that the reactions of forgetting the harness and flying comes naturally when the need arises.

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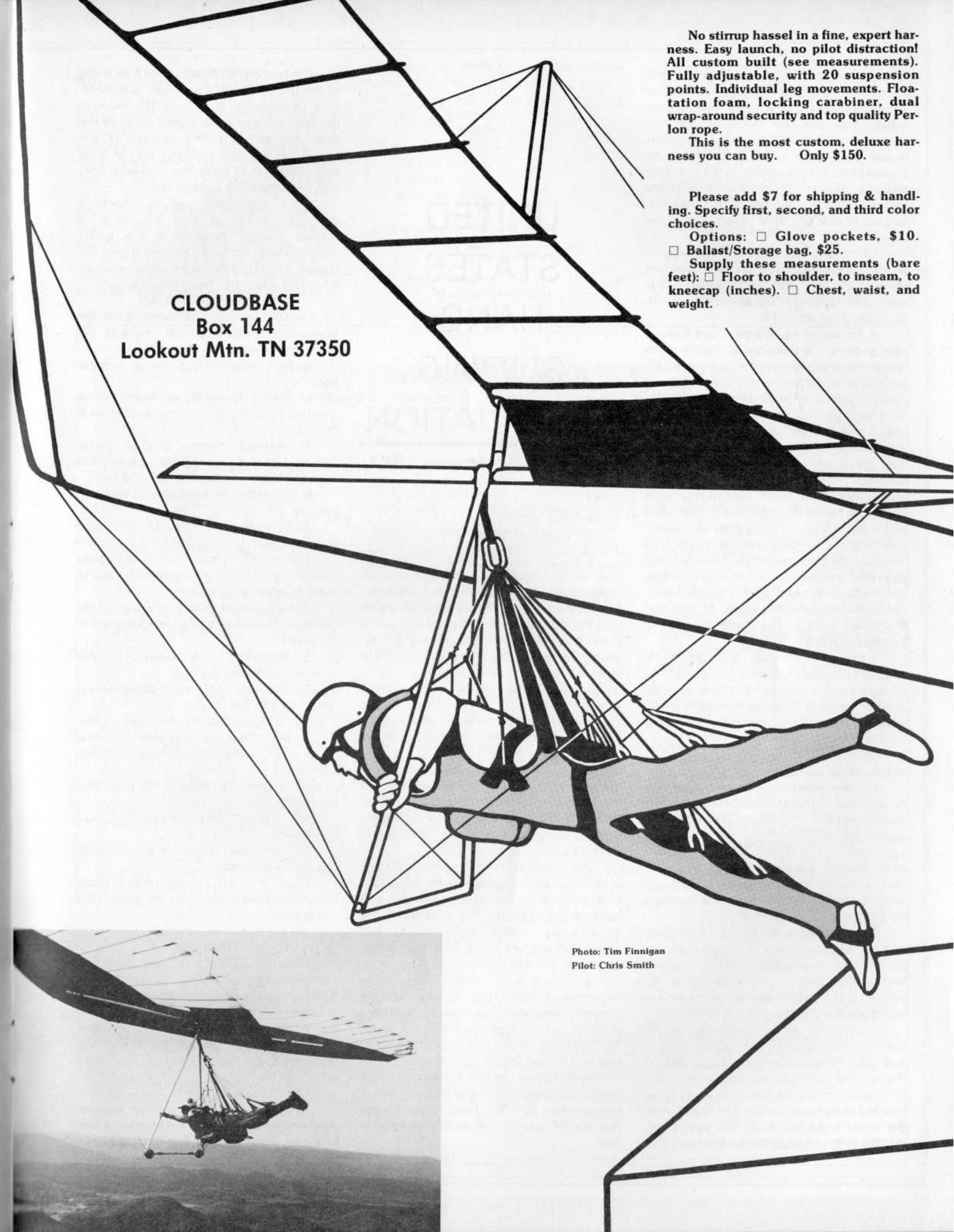
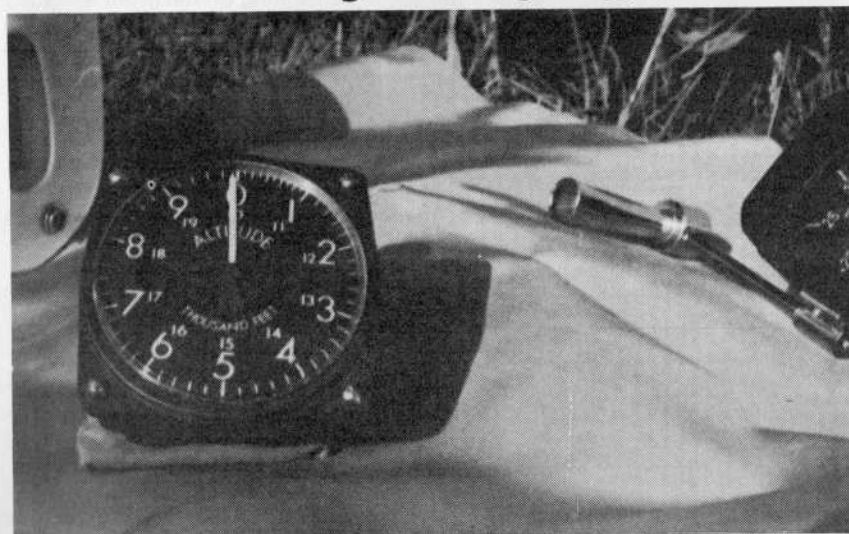


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Pilot: Chris Smith

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First, and foremost, I would like to thank each of you who sent in an accident report, either on yourself, or another pilot, during 1981. You are the backbone of our voluntary system and the only thing that makes our sport safer is the learning process that occurs following the accident analysis. But, none of this is possible without you, the individual pilot in the field, turning in that accident report. Again, my thanks.

Of the one hundred thirty-two reports which I received, our primary problem remains the stall: stalling at launch -- 34; stalling on landing -- 25; and stalling while scratching for lift -- 17.

In 15 instances, the pilot was flying a new glider or had borrowed a glider with which he was not familiar. Likewise, 10 accidents occurred when the pilot was flying a new site. In several of these, the pilot had expressed anxiety about the new site. A new harness, particularly a cocoon, also is causing accidents (tripping on run, stall trying to climb into, tripping on landing). \*\*\*Note: See page 23. Pilots attempting their first few windy cliff launches had three problems: The nose was too high; "unaggressive runs" ("inadequate lunge"); several pilots had "woofos" as their wireman. A few tripped over the nose man; only one wireman was knocked off the cliff by his student who failed to indicate the start of his run (fractured pelvis). The student made a successful launch.

Strong weather was a factor in 12 accidents. Predominantly, intermediate pilots were flying in winds too strong for their experience. A few experienced pilots were overcome by conditions too strong for any experience level.

Emotional factors contributed to eight accidents.

To my amazement, only three structural failures occurred during aerobatics. All three survived with parachute deployment. I am pleasantly surprised by this small number and can only assume that stronger gliders and "better instruction" are responsible — since it is evident that more aerobatics are being done.

There appears to be an increasing number of inadequate preflights. Several factors are responsible. First, H.G.M.A. certification and our recognition of its value has resulted in a certain complacency that the glider is air-worthy... all of the time. Secondly, newer construction techniques and double surfacing have made certain portions of the gliders difficult to inspect on the preflight. In addition, the slack wires have allowed two phenomenon: The first is, that the never-kinks can kink. The second is, that the tang can wiggle back and forth and

# UNITED STATES HANG GLIDING ASSOCIATION

## Accident Review — 1981

by Doug Hildreath  
USHGA Accident Review Committee

unscrew the lock nut. Although both of these can easily be detected on a preflight, one needs to think of this possibility and take the trouble to look for it, particularly under the double surface. Please do not forget the final preflight item — there were three failures to hook-in in 1981 (hook-in, hang-check, lift the glider and feel tight straps).

There were 10 instances where pilots successfully deployed their parachutes and it is highly likely that all 10 survived because of their parachutes. Incidentally, there were no significant injuries in any of the pilots who deployed their parachutes. Two fatalities almost certainly would have been prevented had those pilots been wearing parachutes.

The prone pilot is injuring his face, head, and neck, as would be expected. Most pilots are wearing their helmets and helmets are reducing the severity of the head injury. Head, neck, chest, and abdominal injuries occur with most major accidents and are responsible for deaths. The shoulder, arm, elbow, wrist, ankle injuries are "minor," occurring predominantly with low-level stalls. There is absolutely no question that if the glider can take the impact, the pilot fairs far better. I am impressed through the accident reports, by the number of pilots who are learning cardiopulmonary resuscitation (C.P.R.). I would encourage the rest of you to follow this admirable lead.

The number of deaths from free flying in the United States continued to decline; only 14 pilots lost their lives. The cause of the fatal accidents paralleled those of the non-fatal accident (the mistake is the same). Let me re-emphasize that at least two pilots would have been saved if they had been wearing parachutes.

I am especially sad to report a spectator death at Dog Mountain. A "blown launch" resulted in the glider turning and skimming down-wind over the launch, knocking down an elderly woman who died when her head struck a rock.

### RECOMMENDATIONS

1. Launch seminars stressing both the theoretical and practical aspects of launching in all types of conditions.

2. Parachute clinics on a regular basis.

3. Always fly with a parachute. Deploy it at the earliest sign of trouble. Repack it regularly.

4. Consider remote control glider mounted ejectable parachute system. [One is now available; see page 7. —Ed.]

5. Consider an audible stall warning system.

6. Establish a regular preflight routine. Consider manufacturer's placard of preflight items. Invite another experienced pilot to preflight your glider to learn how he does it.

7. Complete annual inspection of the glider, with changing of all major bolts and hang strap.

8. Respect the weather and micrometeorology (rotors).

9. Do not attempt down-wind launches and landing.

10. Be particularly attentive when flying a new glider or trying a new harness.

11. Be conservative at new sites. Ask advice.

12. Listen to your emotions and inner-self.

13. Know and respect your limitations.

14. Consider protective pilot fairing, roll cages, air bags.

15. If a crash is inevitable, avoid leading with your chin. Let the glider take the impact.

16. Hook in.

### TANDEM

To my surprise, I received only one accident report relating to tandem in 1981. An experienced pilot was landing tandem, was hit by a gust, corrected, but the passenger stayed on the low side (harnesses not hooked together); the glider ground-looped, and the pilot broke his collar bone.

### TOW:

I received eight accident reports involving towing in 1981. There were five fatalities. Four of the five involved lock

outs. [Consider concepts on Pg. 18 — Ed.]

Four accidents involved boat towing, two involved Yarnall winches, one Atlantic Ultralight mini-hill winch and one unspecified winch. From these several cases, a few comments can be made: First, that the operator of the winch/boat must be in continuous verbal/visual contact with the kite. Whether the winch operator watches the glider, whether it is the boat spotter, whether a CB is used is secondary.

At the first sign of a lockout, the pilot must release. The release mechanism must be within easy reach of the pilot. The pilot

must keep his hands close to the release mechanism. The boat or winch operator must be prepared to release at the first indication of a lock-out.

### SUMMARY

Fatalities — Cause

4 --- Stall on launch  
3 --- Weather/storms  
2 --- Divergent glider  
1 --- Scratching stall  
1 --- Landing on top in rotor  
1 --- Incomplete assembly  
1 --- Mid-air collision  
1 --- Dove in (? cause)

All accident reports

34 --- Stall on launch  
25 --- Stall on landing  
17 --- Scratching stall  
12 --- Weather  
16 --- New Kite  
10 --- New Site  
3 --- Aerobatics  
8 --- Emotional factors  
3 --- Failure to hook-in  
Structural failures  
3 --- Aerobatic-induced  
2 --- Turbulence-induced  
2 --- Never-kinks kinking  
2 --- Lock nuts unlocking  
1 --- Home repaired rudder cable

