

**THE WILLS WING FORMULA
FOR EXCEPTIONAL ACHIEVEMENT:**

1 PILOT (BRUCE CASE) + 1 DUCK (WILLS WING) + 310 FT. (HILL) = 134 Miles! (CROSS COUNTRY)



On his fifth flight on his new Wills Wing Duck, Bruce Case set a new standard of achievement in cross country flying. Launching from a 310-foot hill near Frontenac, Minnesota, Bruce flew a staggering 134 miles (Great Circle) over completely flat terrain to Hazelton, Iowa. Bruce was within 500 feet of the ground twice in the first 8 miles, but fought his way back up to 4,000 feet in the marginal thermal lift.

"I honestly don't think I could have made the flight on a glider with less responsive handling," said Bruce. "I was circling 75% of the time, and after 4 hours I was exhausted. The Duck's responsive handling allowed me to continue to work the lift effectively for the 5½ hours it took to make the flight.

Wills Wing congratulates Bruce for one of the most outstanding flights ever made in a hang glider.

Wills Wing, Inc.
Quality • Service • Integrity
Dealer Inquiries Invited

1208-H East Walnut
Santa Ana, CA 92701
(714) 547-1344

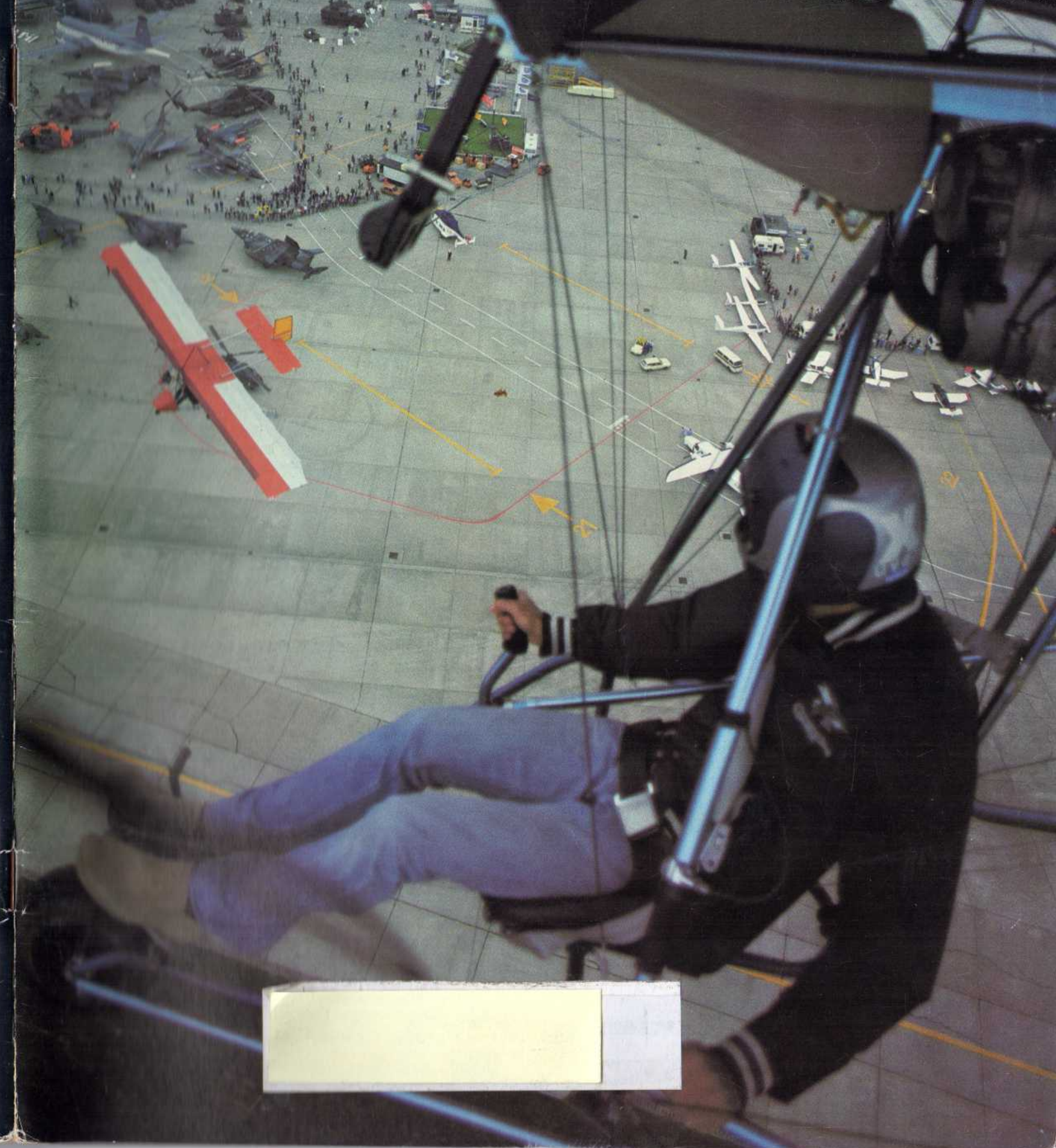
July/August 1982

WHOLE AIR

The International Magazine for Sport Pilots

US\$2.00 □ Can\$2.50 □ FrFr 24 □ 1200 Yen

U.S. Postage PAID □ Bk Rte Permit No. 7 □ Lookout Mtn TN 37350-0144
Post Office Box 144 □ ISSUE NO. 25 □ Address Correction Requested



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

Wings for Man



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.

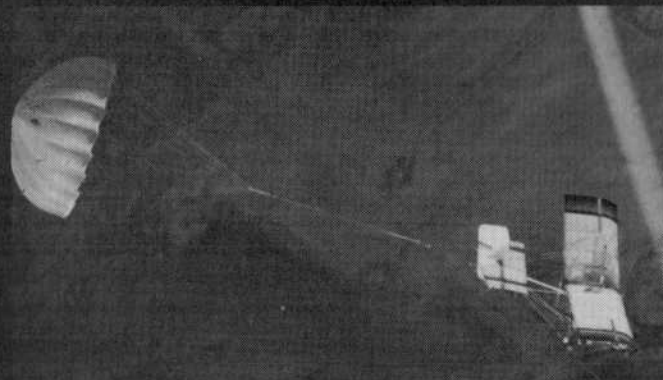
Call or write Bob Trampaneau at the Seedwings Factory, 1919 Castillo St., Santa Barbara, CA 93101 805/682-4250

SEEDWINGS

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

BRS

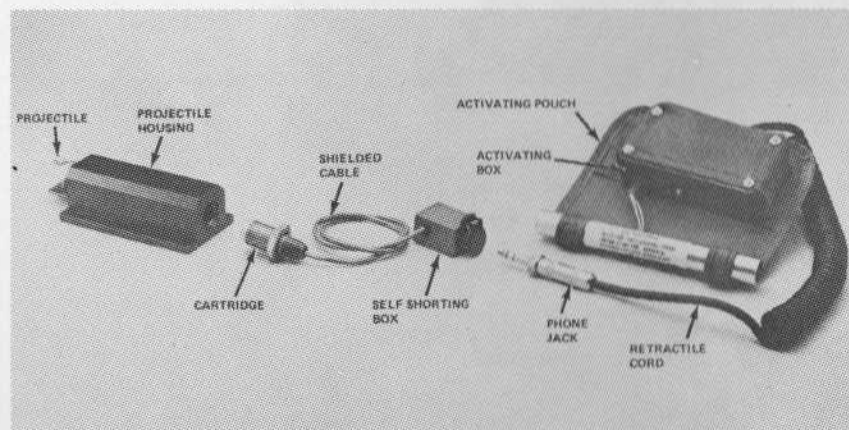
BALLISTIC RECOVERY SYSTEM



"The Foremost in 1982 Parachute Technology." Whole Air magazine

Flying without a 'chute? That's just plain dumb. When you can have full life saving 'chute deployment from heights *under* 90 feet, why take the chance? Only \$690 puts the newest hi-tech recovery system up there with you. A comforting feeling indeed! While manually deployable... a pull on the handle wicks your anxieties away as the 'chute explodes into view behind you slowing you up and letting you down... softly.

Got a perfectly good 26 foot diameter 'chute like ours already? Ever *seriously* contemplated how you'd throw it out? Have you ever *practiced* doing so? Real deployment seminars in Chattanooga proved hand deploy systems average 7.48 seconds. Compare that to 1.5 seconds for the BRS! Seven years of professional effort have delivered today's most sophisticated ultralight recovery system. Available today, for just \$490 using your 'chute.



BALLISTIC RECOVERY SYSTEMS, Inc.

2277 W. County Rd. C
St. Paul, MN 55113
612/633-1650

WHOLE AIR

PILOT'S PERSPECTIVE

- 16 WHITCOMB WINGLETS
An addendum to Richard Miller's theoretical essay, "End Play."
- 17 DEHYDRATION
Dietitian, Dana Burnett, explains symptoms and remedies for this potential affliction for hang glider pilots.

FEATURES

- 23 INTERNATIONALE LUFTFAHRT AUSSTELLUNG (ILA '82)
Legal flying of ultralights shared by American and German craft sparkles the Hanover Airshow.
- 26 TOWING
Skyting revisited. Much interest was expressed in this newest system of safe towing, so here it is further defined.
- 30 PILOT REPORTS
Four pilots look at three intermediate gliders from industry giants — Wills Wing, Flight Designs, and UP Sports.
- 37 BENNETT TRIKES
For a year and a half now, hang gliding leader Bill Bennett has sold trike units. Here's what has changed.
- 42 ULTRALIGHT OWNER SURVEY FINALE
Glenn Brinks tells all, with the help of many owners, in a survey conducted from mid-1981 till early 1982.
- 50 TRIKE CROSSROADS
Noel Whittall brings us up-to-date in England by reviewing all the trike suppliers in the country that started it all.