### 1981 DEATHS — FREE FLYING

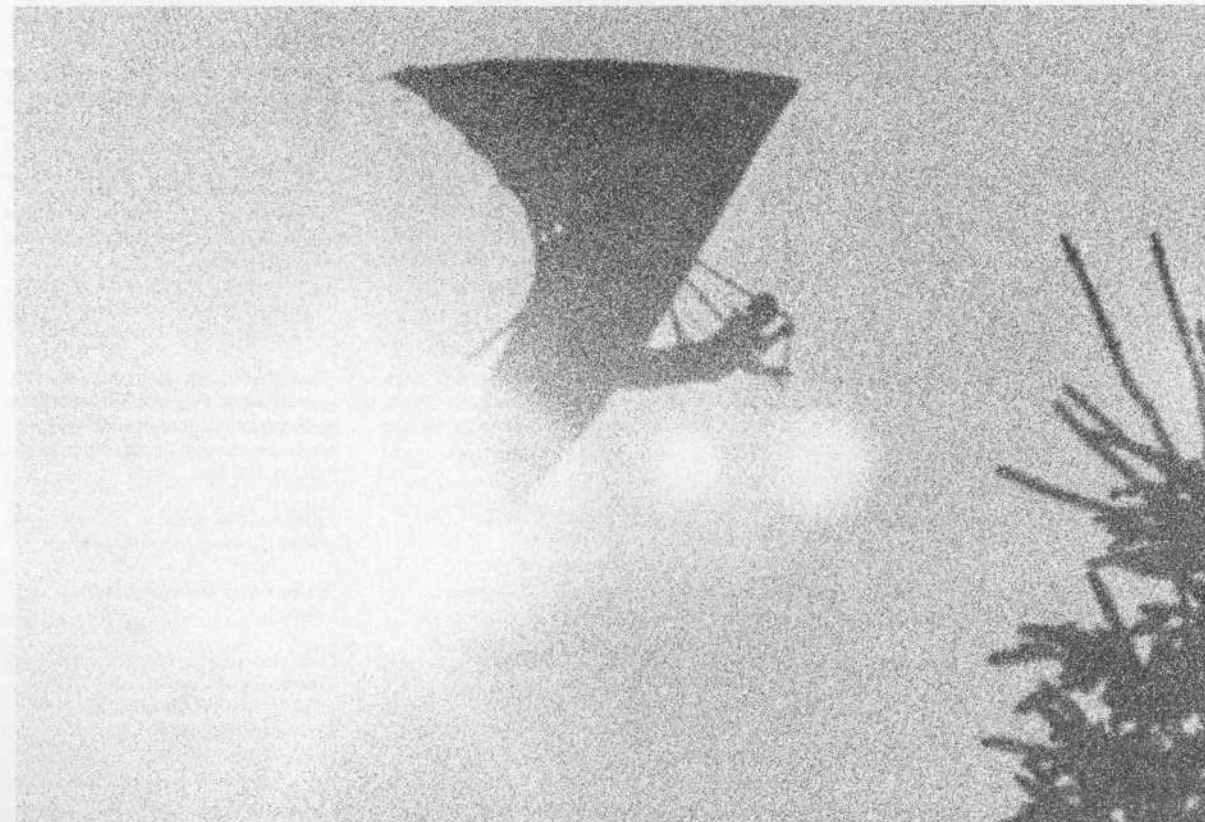
Date	Name	Age	Experience	Location	Glider	Injuries	Cause
3-8-81	MULLIGAN, Bob	46	Advanced (?)	Guadalupe Dunes, California	Manta Fledgling	Fractured neck	Dove into ground. Reason unclear. Did not throw his chute.
3-11-81	GODFREY, Dennis	27	Minimal	Slide Mountain, Nevada	Dinger Standard	Fractured neck	Scratching stall — thermalling close to hill.
4-1-81	SMITH, Stan	25	Advanced	Hidden Valley, California	Sunbird 178 Challenger	Extensive injuries	Glider dove in, divergent (?)
4-16-81	CALDRON, Steve	35	Minimal	San Bernadino, California	Wills Wing Raven 209	Fractured neck, multiple injuries	Stall on launch.
5-3-81	JOHNSON, Larry	25	Intermediate	Vallejo, California	U.P. Condor	Head, spine, chest	Attempted landing on top; got caught in rotor.
6-13-81	GRIBBLE, Dan	27	Beginner	Snake River, Washington	Wills Wing Alpha 215	Head, face, neck, chest	Strong winds, turbulence, flying fast. Tumble with structural failure (?). No parachute.
6-21-81	BROWN, Matt	24	Advanced	Spokane, Washington	Sunbird 178 Challenger	Multiple	Dove in after "demonstrating" — glider was divergent — parachute was thrown too late.
6-25-81	ABBOTT, Bob	26	Five years	Sandia Peak, New Mexico	Electra Flyer Cirrus 5-A	Electrocution and hypothermia	Appeared to fly into storm front — sucked into hailstorm — glider apparently struck by lightning — glider broken and torn; pilot covered with ice.
6-28-81	LEYVA, Damien	14	Student	Milpitas, California	LEAF 170	Head, multiple	Stalled on launch; turned back into hill. Pilot struck ground first. Donated heart and kidneys so that 3 others might live.
6-81	STOVERUD, Bruce	32	Advanced	Missoula, Montana	U.P. 166 Mosquito	Head, face, neck, chest, abdomen, pelvis, arms, and legs	Experienced pilot launched into mellow winds. Two minutes later, freak spring storm with high winds forced landing in canyon. Rotor slammed him in from 100 feet.
7-81	ZURSKEY, Craig	34	Advanced	Elk Mountain, California	U.P. Comet	Head	Launched new glider in 25 mph winds, stalled climbing into harness.
8-30-81	SARIGO, David	52	Intermediate	San Bernadino, California	Comet 165	Extensive	Dove in after low-level mid-air collision.
9-6-81	REDDY, Cliff	25	Intermediate	Ruch, Oregon	U.P. Condor 194	Head, face, neck, abdomen	Over-anxious pilot failed to completely assemble glider (wing nuts). Flew glider to 700 feet. Glider "dis-assembled." No parachute.

CONTINUED, NEXT PAGE

10-11-81 PARKER, David 27 Student Simi Valley, California Seahawk 190 Head Good student. Had smooth launch, but slowed, stalled, and turned back into the hill.

**1981 DEATHS, TOW**

Date	Name	Age	Experience	Location	Glider	Tow	Injuries	Cause
4-12-81	LEWIS, Joe	31	Advanced --	Columbia, South Carolina	Seagull, 10 Meter	Atlantic Ultralight mini-hill winch	Head	Low-level lockout. Hands on down-tubes, release on base tube. Missed on first attempt to release. Pilot hit head first.
8-18-81	ST. JOHN, Ralph	31	Minimal (?)	St. Clare, Michigan	Unknown	Boat tow	Broken neck (?)	Boat tow, presumed lockout. Dove in from 300 ft. Possible fractured neck and drowning.
3-1-81	INMAN, Stephen	25	Minimal	Spokane, Washington		Winch		Lockout; either release did not function properly or pilot did not correctly operate release.
11-26-81	KLEIN, John	34	Five years	St. Petersburg, Florida	U.P. Comet 185	Boat tow	Head (arm, chest)	Pilot had expressed concern about presence of a crane following release from boat tow and he was flying slowly near crane; apparently entering down-wind stall and flew directly into crane.
1-18-81	CUDNEY, Dan	32	Intermediate, 100 winch flights	Spout Springs, North Carolina	Seahawk	Yarnall	Head, chest, thigh	Low-level lockout. Release was on down-tube, difficulty in locating release.



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The Sensor 510 is a true continuation of the long line of hybrid gliders from Seedwings. Incorporating aesthetic, sleek looks and the original curved wing tip shape.

The obvious differences of the 510 from the model 210 preceding it are the deflexorless leading edge, higher aspect ratio, now at 7.0, and the 130° nose angle. The 510 sports a thicker airfoil with more lower surface and an enclosed floating cross-spar. There is also an absence of lock up tips with a bridle wire going to the third rib from the tip.

Some of the nice features retained from the previous models are, a very short overall length when broken down, only 18 feet; fairly moderate weight of 75 pounds, good by today's standards; and a tightpacking, lightweight cover bag with a full length zipper.

#### SET-UP

The 510 has a conventional, off the ground type set-up. This is due to the Wills Wing type control bar bracket, which does not allow the bar, once assembled, to pivot from the bracket and lay flat on the ground.

Once the contro bar and kingpost are in place you spread the wings out, being careful not to drag the excess sail cloth at the tips. The cross-spar is not yet tensioned in order to insert the ribs without flattening them. This step has been improved since the advent of applied, hanging rib pockets. The cross-spar is tensioned before inserting the last two tip ribs.

The tensioning is done simply by opening the zippers in the lower surface, which allow ample room to reach in and grab the cross-spar. Without excessive force and karate screams you can pull the cross-spar back to the place where they over-center and stay anchored by a cable from the noseplate.

At this point a locking pin must be secured in the folding plates. This procedure is a bit awkward, not only dropping the pin in, but in safety pinning it also.

A rear wire from the base of the kingpost to the folding plates locates the position of the cross-spar in flight. A bit of a trick is required to get this one on, but once done, you can zip up and get out to the tips.

All I can say about the curved tips is that a lot of hours hassling with these things are necessary before you get good at tensioning them easily.

Certain techniques for inserting the tapered glass rod and bending them properly in order to tension the sail are learned each time. But the first time is indeed difficult.

Finishing up the rest of the assembly is fairly uneventful, with what is left of the ribs and attaching the bridles.

#### HARDWARE AND FINISH

The 510 is a quality hand crafted glider, which you can see if you look closely. All the hardware is top of the line, much of it utilized from other

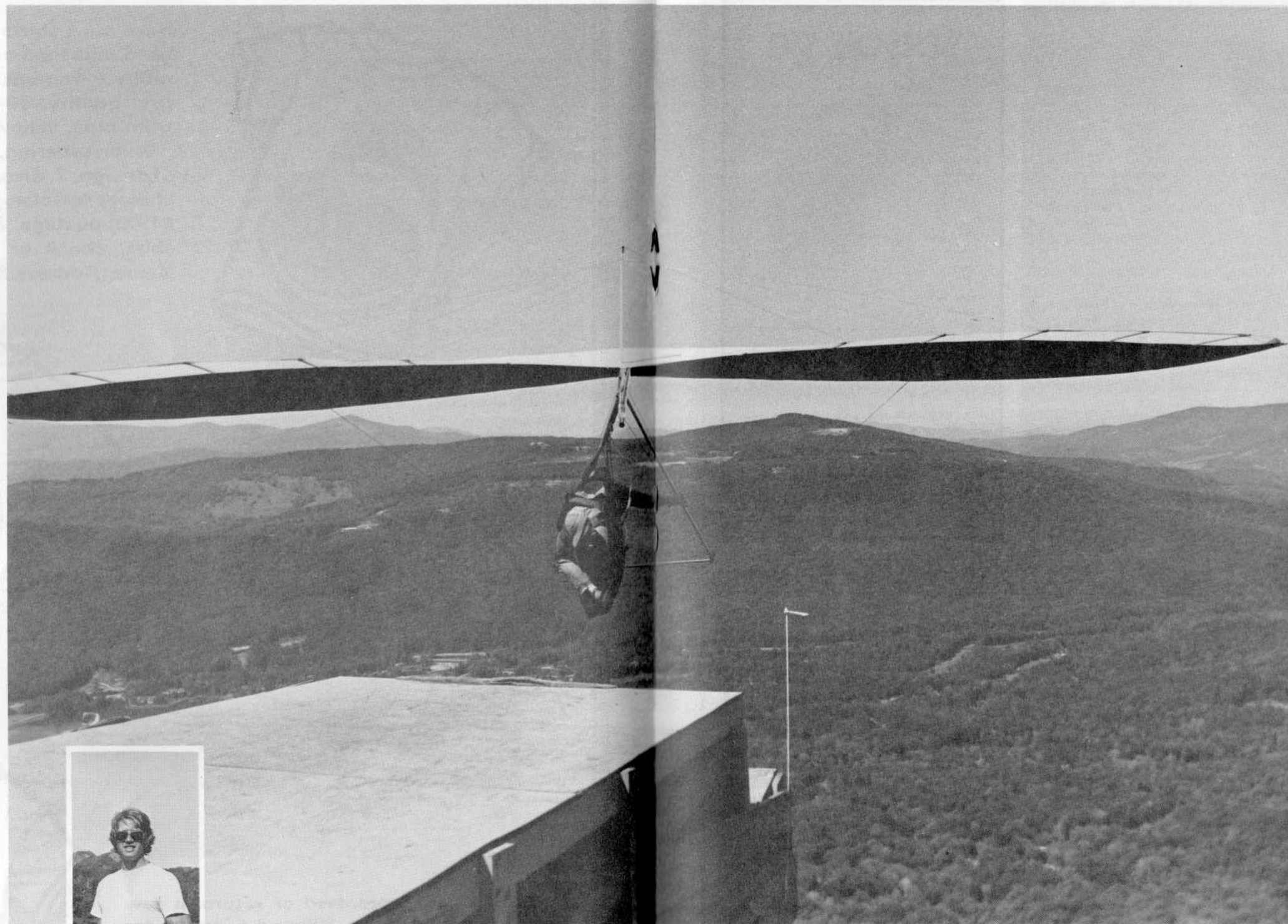


Photo by Hugh Morton

Evaluating the glider that took the Nationals, First and Second Place/by Jeff Burnett and Stewart Smith

# SENSOR 510

manufacturers. All the cables are coated and heat-shrink-fitted at the connections. The tubing is all anodized 6061-T6 with beefy construction throughout the frame.

There is a minor problem with the ribs losing camber with time. A planform is included and it is advised to take time checking them periodically.

The sail on the 510 is exquisitely made and gives the total look to the glider. It is not a production type sail at all.

Sue Wiegand Sails has long had a reputation for making some of the finest on the market and does an outstanding job on the 510. It is made with quality Dimension Sailcloth with ample reinforcing and Lexan stiffeners. Colors are available on the lower surface and leading edge overlay with only 4.5 ounce white available in the body. You are not likely to see a cleaner sail in the sky.

#### FLIGHT CHARACTERISTICS

The first thing you notice about the 510 when you pick it up is that the static balance is quite good, the control frame a bit on the long side, and it could be ungainly for small people. It is lightweight and good balance makes it very easy to ground handle in light winds.

The side rigging is slack, like many gliders on the market, and this tends to cause a lack of feedback from the wings on launch. This is a feeling that does not appeal to me very much. You must take care to equally load both wings before proceeding to launch.

The glider during the launch run gets light very quickly and with some initial energy will pay off dynamically.

Once in the air you notice the glider has light pressure in pitch and yaw. In order to do good effective turns it helps to force the glider to coordinate the turn. The glider will tend to be adverse in yaw if not kept under control. To effect this coordination you initiate roll and then pitch out more with your outside arm. It takes time to make this action instinctive, but helps the sink rate in the turn by making it very flat. If you do not use this kind of technique, roll can sometimes be difficult, especially in reversals.

There is slight roll instability, common to many glider, and it becomes neutral at 20°-30°. The glider can get sticky on the edge of a thermal, but locks in the 360 very nicely. You can easily get the flat spin thermalling effect in this wing.

#### STALL CHARACTERISTICS

Stall characteristics of the glider are quite mellow. When the pilot goes to full push out position gradually, the glider will mush for a short period then drop its nose about 30°. It then repeats this process as long as the pilot stays on top of the yaw action and keeps the nose straight.

I have found the glider quite hard to spin, but it is possible if you are persistent. Sometimes the glider will roll out of the direction of the 360 toward the high side, even though fully stalled.

#### PERFORMANCE

Photo by Ed Schulte



Because of its low twist and ability to flat turn, the 510 climbs quickly in lift. It seems to have a definite advantage in thermals over the other gliders on the market. In ridge soaring condition the 510's straight line sink rate is good but nothing outstanding.

In sinking air between the thermals or when flying at best glide speeds the 510's performance again shines. Especially over a higher range of speeds where most gliders start diving out of the sky, the 510 is still gliding hot.

Due to its light pitch pressure, accelerations are quick and you can pay off and recover speed easily in punchy lift. Another benefit is being able to fly at top speed all day without tiring. The 510 is a very fast glider with excellent energy retention so it is nice for aerobatics.

#### LANDINGS

Since logging many hours on this glider and not always having great success with landings, I felt landings warranted their own section.

Because of its wide nose angle, low sweep and twist, the 510 wants to continue flying after the flare and sometimes slam-dunk its nose. It takes a very straight final into the wind and precise timing on the flare.

It is real easy to find yourself popped off the ground ten or fifteen feet and becoming aware of its lack of parachuting

ability. I am not saying the 510 is impossible to land; I have had a few perfect spot landings with it, but unfortunately not enough of them.

#### CLOSING REMARKS

Overall, I have found the Sensor 510 to be an outstanding high performance competition hang glider.

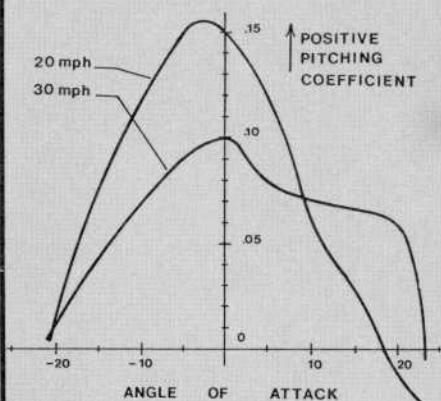
Because of its specific advantages, required higher skill and awareness, lack of forgiveness, difficult set-up, and inability to lie flat on the ground with the wings open, I do not consider this glider to be a great utility-class type.

Another factor is that its price does not make it easily available to everyone. But again, that is because the Sensor has always been a high quality, hand built, one-of-a-kind glider that is made to last through many enjoyable soaring hours.

If good performance, excellent cross country possibilities, and a fun, aesthetic glider is what you are after, then the 510 is a wise choice.

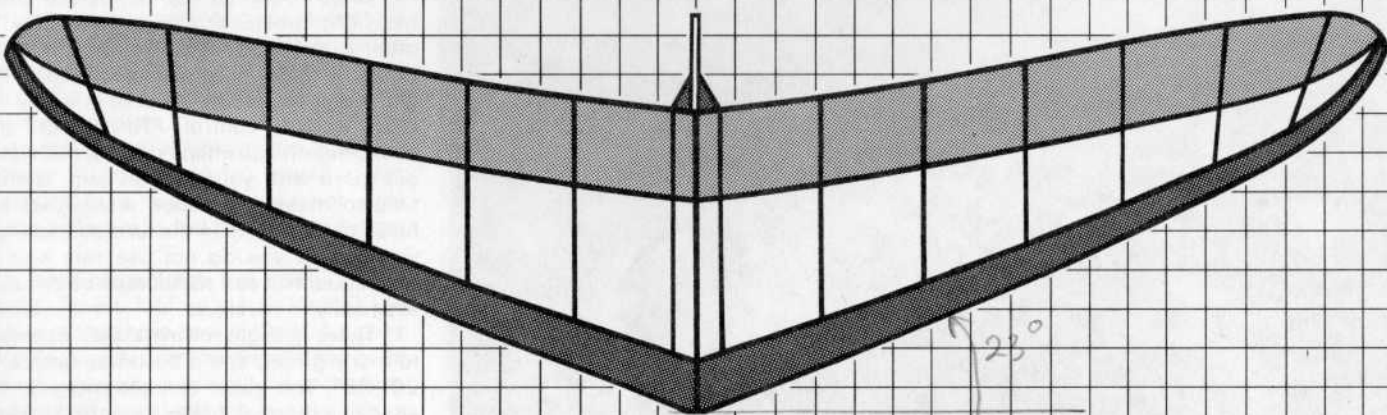
A lot of Sensor pilots like having a glider that not everyone and his uncle is flying. And in my opinion, the Sensor 510 is the finest looking glider on the market.

## SENSOR 510



PITCHING MOMENT GRAPH  
SENSOR 510

## PITCHING MOMENT GRAPH



## SENSOR 510

sail area 165 ft.<sup>2</sup>  
wing span 35 ft.  
aspect ratio 7.4  
bagged length 17 ft.

sail area 180 ft.<sup>2</sup>  
wing span 35 ft.  
aspect ratio 6.9  
bagged length 17 ft.

©.syjut82

## SECOND OPINION (The Sensor 510 — 165 ft<sup>2</sup>)



by Stewart E. Smith

The similarities between the 180 and 165 Sensor 510 far outweigh the differences. The major difference, obviously, is that the sail area of the 165 is fifteen square feet less than the 180 allowing a pilot two choices of wing loadings. As of this writing, the 165 has not been certified and therefore a recommended pilot weight range is not available. Because the minimum to maximum recommended weight range for the 180 is 160 pounds to 230 pounds, I would hazard to guess that the minimum to maximum range for the 165 would be about 140 to 210 pounds.

The difference in sail area between the two gliders is achieved by cutting off the trailing edge. The wing span remains the same but the aspect ratio of the 165 jumps to 7.4 (the 180 aspect ratio is approximately 7). Frame construction and geometry are identical and, therefore, the difference in weight only amounts to fifteen square feet of 3.8 ounce Dacron, a few feet of arrow shaft fiberglass and aluminum batten material.

All of the performance and handling characteristics of the model described by Jeff Burnett apply to the 165 model. The two gliders have the same airfoil and nose angle (135 degrees). Acceleration and/or deceleration seem to be slightly quicker on the 165. It is easier to quickly stall it. Energy retention is almost identical; excellent for both.

My experience flying the 165 was with a hook-in weight of 148 pounds. I flew the 180 with ballast and hooked in a 164 pounds. I have approximately 8 hours on each glider. Based on that limited amount of airtime, I feel that both gliders have excellent banked flight performance. Sink rate in level flight is good but in a turn, it is



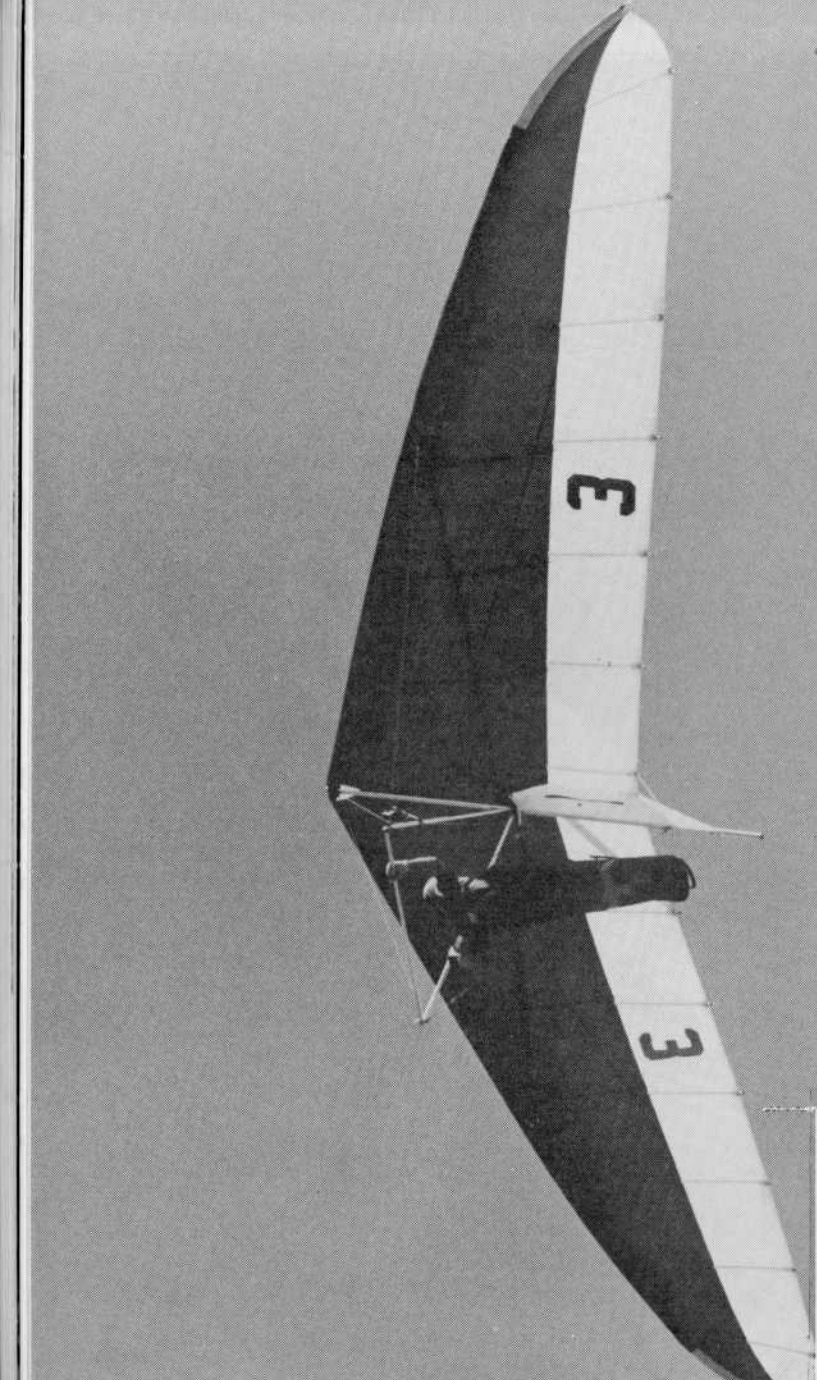


Photo by BJ Schulte

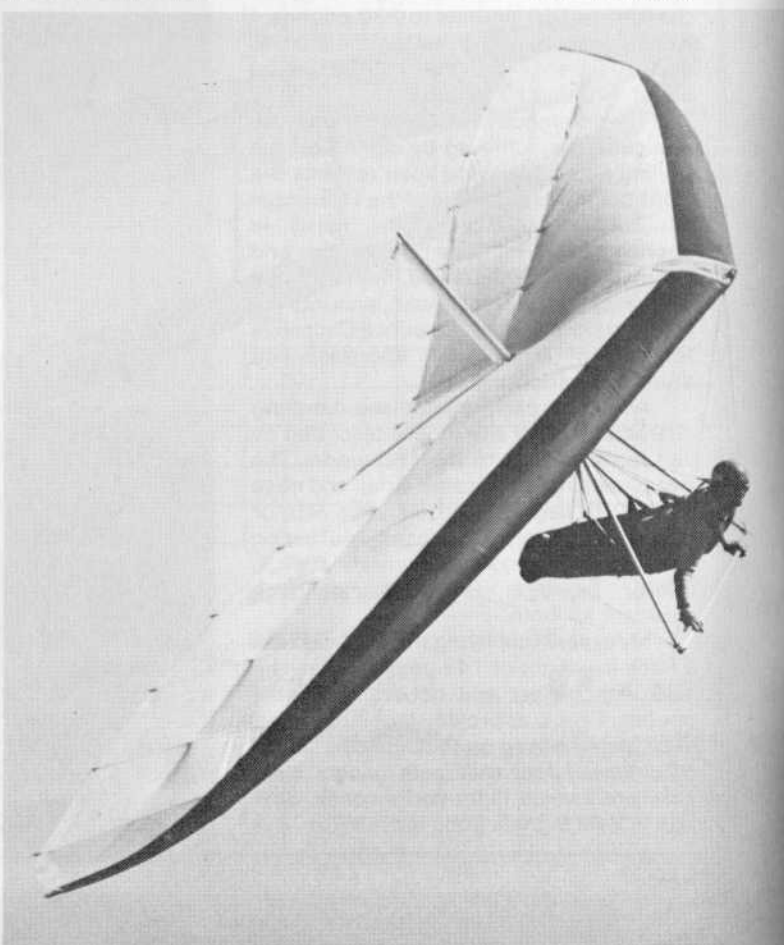
The 510 means 5th generation of Bob Trampenau designs in a 10 meter span.

exceptional and, therefore, climbing ability in thermally conditions is hard to match. The 510's other outstanding performance characteristic is its speed range; both have an exceptionally usable speed range even with my light wing loading. The gliders will go slowly with a competitive sink rate and will go very fast while retaining an excellent glide in comparison to other state-of-the-art designs. Some pilots think the 510's will only go fast. I did not find this to be the case.