AERO TOPICS

- 8 FORUM
Reader Commentary
- 10 CALENDAR ITEMS
What's Happening When and Where
- 11 INDUSTRY NEWS
News and New Products
- 18 BLUEBOOK
Used Purchase Guide
- 20 STATISTICS
Survey on Important Factors in Buying Gliders
- 54 DIRECTORY
Where to Buy What You Need
- 57 CLASSIFIEDS
For the Bargain Hunter
- 58 PRODUCT LINES
Consumer News

WHOLE AIR Magazine is published bi-monthly by Idea-Graphics, P.O. Box 144, Lookout Mtn, TN 37350-0144. ©1982 by Idea Graphics. All rights reserved. Nothing in whole or in part may be reproduced without written permission of the publisher. Publisher assumes no responsibility for unsolicited material. All photos, artwork, and manuscripts must be accompanied by a stamped, self-addressed return envelope. **Change of Address & Subscription Inquiries** — Send to *WHOLE AIR*, P.O. Box 144, Lookout Mtn, TN 37350-0144. Expiration date marked on mailing label in a four digit sequence, followed by two letters. The first two numbers are the month; the second two are the year of subscription expiration. Please give six to eight weeks advance notice of address change. Send both old and new address plus mailing label from recent issue, if available. Subscription rate: U.S. and Possessions, one year \$9.00; Mexico and Canada, one year \$13.00; All other countries, one year \$17.00; Air Mail available, write for rates based on one year (only) subscription.





Volume 5, No. 3, 1982
ISSUE NO. 25

Publisher
Dan Johnson
IdeaGraphics

Editor
Starr Tays

British Editor
Noel Whittall

Circulation Control
Kickoff Computer Service

Art/Photo Contributors
Dan Johnson
BJ Schulte
Chris Voith
Dieter Locke
Donnell Hewett
Bill Bennett
Noel Whittall

Editorial Contributors
Dan Johnson
Starr Tays
Richard Miller
Wade Leftwich
Thomas Phillips
Gary Engelhardt
Ranee Laskewitz
Glenn Brinks
Donnell Hewett
Dana Burnett

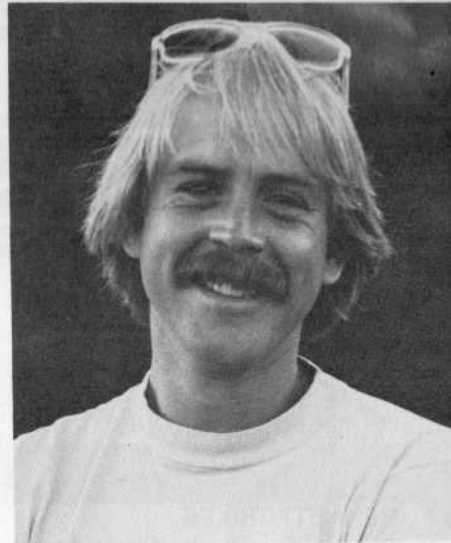
Advisory Panel
Mike Meier
Steve Pearson
Dick Boone
Tom Peghiny
Chuck Slusarczyk
Roy Haggard
J. C. Brown
John Lasko
Tom Price

Cover Photo
Dieter Locke

On The Cover:

Quicksilver MX and Lufthansa airline pilot, Dieter Locke captures Hans Gygax flying his own design, marketed by Sherpa. The backdrop for Locke's picture is the World Class airshow at Hanover, Germany. Ultralight flying in Germany was legalized concurrently with this exposition.

Publisher's Column



EVALUATIONS

Since our "Face Off" article was released, we have received a large measure of feedback on the effort. Fortunately for us here at *Whole Air*, and just as fortunately for you reader/pilots, most of the response was constructive criticism.

When we made the plan for the "Face Off" evaluation, we knew we were trying an unproven system. We have been innovating in this manner since our beginning in May of 1978. Along the way each new endeavor has brought problems and errors, discoveries and successes. Some articles earned us a "...ho, hum, didn't learn much at all." Others brought "...bravo, we're glad *someone* is providing this desired information."

Universally, though, you readers *applauded* the pilot reports, regardless of their format. The communication on new products remains *Whole Air's* most valuable service. We *will* persevere!

NEW DIRECTIONS

We want to heed the many generous words of advice given to us following "Face Off." While we *know* we are not perfect in the effort of product reviews, we *are* learning... more and more with each installment.

Unfortunately, we are almost alone in the task. Virtually no one else in the hang gliding/ultralight world makes the continuous effort to evaluate equipment as does *Whole Air*. That is all right. We do not mind being rather alone. But it slows our progress toward absolute professionalism. Unlike the design work of the sport, we

have little material to copy or use for direction.