Retroactive changes are already being made on the 510's to correct a slight spiral instability by a small side wire length change. Also, the length of the wires retaining the cross bar are being altered. Both of these minor modifications are improving the handling characteristics of the gliders. Improved handling translates into better usable performance. Curved tip assembly modifications will make handling easier, too. Because Bob Trampenau is a small scale manufacturer, he feels he can make adjustments in design and hardware more easily than a larger manufacturer since he is not locked into large scale production techniques that are both costly and time-consuming to change. His gliders are carefully handmade.

Having flown with Jeff Burnett a great deal while he was on the Sensor 510-180, I can assure other pilots that in competent hands, the glider performs extremely well. If you are an Advanced, (USHGA IV) pilot, the Sensor 510 is worthy of your consideration and attention as a competitive package for 1982.

Photo by Jim Morton



# THE CRYSTAL CHRONICLE

1982 International Edition

Vol. 2 No. 1 CHATTANOOGA, TENNESSEE

March/April



CRYSTAL FLIGHT RESORT, Inc. is entering its second year of Simulator training with very encouraging results. More people are experiencing the thrills of hang gliding, because now there is "a safe way to do it." A real glider tethered from above brings you to a four foot deep sawdust landing zone. So simple, yet innovative. People dreamed of a way to do it better, and Crystal created it.

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Crystal Flight Resort is operated by Crystal Air Sports, one of the sport's oldest surviving businesses. Contacts with all major manufacturers allow the Pro Shop to carry a full inventory of all the finest equipment and accessories available. Wills Wing, U.P., Flight

Designs, and Pro Air keep Crystal's stock First Class.

The Flight Resort concept continues with a program to take students progressively up the training slope to the only ramp training launch available. This leads the student smoothly to the cliff launches so common in the East. When qualified, students are graduated with their first mountain flights, which are under close supervision, and in radio contact with two Certified Instructors.

Advanced students may avail themselves of the unique chance to deploy their back-up parachutes in a real environment. The Simulator again opens new doors to safe learning experiences.

## Motorized

ALSO AVAILABLE AT Crystal are ultralights for every type of pilot or would-be pilot. They have Bennett and Flight Designs Trikes, and the Eipper Quicksilver line in stock and available on an immediate basis.

Naturally the pilot who prefers the hang glider as his/her only flying will be pleased with the addition of a Trike to their wing. Flatland soaring capability is nice on downwind or "sled run" days.

One of the leaders in ultralight aviation, the Quicksilver comes in three styles to suit the pilot's flying needs. Whether it is weight shift control, or three axis, Quicksilver fills the bill, and Crystal has it.

## Weather

The weather outlook is for much flying and soaring from early March till the end of February.

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"Work/Fly" Program. Check it out! You are advised to make your reservations early this year, because with the World's Fair in Knoxville this coming summer and fall, lodging will be in short supply. Enjoy "CASMO's" new pool, color televisions with lots of hang gliding, video tapes of the latest meets and local flying events. They say that if you do not have "Bunkhaus" in your logbook, then you have not been "up" yet.

The "CASMO BUNKHAUS" in Chattanooga, Tennessee, USA.



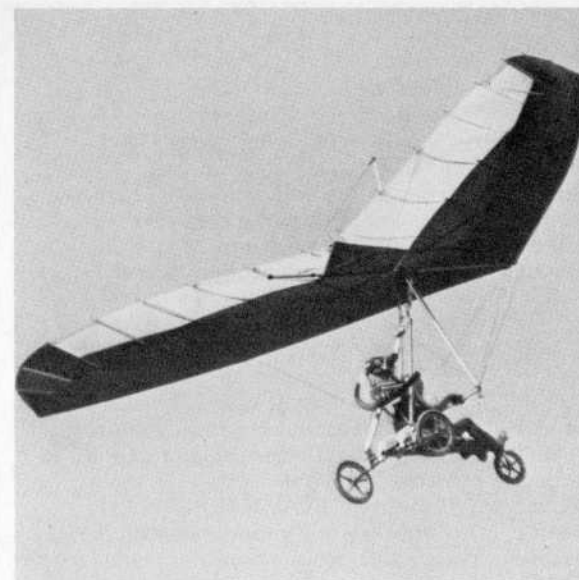
## HOTLINE

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# «Flying the Jet Wing»

Trike flying is a whole new balancing act. Here's to making it easier on the deluxe Jet Wing/by Dan Johnson

Photo/Warren Puckett



Once airborne, the Jet Wing flies very comfortably and with light bar pressures/photo: Warren Puckett



Flight Designs President, Marty Alameda, demonstrates the Jet Wing at Zephyrhills, Florida at the occasion of the Skydiving World Meet

Transitioning from hang gliders to the Flight Designs ATV (trike) is an experience of mixed emotions.

Excitement is present of either side of the fence. A new world is awaiting that first flight. Even true for pilots with other ultralight air time, you can expect the trike concept to be quite different. If you are a proponent of weight shift, you will love triking. If achieving soaring flight (on a motorized system) is important to you, the trike idea holds excellent promise.

Frankly though, do not concern yourself with soaring on the first flight. Not, mind you, that it cannot be accomplished; you simply ought to get the fundamentals down first. It will not even consume a whole day.

One the "darker" side of the fence is fear. One of the earlier transitioning flyers observed was a deeply experienced ultralight pilot. An airman whose credentials can make for endless "war stories," came in visibly shaken from his first encounter. He was also smiling so widely, that it seemed his face could crack in the cold morning air.

The mixed bag of emotions is extremely positive, overall; the mention of the fear is only to suggest that, indeed, this is a very different specie of flying animal.

In the case of the Jet Wing ATV (All Terrain Vehicle), the animal is a tiger, and on lift-off, you feel as though you have an especially fleet such cat by the proverbial tail. But this is getting out of sequence—let us start nearer the beginning, and follow a sample transition through the steps. Since witnessing ten such transition experiences first-hand, a pattern for success has been discovered.

After extensive conversation on exactly how to proceed, and after getting nods of agreement on each step, the wise sequence of which seemed undeniable, two early transitions (let us call them Dave

and Scotty) blasted off the runway in a crescendo of decibels, two-cycle smoke, fear and apprehension, seeking the safety of being airborne.

In both cases, perfect flights were achieved, and apologies were offered for so badly violating the careful steps each had planned and agreed to follow. Funny thing. The most important consideration, however, brought them back safely, as both are accomplished pilots who stayed with the flight till its satisfactory conclusion back on the tarmac. A novice would have been in big trouble. But a novice might have followed directions. Etch this into your mind before your initial trike experience arrives.

#### BEGINNING

Locate a good strip (probably your Flight Designs dealer has one), the kind usually sought for ultralight training. Hard surface assures smoothness, but a smooth grass strip will do just fine. A thousand feet or more is highly advised, with no significant obstacles/hazards in a surrounding perimeter of another thousand feet. Use calm winds only... zero is absolutely best.

Get used to the overall system by ground handling. Force yourself (or your friend) to spend at least twenty minutes doing nothing but taxiing and feeling out the throttle, specifically articulation of the throttle and the acceleration produced by various settings. [As yet the Flight Designs throttle does not hold its position so your hand must stay on it.] In NO event should the nosewheel lift off the ground during this part of preparation. Be careful. Use an airspeed indicator and keep the speed below 25 mph.

Next, go to "high speed" taxiing. It is possible, though tricky, to raise just the nosewheel. As the Jet Wing is balanced lightly over the nosewheel, and as acceleration is fast, the nose comes up

very subtly, and in the aforementioned cases of Dave and Scotty, once the nose wheel was raised, the rest followed very rapidly. So advising another twenty minute session of "high speed" taxi has a specific point. The idea is to slowly, smoothly increase the speed to nearly 30 mph (rotation or lift-off speed), then back off the throttle to about one-third to one-half, NOT all the way, however. At this time, while good forward motion is present, push the bar forward several times, pausing, relaxing, then pushing out again, each such time a little farther. [During the acceleration, hold the bar at trim, which is approximately above the knees.] When the energy dies down, slowing you to say, 15 mph, start the cycle again, by accelerating back to nearly, but not quite, 30 mph. In the initial push-outs, you may raise the nosewheel. This is why you reduce the throttle first, so as not to get airborne... not yet. But it will impart some extremely valuable information on pitch control, authority, and the sensation of how the trike carriage wants to swing underneath you. The importance of this is difficult to over-stress. When you feel you have gotten it down, do it a couple more times. You will be so glad you did.

Crow-hopping is a customary technique for training in ultralights. A new student should not get too high till more knowledge is gained. Crow-hopping in the Jet Wing is darn near impossible. Maybe it is not even advisable. Recall here, though, that this transition training method is NOT for beginners. Hang III, Intermediate skills are strongly recommended first. All this is to explain why the "high speed" taxi session is very important and should not be cut short. The next step will put you in the air and climbing at 700 fpm.

#### BLAST OFF

"Blast-off" may sound overly dramatic, but judge its accuracy after you have

experienced it. Basically, once you are 100 feet in the air and climbing fast, you can relax. Until then, "alert" is the key word. It, and "lateral control." You tow pilots may comprehend this phrase very well, as the same instructions apply to a pop-start launch. Do not worry about a stall. At full power, you *cannot* stall the Jet Wing. And since forward speed is good (30 mph), lateral response will be good, too. Use it! Stay all over that bar till you have stabilized in straight ahead, climbing flight. But again, this is out of sequence. Let us go back to the start of the runway, approach end, it is called.

Clear the traffic area first. The last thing you need is a distraction like a twinengine Baron zooming just overhead because you began your take-off run just as he was on final. It is also darn impolite, not to say dangerous.

Then smoothly add power to 3/4 or more. That amount is not terribly critical. Move the bar forward to approximately full arm extension, and hold it there. The rolloff is surprisingly long. Remember, a wing like the Demon needs some airspeed to begin lifting, especially with the 115 pound Jet Wing package attached. Plan on 100-200 feet. A small (36 inch) propeller and prop air flow blockage are probably other factors, as is the need of the Kawasaki to wind up before max thrust is obtained.

So now, you are rolling down the runway, accelerating. As 30 mph is approached, the nose will lift (distinctly but very smoothly) and when it does, the trike carriage will begin to move directly under the Center of Gravity. Now the nosewheel will be straight in front of you, the angle of attack very high (like towing, almost). When the carriage moves forward, you should relax your push-out, returning the bar to trim, above your knees, where trim remains regardless of power settings. If you have not already done so, add the rest of the throttle for sustained climb to 100 feet, and maintain lateral control precisely, correcting all course deviations as quickly as they can be recognized.

Do NOT release the throttle!! This cannot be over-emphasized. Think about this all the while you are leading up to actual lift-off. The *most* common error of new ultralight students is releasing the throttle exactly at lift-off, as they are surprised by the rapid rotation and initial climb attitude. If this occurs without pull-in (body forward) a nose-in becomes very likely. This will do you and the Jet Wing no good at all.

Here is an iron-clad rule to commit to memory regarding powered craft. "The throttle controls the altitude; the control bar (or stick) movement controls the speed."

Once at 100 feet or so, retard the throttle somewhat to help prolong engine life and aid cooling, and continue climbing. Keep a sharp eye for any other traffic. Maintain even power using your

sense of sound; it is quite accurate. Relax. At least, try.

#### MANEUVERS

At a thousand feet or so, you should quit gazing around and prepare to practice some maneuvers. Do some basic turns, right and left, at about 1/3 to 1/2 throttle. Then again, with steeper turns. After that, try a series of reversals, linked 180's or 360's. Do these shallow first, then steeper. If you have plenty of altitude, reduce the throttle to what is called "idle thrust," and repeat all the above.

This will cut your altitude, so climb back up. Clear both sides, plus front and rear of other traffic, then begin stall practice. Start at half throttle. Expecting only a mellow nose-over, stall and recover twice, then clear the area again. Always use whatever bar movement seems necessary to maintain lateral control throughout the stall. Do an accelerated stall (stall from 45° bank) experiencing stall at a much higher airspeed.

Now, repeat the above under full power. Expect a mush only, but extreme angle of attack. This will elevate you so that you can now do a third full repeat, but at idle thrust. Here you can expect a breaking nose-over. Clear the engine periodically by revving it, to assure the power will come on when you want it. Two-cycle engines "load up" at idle speeds.

#### LANDINGS

Your last maneuver in this check-out flight should be a simulated landing. Imagine a runway at a thousand feet. An altimeter is handy for this, but references to a ridge (if available) will work. Pretend you are doing the real thing. One comforting thought about now is that the landing is one of the easiest maneuvers to do.

Line up with your "runway" once again maintaining precise lateral control. Control your approach altitude with power till the "field" is positively made. Make all throttle movements as smooth as possible. When you are sure that a steep glide will get you to the field, *slowly* release the throttle to idle thrust. Start this while high. The sink rate as the propeller idles is 400 fpm or so and about 300 fpm engine off. The glide will vary with atmospheric conditions but will not drop below 5:1, and can stay at 8:1. Adjust to these factors of your power-off descent rate. Keep a good airspeed, even as the ground rises up to you at a rapid closure rate, flare to "touchdown."

The touchdown will be much slower than the take-off roll, but is still rapid. A 25 mph approach speed is recommended. Also, it may be useful to "pump" the bar, once the ground is close. This transmits a *feel* for pitch authority, and slows your forward speed incrementally, which in turn will continue your descent. Plan to finally use full arm extension in the flare out. Do *not* add power except to execute a goaround, and even a "little power to

smoothen things out..." will more likely confuse the effort than aid it. Try it both ways later on, and decide for yourself. But no power has been preferred by all transition-ees to date.

Since this was a simulated landing, you should repeat the maneuver at least once before actualizing a real landing. Once on the runway again, you can finally relax, for real, then discuss your relative success with a knowledgeable friend or your instructor. Finally repeat the take-off and landing phases till you are quite comfortable. Twenty-five such repetitions are not unreasonable before you operate out of small fields or land out on a crosscountry flight.

#### EVALUATION

After my first experience with the Jet Wing ATV (but *not* my first trike experience), I had one word to sum up the feeling . . . S M O O T H.

The Jet Wing ATV operates powerfully yet more gracefully than *any* other ultralight I have flown. Of course, I am partial to modern hang gliders, enjoy the simplicity of weight shift, and prefer neutral stability (hence quick banking and light pitch pressure). It took some time before I would fly ten feet off the ground with confidence — a maneuver I enjoy in the Quicksilver. But thermalling the Jet Wing ATV was vastly more pleasurable.

I can do 360's *inside* a Quicksilver turning at a normal rate; can climb with the best of them; cruising with the faster craft; and can land easier than most other ultralights. Still, this is no beginner ship. Training a novice *can* be done, but should be approached with extreme trepidation!

But I can go soaring with just the wing, even including triking to the soaring site, disconnecting the carriage, and powering back home when the thermals die away. I can car-top the entire rig with ease in my little Datsun pick-up. I can set it up by myself in 15-20 minutes (though not the first times). And "cross-country" in the Jet Wing takes on a whole new significance.

The entire Jet Wing ATV sells for \$4350, ready to fly. Since it is competitive in performance, and can still be just a glider too, it has no peers in my opinion, though this will be best realized by an intermediate or better pilot. The package is unique in the *entire* industry as it carries Product Liability Insurance [no one else has been able to afford this], and as such, dictates no trike-only sales at this time. But even this is under development, so by Spring of '82, you will probably be able to purchase just the trike carriage for your present wing, for about \$2450. Once you have seen the system, first hand, I doubt you will quibble over the cost. The finish is exceptional (see *Whole Air*, Nov/Dec 1981).

And if you do not have a state-of-the-art wing, you ought to "jet" down to your Flight Designs dealer. A whole new world of flying awaits you.

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## WING TIP DISTURBANCES/PROBLEMS, SOLUTIONS, AND THEORIES

Part I  
 Wing Tip Disturbances/Problems, Solutions, and Theories by  
 Richard Miller

Diffuse is the opposite of sharply defined. The condition of diffuseness is characterized structurally by division into large numbers of regular units; dynamically by stability, small and uniform changes and rates of change within the structure; graphically by softness and fineness of gradation; by evenness, symmetry, homogeneity and isotropism. A steady, gentle fall of snow into a quiet pine forest, in contrast to rough chunks of ice dropping on irregular rooftops, illustrates diffuse action.

Diffusion is the aim of streamlining. The goal of streamlining is to limit turbulent flow, or to assure the transmission of the smallest possible amount of energy from a moving vehicle to the medium through which it passes. Thus diffusion, streamlining, and the ideal of zero-energy transfer to the ambient flow, are all aspects of the process of drag reduction.

When those characteristics of a wing which cause it to function as a lifting surface — chord, camber, thickness and angle of attack — are carried to its outer extremity and terminate in the ambient flow, as is the case with most man-made wings, that extremity functions as a pump. The flow generated by the resultant pumping action of the wing extremity is not diffuse. It is not marked by evenness, symmetry, homogeneity nor isotropism. Structurally it is irregular, sheer, roughedged; dynamically it presents a picture of heavy contrasts and sharp divisions.

It is quite likely that no other manmade object has benefited more from the technique of drag reduction than has the sailplane — excepting only the extremities of its flying surfaces. While scrupulous attention has been exercised on every other aspect of its design, the wing ends have been left rough-cut and neglected. Looking with the inner vision, using the filter of diffusion, one sees the glaring contrast between the raw stumps of churning discharge at the wing ends and the refinement and elegance of the remainder of the aircraft.

Perhaps no other vehicle on which a comparable amount of care has been expended exhibits such a striving for perfection on the one hand and almost total disregard on the other. It is part beauty, part beast, a singular mixture of economy and waste, of prudence and

prodigality. The chrome-plating stops and the coarse, rusting metal beneath it is exposed. The well-tended freeway ends in a rough, pot-holed road.

Very curious. Very, very curious.

Drag, in the most general sense of the term, is any friction, force or flow generated by an aircraft that shortens its glide path. Aerodynamic drag, however, is defined more precisely. It arises from frictional forces that result from viscosity and, as a concomitant, leaves air in motion in the direction of flight; it is a consequence of fore-and-aft pressure differences acting on a moving body; and it varies, at least in a general way, with (the square of) the velocity of the relative wind.

The loss due to the flow at the wing extremities qualifies for the general definition of drag, but by none of the conditions of the second. It is not due primarily to friction; the air left in motion is at right angles to the flight path; it generates neither pressure behind the aircraft which exert retarding influences; and — at complete variance with the definition of aerodynamic drag — it varies inversely with airspeed.

The case of a dirigible with a hole in the side of its hull, to which that of the glider is analogous, illustrates this point. The loss of the sustaining medium, say helium, contributes along with frictional and pressure forces to shortening the airship's flight, but is not in itself aerodynamic drag.

What fuels the premature descent of the airship with its leaky hull, to which that of the glider is directly analogous,

What fuels the premature descent of the airship with its leaky hull is the pressure potential between the helium and the more dense ambient atmosphere; what fuels the premature descent of the glider is the exposure of the pressure potential across the wing to the ambient flow. The two instances are distinct, however, in that the sustaining medium is independent of the aerodynamic forces that act on the airship, whereas the sustaining medium of the glider, its lift, is an integral part of the flight process. Thus in the case of the aerostat the specified loss can be characterized as a simple leak, and in the case of the aerodyne, as a flow generated by a pump.

In its function as pump the wing end is as unique, in its way, as the retarding force it produces. It is a pump whose one physical component, the wing, has a fixed, finite dimension, and whose source of pressure is the potential across the wing, yet with the chord and the lift constant, its

output may vary by several powers.

These anomalies are a consequence of the fact that the pressures generated by the

wing are on the outside rather than the inside surface of the pump; that the pressurized area is therefore elastic; and that the pump, with its invisible orifice and intangible valving, operates within a secondary pressure system. As a consequence there are two variables that control output:

- The volume of air upon which the wing works varies with the lift coefficient.
- The resistance to flow at the tip, or capacity of the pressure of the relative wind to inhibit or contain the pressure of the transverse flow, varies with velocity.

Let us, by way of illustration, assume that glider X develops a lift coefficient of one at its  $V_{max} L/D$  and of twice that value at its  $V_{min}$  sink. In both cases the total lift is the same, but at the higher lift coefficient (and lower airspeed) the losses due to three-dimensional flow are four times as great. Twice as much air is being used to sustain the aircraft at the lower airspeed — a consequence of the  $V^2$  in the lift equation — and although this is of no particular importance insofar as sustentation is concerned, the fact that there is twice as much air in the region swept by the tip flow is of obvious importance.

At both the lower and higher airspeed, as a consequence of the uniform potential across the wing, its capacity to generate a transverse flow remains constant. The capacity of the relative wind (or dynamic pressure of flight,  $q$ ) to contain or inhibit this flow, however, diminishes with speed. Because it, too, is controlled by a square power its containment capacity varies inversely with the lift coefficient: it has only half the intensity at the airspeed corresponding to the high coefficient. Thus, at the higher lift coefficient the doubling of the volume of air provides the requisite square power and the doubling of the rate of flow the cube power that result in the quadrupling of the tip flow.

From the foregoing it appears advisable to 1) Shape the wing planform so as to take the greatest possible advantage of the tendency of the free-stream flow to contain the flow at the wing end, and 2) Reduce the tip chord and the lift coefficient in the area of potential tip flow to the smallest practical values.

A potential exists between the higher pressure air beneath a functioning wing and the lower pressure air above it which, when there is nothing to prevent it, causes a flow from one area to the other. Such a flow does not take place around the leading edge of the wing because it is contained by the dynamic free-stream



pressure. At the extremity of the surface, the wing does not contain the flow, or does so to a very limited degree.

So far as the function of lift is concerned the leading edge is obviously indispensable, and from a structural point of view, so is some limit to span, but the leading edge, left to itself, does not resolve the structural problem, and the wind end, as we are used to seeing it, is not a satisfactory solution to the problem of containment.

Fortunately, compromises are possible. An intermediate angle between the leading edge and the wing end, or negative rake, terminates the wing in a suitable manner and at the same time brings the dynamic pressure of the free stream to bear more directly on the transverse flow — simply blowing the higher pressure air back under the wing if you like. Is it too simple to work?

Hoerner claimed that the trailing edge gave the true span of the wing, a contention that supports the idea of mean negative rake. Model tests performed by Eric Jedelsky showed that a wing with its leading edge swept back to a straight trailing edge gave about a ten-percent increase in duration over a wing identical in all other respects, but with its planform reversed. Considering the relatively smaller contribution of tip losses to the total drag at a model scale, this is quite a significant figure.

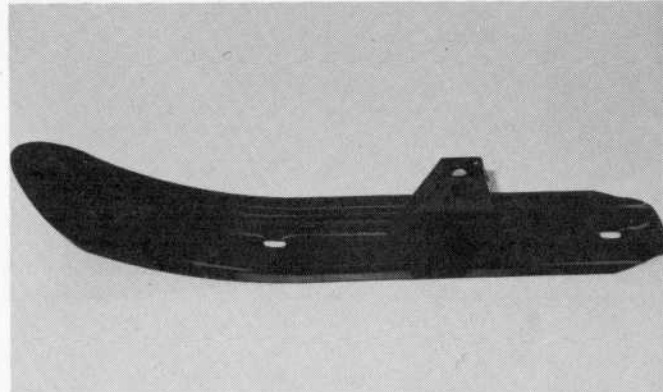
Jedelsky's experiment is symptomatic, for the model builders are well ahead of the full-scale aircraft designers in the matter of using negative rake. It might be going too far to say that it is common practice, but not to say that it is not uncommon. George Perryman has been using the aft-swept planform for at least 25 years, I believe—to the extent, at any rate, that it has become his trademark. (See *M.A.N.* for March, 1980, p. 54 for a representative Perryman design.)

An article in the February, 1980, issue of *R/C Modeler* (p. 44) recommends sweeping the leading edges of propeller blades back for improved performance.

Examples from the field of contemporary full-scale aircraft are by no means easy to find, but one or two can be cited. The Dornier L.T.A. (Light Transport Aircraft) features a negatively raked wing and matching tailplane. It was developed under a program sponsored by the German Federal Ministry of Technology and the result appears to be a wing substantially more efficient than others of comparable span and area. Project Manager Reinhold Birrenbach states that the triangular shape of the tip yields a better distribution of the trailing vortex than do conventional tips. For more see *Aviation Week* for July 2, 1979, p. 57.

Part II Next Issue (May/June '82)

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## INSURANCE ANSWER MAN

*What is Physical Damage Insurance?*

This is coverage for what is called "all risk" damage to your glider from its operation or transportation. It includes theft, which was an optional, extra cost coverage. In cars this is called "collision/theft (comprehensive);" in airplanes it is "collision/hull" insurance. Coverage during operation is by "declared" pilots, much like auto insurance's "insured driver."

*When is the coverage not in force?*

No coverage exists when loss is by wear and tear; gross neglect; wars; or nuclear disaster. No insurance if a not-declared-pilot is flying; if any illegal acts were involved; if dishonesty or fraud is a factor; or from loss due to mechanical breakdown (maintenance caused problem).

Further, if passengers are aboard, no coverage applies, nor if rented (though special coverage is available under a different plan). Insurance does not extend out of the U.S., Canada, or U.S. Possessions.

*What are the benefits in case of loss?*

Insurance is normally based on age of the craft, with depreciation for older craft. Since an insurance company cannot readily supply "like kind and condition" for used, worn ships, all values are based on "new" cost less depreciation. For Physical Damage insurance, this is the Depreciation Table:

Age of Craft	Insurance Available
Less than 1 year old	100% of new cost
1 year old, less than 2	80% of new cost
2 years old, less than 3	60% of new cost
3 years old, less than 4	50% of new cost
More than 4 years old	Not Eligible

A copy of the bill of sale must accompany the application.

(NOTE: Please do *not* just send money.) The deductible portion which you must pay for each loss is 5% of the loss or \$100, whichever is greater.

*What does it cost?*

Again, a table defines the costs. Recall that theft was an optional extra, and the company actually *reduced* rates after its first year of experience. The rates below are "per year.":

Value	Glider	Ultralight
\$1000-1500	\$70	NA
1501-2000	\$85	\$99
2001-2500	\$105	\$132
2501-3000	\$120	\$159
3001-3500	\$140	\$187
3501-4000	NA	\$215
4001-4500	NA	\$241
4501-5000	NA	\$269
5001-5500	NA	\$297
Over 5500	NA	6% of value

Basically, \$75 a year, for USHGA members, will cover state-of-the-art hang gliders, and \$259 will handle a five thousand dollar ultralight. Compare this with your collision/comprehensive insurance on your auto. You should find this cost to be surprisingly reasonable.

*How do I make a claim, after a loss?*

Simply complete the claim form that comes with your policy and the company will process the claim.