So this issue, we do two things at once. On pages 30-34, we present three pilot reports on state-of-the-art intermediate gliders by three major companies. And on pages 41-48 (not inclusive) we offer owner survey reports on the top-selling four ultralights. While the flying disciplines are perhaps opposed, we yet ask your response to the usefulness of these article groups.

For if it is well received, our most current thought is to do two things: (1) set up an owner survey system for gliders (and ultralights) that are "in the field." Plus (2), visit the manufacturers at their locations to review their latest product.

PERFORMANCE

In the former system, we can gain a great deal of objective information gathered over many hours and months of flying by a batch of pilots who are wired into their craft. This should qualify as good criteria to judge performance, among many other things. Factory input will be sought to balance any repeated negatives (see Weedhopper report).

UP-TO-DATE

But the above will have a lag time, as the information is collected. This cannot keep up with our fast-developing industry. So we will increase our spending budget in order to visit factories expressly for the purpose of reviewing something brand new. These articles will *not* try to judge performance. It will be too early to do so. And we will rarely be able to fly the new ships long enough to fairly "face them off" against other new craft.

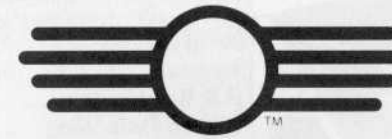
But we will be able to describe (in words and photos) what is new about them, and what the factory tried to achieve, and by what new techniques.

We feel if we can accomplish these specifics, that our errors will have helped create some better reading for you pilots. Thus, our successes should continue to mount as well.

Please *do* respond to these thoughts. There is space on the Reader Response Card just for this purpose.

Thanks,
Dan Johnson

AERO MARKET PLACES



Hang Glider Emporium

613 N MILPAS SANTA BARBARA CA 93103 805 965 3733

Chandelle San Francisco, inc
Hang Gliding Center

Come Visit Us!

198 Los Banos Ave., Daly City, CA 94014

(415) 756-0650



Golden Sky
Sails, Inc.

Mark Windsheimer
President

572 Orchard Street Golden, Colorado 80401 (303) 278-9566



Boris Popov
Northern Sun, Inc.

(612) 633-3333

2277 W. Co. Rd. C
Roseville, MN 55113



ERIK FAIR
U.S.H.G.A. CERTIFIED
FLIGHT INSTRUCTOR

HANG GLIDING FLIGHT SCHOOL
GLIDER SALES • SERVICE • ACCESSORIES

1202M E. WALNUT
SANTA ANA, CAL. 92701

(714) 542-7444



Specialists in Powered Ultralight Aircraft,
Hang Gliders and Accessories

U.S.H.G.A. Certified Instructors, Ratings/H.G.M.A. Certified Gliders

(305) 252-1706

18639 S.W. 107th Ave.

Miami, Fla. 33157

HANG GLIDING AND ULTRALIGHT AIRCRAFT



INSTRUCTION, SALES, AND SERVICE

Learn to fly over soft sand and through gentle Atlantic breezes a few miles south of where the Wright Brothers learned to fly.

Over 30,000 people have learned to fly with us. Large inventory of new gliders and ultralights in stock, and repair facilities.

Call (800) 334-4777 or (919) 441-4124 or write to Kitty Hawk Kites, P. O. Box 340W, Nags Head, NC 27959 for brochure, or parts and accessories catalog.

CRYSTAL AIR SPORTS

Lessons... sales... services... USHGA & FAA certified...

The Most Innovative Training Methods and Equipment.



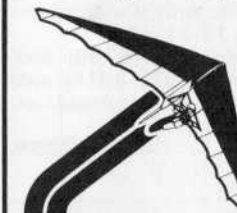
WILLS WING FLIGHT DESIGNS
PRO AIR SEEDWINGS
EIPPER BENNETT and Used Craft

Crystal... professionals since 1974.

Home of the Crystal Hang Glider Simulator

Call 615/825-1995 or write Rt. 4, Cummings Hwy., Chattanooga, TN 37409

Hang Gliding Headquarters for So. Calif.



- Dealer for UP, Wills, Pro Air
- Over 40 gliders in stock
- Complete line of accessories
- Beg to Adv instruction
- Glider rentals

WINDSPORTS

5219 Sepulveda Bl., Van Nuys, Ca 91411 213-789-0836



1945 Adams Avenue
San Diego, CA 92116
(714) 298-1962



FORUM

Dear Editor:

I would like to bring your readers' attention to the recent fly-off reports and the obvious inconsistencies and blatant disregard for the facts by one of the test pilots. The reporting of Bruce Short must leave a credibility gap for *Whole Air*, and this person should never be used again in the same capacity. The reasons are as follows:

1-For a glider he doesn't care for, he gave it the highest points of the three tested. For example: 98 for the X-180, compared with 82 for the Pro-Air, and 89 for the Duck.