*How do I obtain the insurance?*

You can contact the company directly or consult your local dealer for assistance. Glenn Muehlstedt, who supplies this and other insurance, is the same representative offering the USHGA liability policy. An established track record exists for payment on valid claims.

## IF YOUR FLYING CONDITIONS ARE LESS THAN PERFECT,

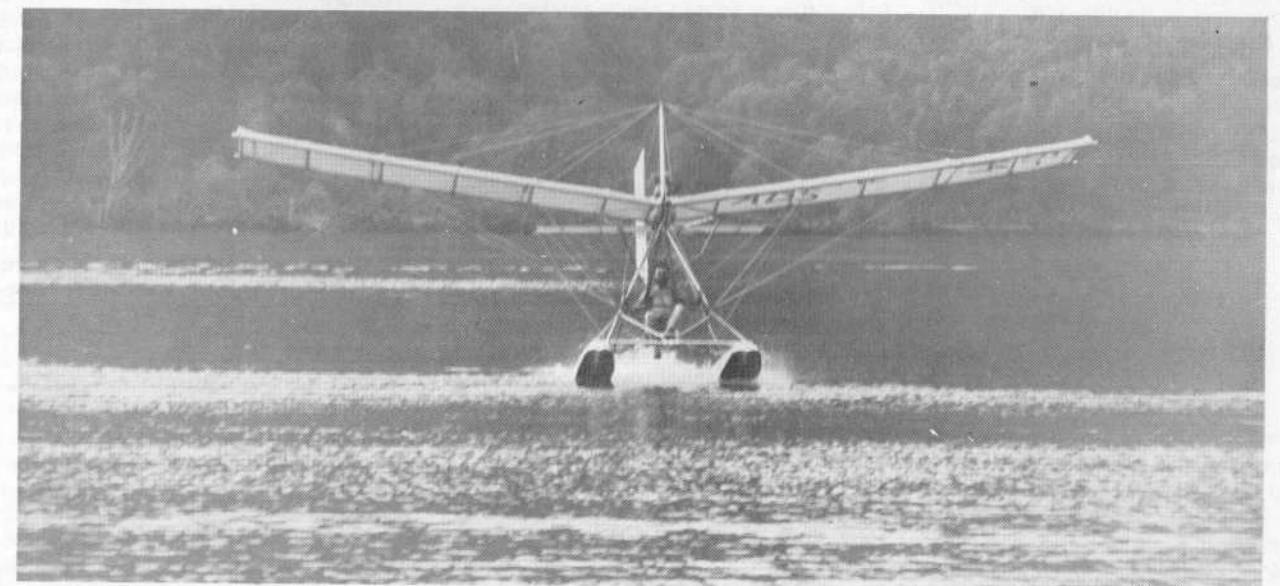
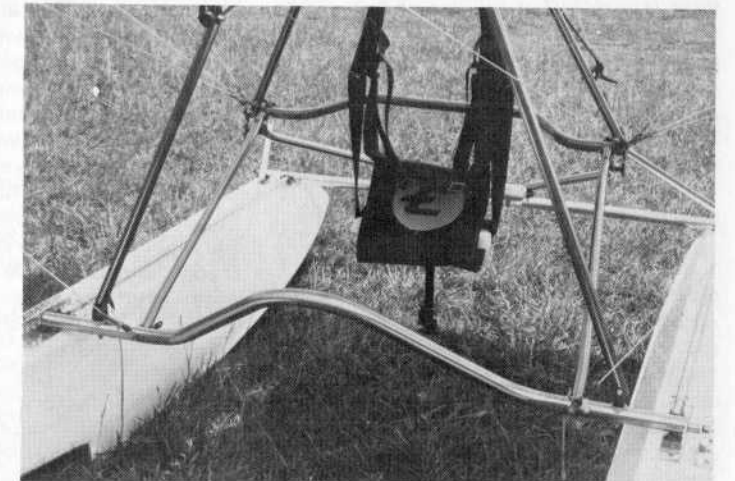
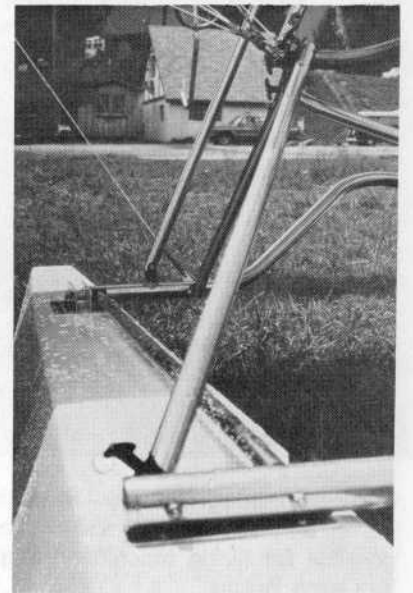
meaning rough jagged beaches, winds over ten mph and choppy water conditions (up to 2½ foot waves), then you need all the benefits that have been built into the **Florida Pontoon Company** floats. They were designed to give exceptional stability due to the deep keel, cathedral hull, full chines and a venturi section behind the step, which make them very stable even in cross wind conditions. The features allow for more favorable and forgiving control on take-off and landing, and are particularly needed by amateur sea-plane pilots.

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Write or call us for more information and the location of the dealer nearest you. Act today!

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# ULTRALIGHT OWNER SURVEY

Owners talking frankly through a survey may be the most valid evaluation possible for flying machines/compiled by Glenn Brinks

The results are in. The owner survey forms from four different publications — *Hang Gliding*, *Ultralight (E.A.A.)*, *Ultralight Flyer*, and *Whole Air Magazine* — have been counted and tabulated, (with the help of John Ballantyne, President of the EAA Ultralight Assn.), the percentages have been calculated and the owner's comments have been noted. There are winners and losers and a few surprises.

The relative amount of response to the survey was both a surprise and a bit of a disappointment. The number of replies was smaller than expected, in some cases too small to permit any sort of statistical analysis. The surprise came from the number of responses compared to the number of particular ultralights seen at fly-ins. Look at the list of ultralights and the number of responses for each and compare it with what you have observed at your local fly-ins. We make no value judgements, but simply point out that we expected the relative numbers to be different.

Number of Responses	
Weedhopper	33
Easy Riser	18
Nomad & Honcho	18
Pterodactyl	15
Quicksilver	15
Eagle	11
Rally	9
Wizard	5
Lazair	4
Teratorn	3
Mitchell Wing	2
Hummer	0

The number of responses for the Nomad and Honcho is obviously very high, considering that they were not listed on the survey form. These responses were solicited by a letter sent out by a former DSK employee, and so, are not necessarily representative of a random selection of owners. In keeping with the

spirit of the survey to present all of the information available, the Nomad and Honcho statistics are included here, along with a short explanation of the controversy surrounding that letter. Also included are the responses from some of the ultralights that generated far too little response for any sort of statistical analysis. In cases where only a few owners sent in survey forms, the percentages are obviously not reliable — one owner's opinion could change them drastically. However, this is all the information we have, so we are presenting it for you, the reader, to interpret as you see fit.

The amount of time it takes to build an ultralight can be very important, especially if you planned on have it flying by a certain date (start of the flying season or whatever). The times shown here are not all exactly comparable, as some of these ultralights are kits, while others are supposedly factory finished. However, here are the average reported times to build. Also shown is the range of reported building times — lowest and highest, in hours.

	Average (hours)	Range (hours)
Eagle	8	2-15
Teratorn	24	16-30
Quicksilver	28	20-40
Wizard	30	20-38
Nomad & Honcho	34	25-45
Rally	78	26-160
Pterodactyl	78	26-160
Easy Riser	123	60-250
Weedhopper	137	50-400
Lazair	178	110-250
Mitchell Wing	425	400-450

Do the parts fit? Can they be fabricated without elaborate tools? Are special skills required? These are the types of questions a prospective ultralight owner would like to know about a machine. They all can be lumped under the general question, "Were there any problems in building it?" Here are the percentages of owners who reported having problems completing their ultralights.

Lazair	0
Eagle	9

Quicksilver	13
Wizard	20
Pterodactyl	25
Nomad & Honcho	33
Easy Riser	41
Rally	44
Weedhopper	48
Mitchell Wing	50
Teratorn	67

Set up time is one of the most important aspects of an ultralight from the standpoint of convenience. Many of the manufacturers claim very low set-up times. How many are true? One-man set-up is frequently claimed. A fair number of owners say their ultralights require two or more people for set-up. The following two tables show what the owners report for average set-up times (in minutes) and the range of reported times, and the percentage of owners who report needing two or more people to set up their machines.

	Set-up time (minutes)	Range (minutes)
Mitchell Wing	15	10-20
Teratorn	20	15-25
Nomad & Honcho	29	20-60
Lazair	34	28-45
Quicksilver	37	20-60
Easy Riser	43	20-90
Pterodactyl	53	25-120
Wizard	53	30-90
Rally	53	30-90
Eagle	64	30-105
Weedhopper	66	18-210

#### Percentage of owners reporting two or more people needed for set-up.

Easy Riser	12
Pterodactyl	12
Nomad & Honcho	28
Wizard	40
Mitchell Wing	50
Quicksilver	60
Weedhopper	67
Teratorn	67
Eagle	73
Lazair	75
Rally	89

After the ultralight is built, set up, the important part starts — flying. The owners rated their ultralights on how easy they are to fly and if they had any handling problems. The numbers are self explanatory. The responses of the Nomad and Honcho owners are reported here, but they are not reliable indicators of the Nomad and Honcho flight characteristics, because only a few of the owners had flown their machines, so all the percentages are extremely small.

#### Percentage of owners who rate their machines "Easy to Fly"

Lazair	100
Quicksilver	93
Wizard	80
Rally	67
Teratorn	67
Eagle	64
Weedhopper	39
Pterodactyl	38
Easy Riser	35
Nomad & Honcho	15
Mitchell Wing	0

#### Percentage of owners who rate their machines "Tricky to Fly"

Teratorn	0
Lazair	0
Quicksilver	0
Wizard	0
Eagle	0
Nomad & Honcho	0
Pterodactyl	6
Rally	11
Weedhopper	33
Easy Riser	47
Mitchell Wing	100

Closely related to the question of how difficult an ultralight is to fly is the question of whether it has any particular handling problems. In this summary of the results of the owner survey, we do not have room to report each of the problems listed by the owners. But we can list the percentages of owners who report handling problems, and then go into the details of each ultralight later, in a separate article on each model. Again, the percentages should be viewed suspiciously for those ultralights with few owners responding.

#### Percentage of owners reporting handling problems.

Nomad & Honcho	5
Eagle	18
Wizard	20
Rally	22
Quicksilver	27
Pterodactyl	31
Teratorn	33
Easy Riser	47
Lazair	50
Weedhopper	67
Mitchell Wing	100

Those percentages reflect all owners who reported any handling problems. The problems were not broken down into categories according to the severity of the problems.

So far, we have presented a few of the statistics and results of the owner survey. Future articles will deal with each ultralight in detail, giving the rest of the results, some of the comments from the owners, and the factory's response to any complaints from the owners. We have saved the most important question for last. Each owner expects certain things from his or her ultralight and judges it accordingly. If it has minor failings, those can be overlooked of the overall performance of the machine is as good as expected. After going through all the preliminaries, the final question is whether the owner would buy another machine of the same brand, or recommend one to a friend. If the whole survey had to be summed up in one question, this would be it. Here is how the various ultralights stacked up.

#### Percentage of owners who would buy another

Quicksilver	100
Wizard	100
Lazair	100
Pterodactyl	94
Eagle	82
Teratorn	67
Easy Riser	59
Mitchell Wing	50
Rally	33
Weedhopper	33
Nomad & Honcho	28

This summary of the owner survey results is not the last word on the relative merits of the various ultralights. And even the individual articles on each model will not tell the complete story. But, at least this is a start. If you are thinking of buying one of these ultralights, you can probably get a good idea of which models are well received by their owners. The individual articles will offer more data (including all the questions on the survey form that were not covered by this summary), and should give some idea of the reasons why the owners like or dislike a particular ultralight. We each have different needs and priorities, so your choice may be different from most other ultralight owners. Watching an ultralight fly at a local meet or fly-in is a must. What some owners call handling problems may be no problem to you. Workmanship and design details also should be seen first-hand. By checking with local owners, watching particular models fly and inspecting them closely, and reading our owner surveys, a pilot should be able to make an intelligent decision based on fact rather than advertising enthusiasm.

The original owner survey forms are being kept on file and anyone who wishes to inspect them (pilot or manufacturer) may do so by calling Glenn Brinks at 213/347-6506, or by contacting Whole Air with such a request.

The number of responses received for the DSK Nomad & Honcho was all out of proportion to the number of airplanes produced, especially considering that the DSK ultralights were not listed on the survey form. The level of response was due to a letter sent out by Bob Schiebel, a former DSK employee.

In the letter, Schiebel makes reference to a couple of prop failures that occurred at Oshkosh. The first occurred when a prop nut came off during run-up and the second when the prop shaft broke in flight. Rod Gage, who runs DSK, says the failures were the result of improper pre-flight inspection. Schiebel says they were due to lack of proper preparation by the factory.

Schiebel's letter also says that no complete kits have been sent out by DSK. Gage admits that there were parts availability problems, but that those problems have been cleared up and that current kits are complete.

Because of the letter, there is some doubt about whether the DSK responses are typical of DSK owners. The same doubts can be applied to other ultralights such as the Teratorn and Mitchell Wing that got very few responses. The small samples involved may or may not reflect the opinions of most owners of those ultralights. However, these are the opinions of the owners who chose to respond to the survey. If other owners have different opinions, they will just have to wait for the next survey.



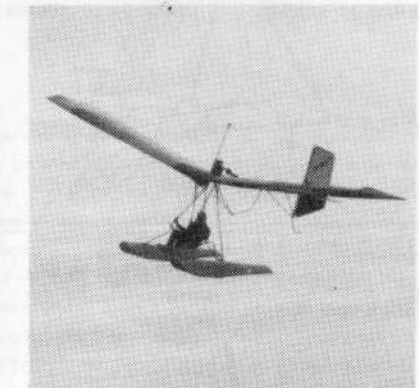
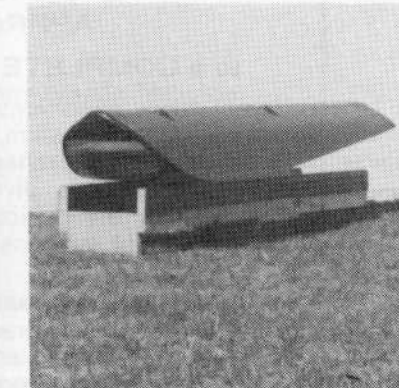
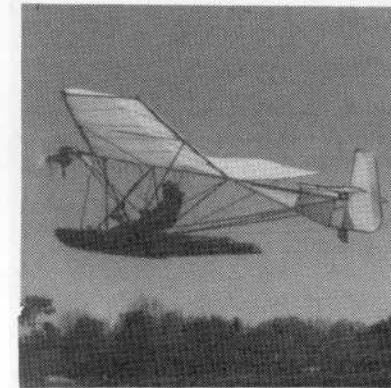
EDITION NO. 23

These prices are designed to be guidelines for evaluating your glider or one you wish to buy. We do not intend for these figures to be considered the final authority. Consult your local qualified dealer.

MANUFACTURER	YEAR MODEL	SIZE	CLEAN PRICE	AVG. PRICE	MANUFACTURER	YEAR MODEL	SIZE	CLEAN PRICE	AVG. PRICE
BENNETT DELTA WING	77 Phoenix 6C	Jr.	550	450	SEAGULL AIRCRAFT	77 Seahawk	170	600	450
	77 Phoenix 6C	Sr.	425	400		77 Seahawk	190	550	450
	77 Phoenix 6C	Reg.	500	425		77 10.5 Meter	---	625	525
	77 Phoenix 8	Reg.	650	375		78 Seahawk	140	675	625
	78 Phoenix 8 Super	Reg.	675	450		78 Seahawk	170	675	525
	78 Phoenix 12	Reg.	500	375		78 Seahawk	190	675	450
	79 Phoenix 6D	185	725	650		78 Seagull VII	162	550	500
	79 Lazor I	190	775	625		78 10 Meter	---	800	750
	80 Phoenix 6D	215	875	700		78 10.5 Meter	---	800	750
	80 Lazor II	175	925	725		79 Seahawk	180	850	625
CGS AIRCRAFT	77 Falcon V	185	650	500	79 10 Meter	---	825	700	
	77 Falcon V	220	600	475	79 11 Meter	---	825	700	
	78 Falcon 5½	Med.	700	625	80 11 Meter	---	925	850	
	79 Falcon 8	Med.	900	800	SKY SPORTS	77 Bobcat III	Lg.	675	600
EIPPER FORMANCE	77 Flexi II	185	525	475		77 Merlin	160	600	500
	77 Flexi III	185	575	500		77 Sirocco I	156	600	475
	77 Cumulus 10	Med.	550	525		77 Sirocco I	175	575	400
	78 Flexi III	Lg.	800	600		78 Osprey	175	700	525
	78 Flexi III	Med.	750	600		78 Sirocco II	164	725	600
	78 Cumulus 10	Med.	675	500		79 Eaglet	191	550	425
78 Antares	Med.	775	600	79 Osprey 2		175	625	550	
79 Antares	Med.	825	600	79 Sirocco III		189	850	725	
79 Antares	Lg.	800	675	UP SPORTS INC (ULTRALIGHT PRODUCTS)		77 Firefly	174	650	500
ELECTRA FLYER	77 Cirrus	3	600		400	77 Dragonfly Mk. II	196	700	550
	77 Olympus	160	575		525	78 Firefly	154	800	600
	78 Cirrus 5	C	600		475	78 Spyder	176	850	625
	78 Cirrus 5	B	750		450	78 Condor	178	900	725
	78 Cirrus 5	A	60		500	79 Mosquito	166	800	650
	78 Olympus	160	625		550	80 Firefly 2B	181	775	600
	78 Olympus	180	625		550	80 Comet	165	1325	1175
	79 Dove	A	700		575	81 Comet	165	1575	1450
	79 Trainer	---	400		300	81 Gemini	164	1450	1325
	79 Cirrus 5	A	650	625	WILLS WING	77 SST	100C	500	400
79 Olympus	160	725	650	77 SST		100B	500	425	
79 Floater	205	775	675	77 Universal		100A	400	350	
80 Spirit	200	1050	875	77 X-C		185	525	450	
FLIGHT DESIGNS	79 Lancer	190	900	675		78 SST	100C	704	650
	80 Lancer	175	975	900		78 Alpha	185	825	700
	80 Super Lancer	200	1025	925		78 Alpha	215	825	725
	81 Super Lancer	175	1100	950		78 X-C	215	800	700
	81 Demon	175	1475	1300		79 Alpha	185	800	675
HIGHSTER AIRCRAFT	80 Highster	205	1000	825		79 Alpha	215	800	700
	80 Highster	190	925	825	79 Omega	220	950	825	
MANTA PRODUCTS	79 Fledge	IIB	1200	1000	79 Omni	187	925	750	
	80 Fledge	IIB	1525	1325	79 Raven	209	1075	800	
MOYES DELTA WING (U.S. MOYES)	77 Maxi I	200	700	625	80 Raven	209	1100	925	
	78 Maxi II	200	750	700	80 Raven	229	1075	925	
	79 Maxi III	200	875	700	80 Harrier	177	1375	1150	
	80 Stingray	200	725	725	81 Harrier	177	1450	1325	
	80 Maxi IV	200	825	725	AMERICAN AEROLIGHTS	80 Twin Eagle	---	3125	2875
	80 Mega II	172	1075	850		81 Eagle, Z-Drive	---	3475	3100
EIPPER MICROLIGHT	80 Quicksilver	CM	3175	2850	PTERODACTYL INC	80 Ptraveler	---	3425	3100
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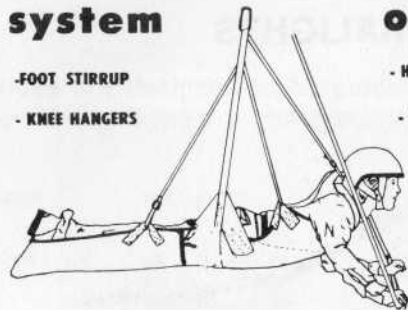
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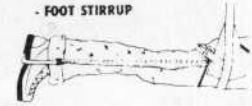
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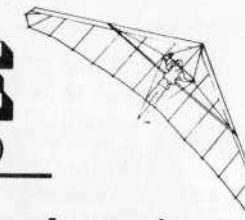
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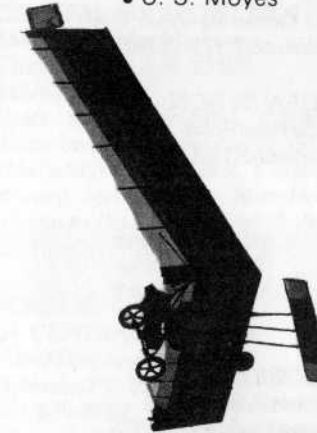
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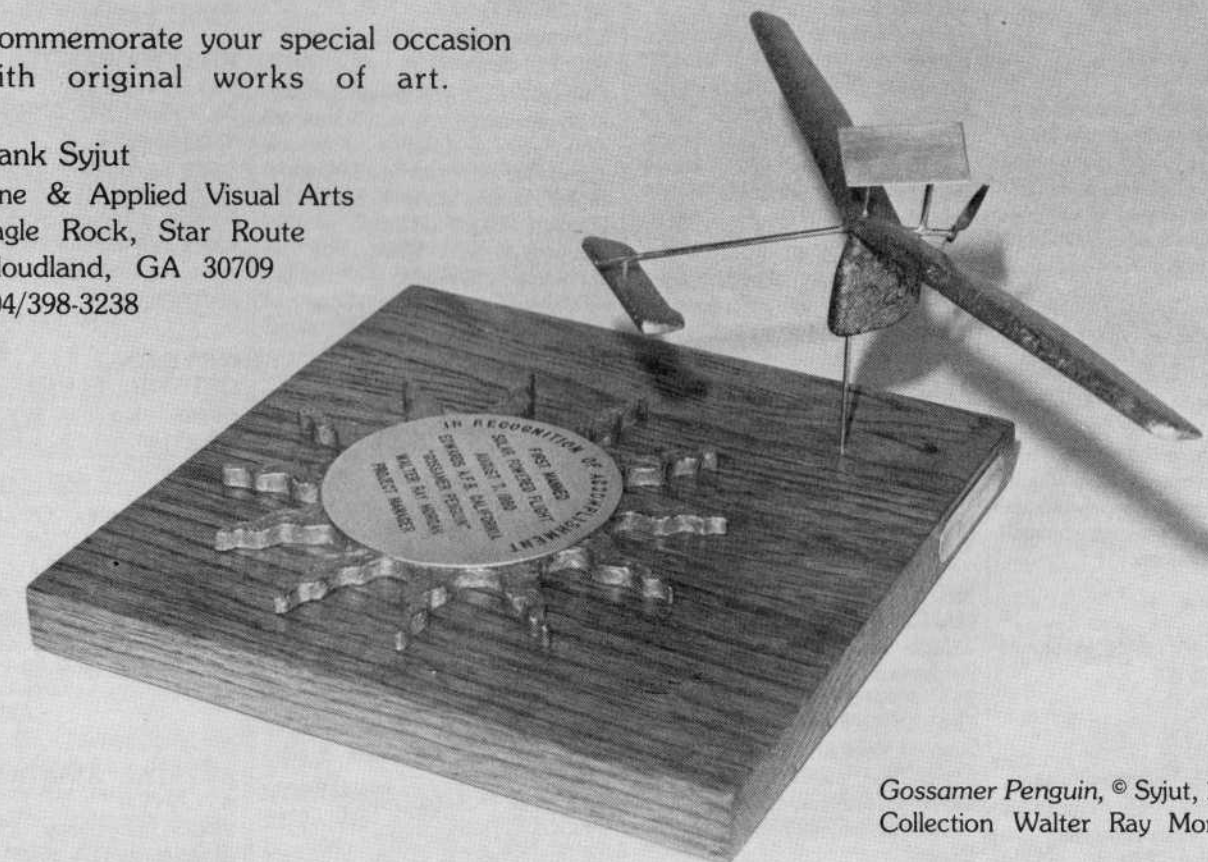
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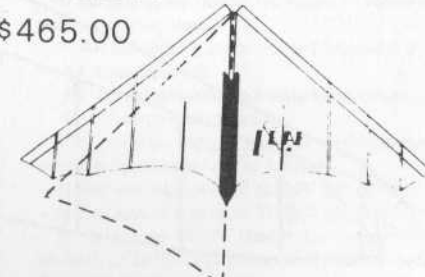
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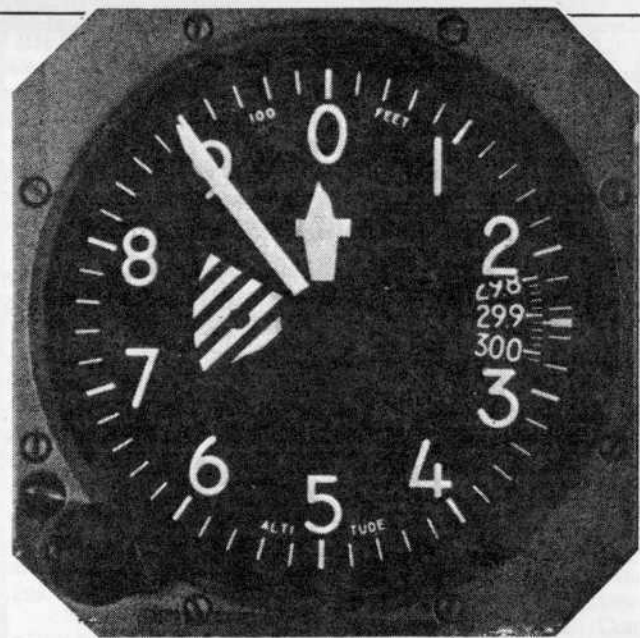


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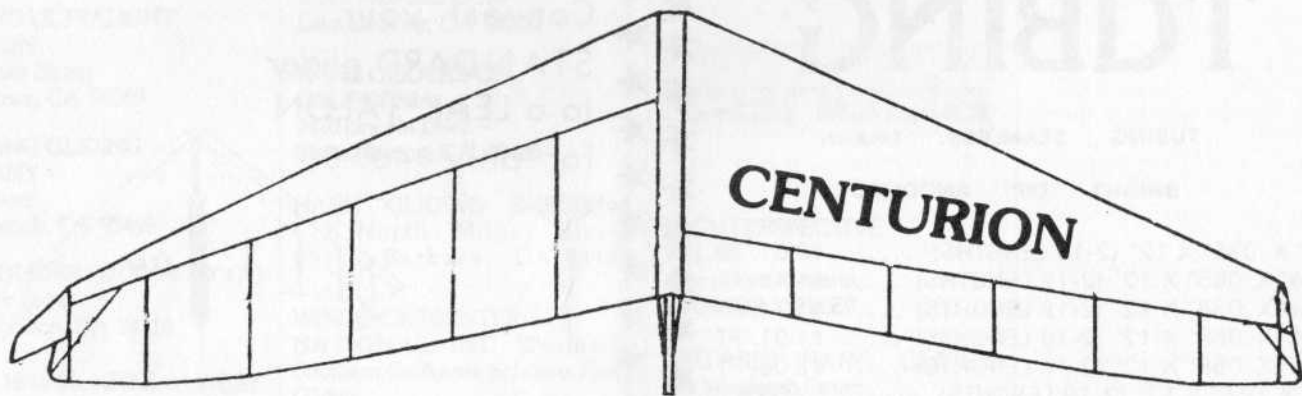
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†See cover of May/June *Whole Air*

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### ASG-21

ASG-21 — 180 squares — Orange and blue trim. Best specimen in the West. Needs new home. 714/459-7845.