2- His claim of having to push out in the thermal on the X glider is contrary to every skilled pilot who knows anything about flying and who has flown this machine. Quotes from Rich Pfeiffer, Bob England, Dave Gibson, and others, all say this is totally untrue. We wonder if he even flew the glider.

3- It is obvious he knows little about polycarbonate materials, or studied the ribs on the X glider or the Pro-Air, as they are both made of the highest quality polycarbonate lexan heavy tubing.

4- The overly plain hardware he mentions shows complete ignorance of 7075 aluminum, 2024 aluminum, 1707 stainless steel, nylon bearings, ball rotary tips, 1/2" X .035 ribs, 3000 lb. restraining straps, stainless steel luff lines, and so forth.

To sum up this person's complete evaluation on the X-180 (and other gliders also) it is exactly the same as his initials — B.S.

Bill Bennett
President,
Delta Wing Kites & Gliders, Inc.

Dear Editor:

On the "Face Off" article: "A" for intent; "D" for content. The written comments do not even match the score card. (It is) minimally useful for the consumer/competitor.

Tom Spross

Dear Editor:

The "Face Off" in the May/June issue looks like a lot of nonrelated numbers. What does all of it really mean?

Mike King

Dear Editor:

We are happy to announce the 1982 Utah Cross Country Odyssey. The task is to make the longest X-C flight measured in a straight line from take off to landing and prove it. The flight must originate in Utah. Anyone can compete, with the competition ending 12-31-82.

Larry Tudor (571-6266) and Gordon Boyce (572-3616) will keep *Whole Air* informed of current standings.

Gordon Boyce

Dear Editor:

How about some articles evaluating the different types of tow releases? Also, how about new flotation devices that would be out of the airstream (inflatable tube type, maybe in the leading edge). And how about evaluation and importance of winches?

David J. Kirkland

(Past *Whole Air's* have dealt with some of these information requests. Tow systems, and their releases, were reviewed in the Jul/Aug '81 issue. Winches and their uses were written up in the May/June '80 issue. —Ed.)

Dear Editor:

I was glad to see a pilot report on the Sensor 510 in your Mar/Apr '82 issue. I recently purchased a 510 and although overall the evaluation was excellent, there are a few points I would like to touch upon.

First, in reference to the side wires, the 510 I fly as well as others I've seen, all have quite snug wires, nothing like the Comet. There is some "feedback" from the wings on launch, but this is from the floating cross-bar, not the wires. All gliders with a floating cross-spar (Demon to Harrier) are the same in this respect.

Jeff Burnett calls the sink rate "nothing outstanding." Well I don't know what he is comparing it to, but here in New Mexico, Comets seem to have the top of the stack, usually, and my 510 is always with, or above, these loose-wired cousins.

Finally, concerning the landing, while Burnett implies the 510 is difficult, it seems no harder to me than other double surfaced gliders, and seems *easier* than my Comet.

In closing, let me thank you for this and other reports you have had on some very unique gliders.

Amado Summers

Dear Editor:

I really enjoy your "Product Lines" at the end of the issue. It is very much like "...saving the best for last."

Dick Fortner

Dear Editor:

I enjoy your magazine's emphasis on *hang* gliding. It's the best one left!

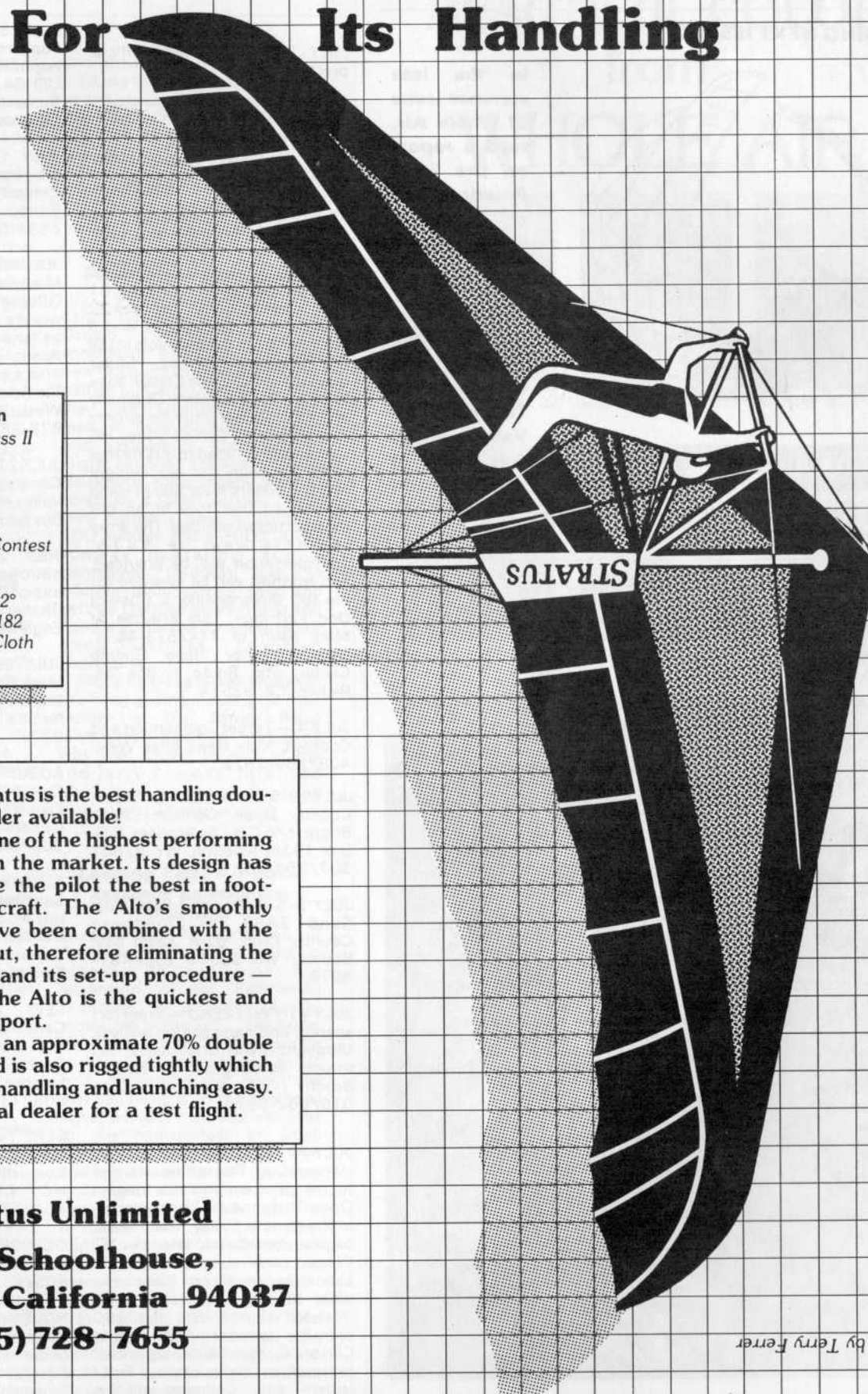
John Hach

ADVERTISER'S INDEX

Aerial Dynamics	52
Airwise	52
B & B Enterprises	57
Bennett Delta Wing	
..... (39) Cover 3, (59) IBC	
Ballistic Recovery Systems ...	4
Cloudbase	29
Crystal Flight Resort	36
Crystal Air Sport Motel	36
Eipper Formance . (40) Cover 4	
Flight Designs	
.... (2) IFC, (22) Cover 2, 27, 47	
Lightwing Insurance	14
Leading Edge Air Foils	12
Progressive Aircraft (21) Cover 1	
Ron Hurst (Safaris)	10
Sealord Floats	15
Seedwings	3
SEPEX (Parachutes)	53
SSE Enterprises	17
Stratus Unlimited	9
Sport Aviation Mfg	13
Tow Kite: Glider Exchange .	14
Ultimate Aircraft Floats	45
Ultralight Flyer	16
U.S.H.G.A.	52
Whole Air	11, 49
Wills Wing 19, (60) Back Cover	
Aero Market Places	7
Directory	54
Classifieds	57

ALTO~STRATUS

Known For Its Handling



1981 Competition

1st & 2nd—Class II
Region 2 Qualifier
2nd—Class II
Region 1 Qualifier
1st—Mattawa,
Washington X-C Contest

Specifications

Nose Angle—132°
Sizes—152,172,182
Spanwise Sail Cloth
Price—\$1925

The Alto-Stratus is the best handling double surface glider available!

The Alto is one of the highest performing hang gliders on the market. Its design has evolved to give the pilot the best in foot-launchable aircraft. The Alto's smoothly flowing tips have been combined with the defined washout, therefore eliminating the trunk, its drag and its set-up procedure — the set-up of the Alto is the quickest and easiest in the sport.

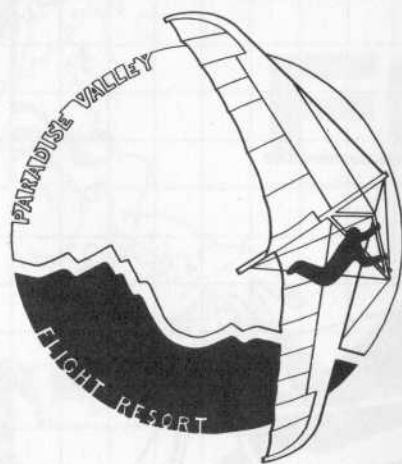
The Alto has an approximate 70% double surface sail and is also rigged tightly which makes ground handling and launching easy. See your local dealer for a test flight.

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

Graphics by Terry Ferrer

FORUM

COMING NEXT ISSUE . . .