### LOOKING FOR SOME GOOD DEALS? CHECK OUR NEW YEAR'S CLEARANCE SALE!!! BRAND NEW

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Gemini 164, 134	\$1295
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### LIKE NEW

Demon 175	\$1395
Comet 165	\$1295
Harrier 177	\$1195
Centurion 165	\$1195
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Glenn Muehlstedt, the pioneer in Glider and Ultralight insurance is now able to offer to you a comprehensive liability policy for dealers and schools that provides:

- 1) A combined single limit of liability in the amount of \$500,000.
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- 5) We will include as the named insureds:
  - A) Your business.
  - B) Your employees (including instructors).
  - C) Students while training.

The premium charges (subject to completion of an available application) are as follows:

- 1) Flat annual charge of \$150.00 per store or shop.
- 2) Flat annual charge of \$100.00 per training site.
- 3) One time \$20.00 charge for powered training student, or \$8.00 for foot-launched training student, for the entire training program.
- 4) Flat annual charge of \$50.00 per instructor. Also we are able to offer an accident policy for students which will provide \$25,000 coverage for loss of life, medical expenses, and other extensions caused by a hang gliding injury for a flat charge of \$25.00 during the entire training program. (This is a super program.)

I think the programs I've outlined are very attractive and offer the protection for which you have been looking. If you are interested, please contact our office to obtain an application, so we may forward you a quotation immediately. If you have any questions, let me know.

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# PRODUCT LINES

CHATTANOOGA, TENN. — Welcome to a new season with us... it's gonna be a great one. So say a definite majority of the industry persons to whom we've recently spoken. Our 12,000 mile plus Winter Tour this year took us from 30 below Minnesota to sparkling Los Vegas to pastoral Northern California (mud slide time excepted) to the fast lane of L.A. and many points in between. Lotta folks saying 1982's lookin' good! One afternoon in an interesting free-form discussion involving some top designer names and industry leaders, the confident statement was voiced saying, "... performance gains seem more, not less likely than ever before... we see no reason why modern hang gliders cannot be stretched to 16:1 or more in the foreseeable future." No sense dealing details yet, 'cause no one has a crystal ball, but industry-wide (at least the "heavies") are looking at wings that could go faster, flatter and yet go slower better (land-able!). Phrases like, "... variable geometry airframes and/or sails... augmented weight shift controls... in flight trim control..." all make the attentive sit at attention with interest. Oh boy! So let's look around. Perhaps back east is the place to start since that's where the Tour began. In Massachusetts, a familiar name, **Tom Peghiny**, is ready to market something he calls an Integrated Trike. With a hybrid-composite airframe, and close coupled rudder, the \$3600 (estimated retail with small engine) craft may be among the first real steps to a **motor-glider** (our thought). Soon to arrive is a fold-able flex-wing ship (trike) with 160° nose, tremendous pre-loaded leading edges, 30 foot span, A.R. of 6.0, and 155 squares. The Sky Cycle will be built/shipped by **Denny Franklin** (Maxair Hummer builder) and marketing will commence shortly. Over in Minnesota the **B.R.S.** is here! **Boris Popov** is ready to deliver the efforts of his seven years of developmental work (see ad pg. 7). We plan a complete write-up in the May/June *Whole Air*, but the safety of ballistic recovery systems is available today. As though running one of the country's leading shops (Northern Sun), and developing the BRS weren't enough, busy Boris has also introduced a line of snow skis for ultralights. Called Snow Skys™, they are not only extremely professional appearing, but priced at about half the competition's prices. And what better place to develop snow skis than Minnesota, eh? (See ad pg. 44) In the same metropolis, **Glenn Muehlstedt** has got his insurance engine full stoked. *Whole Air* will help explain the wide array of insurance plans now offered by Glenn in a new column called, "Insurance Answer Man." Back a tad farther east, new big bucks are flowing to the **Hawk** from CGS. Yep, new investment for the Patent Man, **Chuck Siusarczyk**, from, you guessed it, another Pole! Fella by the name of **Frank Durkalski**, and son, **Court**, own the world's largest fuel pump bearing manufacturing business. The company, **Truline Bearing**, makes components for the majority of flying machines including the behemoth Boeing 747. Part of Frank D's interest is pursuing the patent rights, and plans are being laid. Also, the new greenbacks will conceive a new offspring, **Hawk Ltd.** whose purpose will be R & D, testing, and development. From the chilled east we went to chillier (!) Simi Valley, California and got some most enjoyable Pro-flying on **Pro Airs** from **Dick Boone** and company. It warmed up finally and **Grigsby** set new flying marks for a site referred to as "the backside of Grigsby's Ridge." It overlooks the Pro Air factory in Simi. This new company now offers a complete line of ships from their top 'o the line **ProStar**, to the more familiar **Pro Air**, to the super-intermediate entry called the **ProBreez**. Watch for upcoming Pilot Reports on these new ships. From Simi we ventured northward to Flight Designs, where so much is happening, space will only permit skimming the tops of the clouds. They have a new super-intermediate, the **Javelin**, not based on their Demon, but rather a whole new design (see pg. 2, IFC). Of course, we have been saying some things on their very deluxe **Jet Wing**. But they are nearing the time when they will unveil their new **FD-1 Ultralight**. We saw it. It is no re-make of other designs, and they've spared no expense to make it deluxe, too. The public is to view it first at '82 **Sun 'N Fun**. Then, Flight Designs is nearing completion of their **ballistic system**, somewhat different in concept from the BRS. More on that as it nears final preparations. Next is a **new hand deployed chute** (see pg. 11). Even all that is not it... a new flex-wing is in progress (NOT near final stages, tho), and everywhere you look, growth is evident. Their list of new products and projects is almost fatiguing to take in, and reflects their "... here for a long, long time" philosophy made so possible by the marriage with giant Pioneer parachutes. The situation is so solid that even the "older" employees feel glad they "got in" on the action when they did. One very important fact (we felt) is that they will NOT abandon their substantial hang glider market — hardly, as much expansion is planned there as well. A last note is that Flight Designs products are now covered with Product Liability Insurance to the magnitude of \$10 million. The fifty year old, \$54 million (annual sales) Pioneer company provides this, as they are what is known as a "deep pocket" legal-ese-wise. From Salinas, having waited till the mud slide disaster passed, we slid up to Manta, where we were given the executive tour of the **Fledge III** and **Foxbat trike** by Manta hot pilot, **Rex Miller**. Typically Manta in slick, well-tooled finish, the outfit who has supplied all of Pterodactyl's wings has now entered the "motor market." We laid plans for a flight review of the Foxbat so keep lookin' thru these pages. Our north California excursion cut short due to the weather wait, we returned south toward 100 mile-an-hour

Santa "Banana" winds, and stopped at Seedwings to see revered designer **Bob Trampenau**. Bob's had the best year in his history, selling over 75 **Sensor 510's** from June '81 thru Jan '82. It's the best glider EVER for them and ahead of its time. See Pilot Report in this issue. Things are so good looking for **Seedwings** in '82 that Bob asked us to convey word that he is seeking employment applications for full fabrication of airframes, full assembly, test flying and shipping. The work is managerial as well. At the **Aolus** factory, we were told that their new **Sonic** flew near the end of '81. They now plan to get all details cleaned up before first exposure, but find better slow speed, MUCH better landings and more conventional handling, still in the very wide nose class. Now we're driving through L.A. (cough!) to **Wills Wing**. Next to them is **Hang Flight Systems**, who has a "Fashion Show" (huh?) planned for March 23 at 7 p.m. at H.F. They'll have live models (famous diver names) displaying merchandise. Sounds unique. At **Wills**, things are bristling with activity. Having added **Tom Price** and **Rich Pfeiffer** to the staff has upped the already fast pace. They have their super-intermediate **Harrier II** ready and it could be the most proven such out (what with many hundreds of Harrier I's in the field). Of course, things are proceeding on **Duck** production. Over 200 are already sold and no one has even seen one yet! Plus accessories galore, including the **Bulletman** harness (see pg. 15). We got in it, and surprise (!), it's pretty comfortable. Definitely easy with its automatic bomb-bay-doors. Slick(er) is the key word with this super-faired harness. Watch for Pilot Reports on the **Duck** and **Harrier II** maybe as early as next issue. An industry Sidebar is the early February marriage of designer genius, **Steve Pearson**, to **Nancy Kells** (sister of Rob). Congratulations Steve and Nancy! Outside Wills we ran into **Roy Haggard** as he and **Meier** returned from an HGMA meeting. At the gathering **Meier** was elected Prez' of the HGMA, with **Roy** as V.P., and **Dick Boone** as its Sec'y. **Roy** was pressed for time but gave us a thumbnail sketch of things at **UP Sports**. Their entry to the massive board sailing market is in high gear, with them producing finished products. It is indeed a sports field with giant potential, and their considerable personnel talents may have them in the lead a la hang gliding and the **Comet**. Things are also very active for their **Gemini**, which has been thoroughly developed and looks to sell extremely well for **UP**. Watch for a Pilot Report on this ship, too. Soon. Cross-town (L.A.) to **Uncle Bill's**, things are into a new energy level as **Bill** adds **Bob England** and **Steve Aycock** to **Mark West** for significant design/development talents. **England** did the **Demon** for **HiWay** (Britain) and **Aycock** is recalled for his trike victory at last year's **Arizona Air Race**. This group has the X-Series flying better than ever and we're sure they'll be looking to win again, as this issue is being printed, at **Air Race II** (Feb '82). **Bennett** is busy with other products as well, like a voice-actuated FM radio helmet, a super-light 'chute, and an instrument panel (see news releases). **Bill** also told us more about a huge Bible distribution program to **Red China** (!?). Yep, the Hunt "silver magnate" Family is trying to gather a reported 200 ultralights to GIVE to the Red Chinese Sports Federation in return for the privilege of placing Bibles in Chinese hands. **Bill's** trikes are heavily involved, but at press-time, details were far from complete or certain, and the future still unknown. Time will tell. Also contacted were **DSK Aviation** (**Honcho**), **American Aerolights** (**Eagle**), and **Eipper** (**Quicksilvers**) among others. **Chuck Stahl** showed us his newest **Centurion** at **Elsinore**. **Chuck** reports good response to his *Whole Air* ad, even from **Yugoslavia** and **Taiwan** (we do get around!). Marketing of the **Centurion**, with its nifty articulating winglets, is going fine, tho typically slower through in winter. He plans to visit Chattanooga with his bird, allowing a Pilot Report in a summer issue. We didn't get a ride on the craft, however, as a flight was available on a **Duck** first, and then it was time to head to **Sin City**, **Los Vegas**, for the **Eipper Extravaganza**. Gobs of things going on for ultralighting's **Numero Uno** (their claim). A **Two-Seater MX**, snow skis, a single cylinder **Cuyuna Quicksilver** with a weight-shift-moved elevator, a special motorized emergency 'chute and free-fall-capable harness, plus floats, radio helmets, wheel pants, gear bags, new literature, and on and on. Whew! But the main event was the Seminar. Held at the lavish **MGM Grand Hotel**, **Eipper** had room for the over 200 attendees, and had four Quicks set up in the meeting room. In the most professional Seminar to date, **Eipper** announced their **No. 1** status, which they alleged the competition acknowledged. They sold 2200 units in '81, tripling the previous year's sales, grossing \$7 million. As you might suppose, they feel '82 is going to be a blockbuster. In **Dallas Texas** near the end of our Tour, we visited with ex-USHGA Prez, **Dave Broyles**. He's leading again, now for the **Ultralight Pilot's Association**, or **UPA**. Formed under the wing of the **AOPA** (3 times larger organization than the **EAA**) **UPA** may fill the void for **UL Pilots**. The **AOPA** was in contact with **USHGA** and liked the no-regulation attitude of **Yoo-sh-ga**. Should be interesting to follow their developments, as we will. On a last but sad note, **Bennett** informed us that **Andy Jackson**, operator of **Pinecrest Flight Park** (Crestline site) has been hospitalized. We'd like to encourage those familiar with **Andy** to drop him a positive word, care of: **Pinecrest Flt. Pk.**, **Pine Street**, **San Bernadino**, **CA 92410**. Got news or opinions? Send 'em to **Product Lines**, **Box 144**, **Lookout Mtn, TN 37350-0144**.

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