In the late summer issue of *Whole Air*, read a report on the 1982 American Cup in England, and notes from the Owen's Valley Classic.

Then we'll present a unique idea, "Paradise Valley Flight Resort,"

a theoretical architectural effort aimed at devising a special and beautiful place to fly. Of course, we'll give you pilot reports, a review of Oshkosh '82, and much more. **SUBSCRIBE today... see page 49.**

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.

CALENDAR ITEMS

JULY 1-2 — XC Classic official practice days.

JULY 3-10 — XC Classic Contest Flying.

JULY 11 — XC Classic Fly-in, awards ceremony, barbeque.

XC Classic 82. Entries are restricted to 50 pilots this year. The top 18 pilots from the XC Classic 81 and the top three rigid wing pilots from the XC Open 81 are eligible for entry. There are 20 invitational positions open and 9 positions from the top pilots in the 82 Challenge Races. Glider qualifications for the Classic have been a bit of a problem. Originally announcing that entry for gliders was unlimited, Owen's Valley HG Center has decided to qualify that statement with the requirement that the gliders *must* fold in some fashion so that they fit on our transportation vehicles. The entry fee this year is \$475. Transportation will be provided, and trophies will be awarded for the top three positions. Contact Don Partridge, Tom Kreyche or Mark Axen at 714/873-4434, Owen's Valley Hang Gliding Center, Star Route 4, Box 3A, Bishop, CA 93514.

JULY 4 — Target Competition and Cookout, Kitty Hawk Kites West; 408/384-2622.

JULY 1-5 — Wyoming Cross-Country Open. Contact: Chuck Bright, c/o C & L Enterprises, P.O. Box 1536, Riverton, WY 82501 307/856-4671.

JULY 3-5 — Region I Regionals. Send SASE to: Cloudbase Country Club, 52-A 221st SW, Bothell, WA 98011 206/481-5878.

JULY 4TH WEEKEND — Frankfort soaring and hang gliding festival. Ultralight fly-in and demo. HG towing competition at Elberta Beach. Contact Jim Nelson 616/882-5070.

JULY 12 - SEPT 5 — Owen's Valley Horizon Cup. This will be awarded to the pilot making the longest Open Distance flight originating in the Owen's Valley. The contest begins immediately after the XC Classic, and runs through the Labor Day weekend. Pilots may enter at any time before their intended flights, and the \$90 entry fee includes either 1 ride to Cerro Gordo with unlimited retrieval, or 3 rides to our Piute launch site. Cameras will be required for landing site

JULY 3-4-5 — Tennessee Tree Toppers sponsor Region 10 regional, 1 on 1 style, open to USHGA 3's and 4's. Contact Bryan Burnside, P.O. Box 152, Dunlap, Tennessee 615/949-2006.

JULY 17-18 — Regional Fly-in, Mt. Harrison, near Burley, ID. Contact Frank Gillette, Rt. 1, Burley, ID 83318 208/654-6381.

JULY 20-25 — 6th Annual Grouse Mountain World Invitational Hang Gliding Championships. The world's top 100 pilots come from as far away as Japan, Africa, and Australia, to compete for cash prizes and titles. Contact: Harvey Blackmore, 1368 Burnside Rd., West Vancouver, BC., Canada B7S-2P5.

JULY 21-AUG 1 — Starthistle '82. Competition sponsored by Rogue Valley HGA. Contact RVHGA, P.O. Box 621, Grants Pass, OR, 97526

JULY 22-23 — Dayton international airshow and trade exposition. Contact: Mark Chatterton, 808 Sipsos Circle, Englewood, OH 45322.

JULY 23-25 — Region 5 Series Meet, Boise, ID. Send SASE or call Joe DeCleur, 528 W. Colorado, Nampa, ID 83651 208/467-3277.

AUGUST 7-8 — Aerial weekend at Crested Butte, Colorado. Contact: Elaine Chandler, P.O. Box 1122, Crested Butte, CO 81224 303/349-7311.

AUGUST 16-20 — Trofeo Sansicario hang gliding grand prix XC competition. Prize money. Contact: Gi Ferraris, Holiday Club Cansicario, 10054 Cesana Torinese, Italy.

SEPT 11-12 — 4th Annual Canadian-American Challenge Cup. Black Mtn., WA. \$30 entry. Contact: Rick Girard, 1911 Larabee, Bellingham, WA 98225 206/733-5467.

SEPT 14-19 — Masters of Hang Gliding Invitational International Competition at Grandfather Mtn, NC. Contact: Joe Foster 704/733-0248.

OCTOBER 16-17 — Blue Angels at Point Mugu Air Show. Contact: 805/982-8094.

NOVEMBER 27-29 — Suncoast 8th annual tow launched hang glider championships. St Pete, Florida. Contact: Hal Elgin, 6639 Emerson Ave. South, St. Pete, FL 33707.

INDUSTRY NEWS

HGMA Documentation on New Models

Documentation was presented and accepted on the Progressive Aircraft ProStar 160 and 130 models.

Documentation was presented and accepted on the Wills Wing Duck 160 and 200 models.

Documentation for the DHV (German) certification for the Wills Wing Duck 200, 180, and 160 was presented and accepted.

At the April 16th, 1982 meeting, documentation was presented and accepted for the Dyer Hawk 218.

A resolution was passed requiring that the speed measuring device and the glider be on the same vehicle during loads tests, unless there is a guaranteed speed synchronization between the two vehicles.

Mike Meier, President HGMA (May 26, 1982 meeting)

New Medication Guide Published for Pilots

Pilots who take medication -- from aspirin to prescription remedies -- can now check in a new book which ones are safe for use while flying. The guide is published by the Aircraft Owners and Pilots Association (AOPA), and the National Aeronautical Institute.

The 225 page "Medication and Flying: A Pilot's Guide," was written by Dr. Stanley R. Mohler, director of aerospace medicine at the Wright State University School of Medicine.

Hundreds of drugs are listed in the guide by generic and trade names. Information includes any significant side effects that the medication may have on pilots as well as the length of time it takes for the body's system to clear itself of the drug effect.

The Guide will sell for \$19.95 (\$14.95 to members of AOPA). Contact Charles Spence of AOPA at 301/951-3820.

George Whitehill Becomes New President and Manager of Chandelle

After ten wonderful years of full time involvement in hang gliding, I am pleased to announce that George Whitehill has become the new President and Manager of Chandelle San Francisco, Inc. His energy, resources, and experience as a pilot, businessman, and instructor will assure that the Chandelle tradition of quality instruction, friendly service, and top rate products will continue

and grow.

I'd like to say a special thank you to the industry people and every day pilots who have made these years so incredibly fulfilling and successful.

I'll see you in the air! Fly safely, and Good Lift!

Jan Case, Founder Chandelle San Francisco, Inc.

Flight Realities Opens McCarroll Park

Flight Realities, located in San Diego, California recently announced the opening of their new ultralight airport. The facility, named McCarroll Park in honor of the late Stephen McCarroll, features complete sales, service, and instruction. According to Flight Realities President, Steve Hawxhurst, the company plans to establish a "total service" FBO. "We currently have a 2000' X 100' runway and a 1000' X 50' runway operating and a permanent tie-down line. In addition to our existing sales and service building we intend to add hangar space and complete repair shop facilities," reported Hawxhurst.

Flight Realities is well known in the hang gliding industry for their facility at the Torrey Pines Gliderport. Stephen McCarroll was well known as one of the industry's most talented photographers for both hang gliding and ultralights.

Leading Edge Air Foils Expands Sailmaking Facilities

Leading Edge Air Foils, Inc. of Colorado Springs, Colorado, is pleased to announce the expansion of its Sailmaking facilities to include several motorized ultralight templates. LEAF is now offering these single surface fixed wing sail designs in both the weight shift and three axis sail designs, in the choice of either white or multi-colored sails to the homebuilder or small ultralight manufacturer who wishes to construct his own motorized ultralight. All these sails are professionally sewn by in-house sail loft personnel. LEAF's master sailmaker has over eight years of experience at manufacturing both hang glider and ultralight sails.

In addition, LEAF's new and complete 1982 harness line consists of power ultralight seats, restrainer systems, and parachute mounting systems.

All BEAUTIFUL COLOR from WHOLE AIR



Nov/Dec '81 No. 22 Sep/Oct '81 No. 21 Jul/Aug '81 No. 20



May/June '81 No. 19 Mar/Apr '81 No. 18 Jan/Feb '81 No. 17



Sep/Oct '80 No. 15 Jul/Aug '80 No. 14 May/June '80 No. 13



Mar/Apr '80 No. 12 Jan/Feb '80 No. 11

Nov/Dec '80 (#16) and Mar/Apr '82 (#23) and May/June '82 (#24) are SOLD OUT.

Sounds like a great deal to me... I'd love to save 50% or more! Please send me: _____ (Issue #s)

- Any 3 issues \$1.95 (a \$4.50 value) plus \$2.00 postage
- Any 5 issues \$3.95 (a \$7.50 value) plus \$2.50 postage
- Any 8 issues \$6.95 (a \$12.00 value) plus \$3.00 postage
- All 11 issues \$8.95 (a \$16.50 value) plus \$3.50 postage

Name _____

Address _____

(zipcode)

Send to: BACK ISSUE OFFER, P.O. Box 144, Lookout Mtn., TN 37350-0144

KITE TUBING

TUBING SEAMLESS DRAWN
BRIGHT DIP ANODIZED

3/8" X .035" X 12' (2-19 LENGTHS) \$0.61/FT.
1 1/8" X .065" X 12' (2-19 LENGTHS) \$1.44/FT.
1 3/8" X .058" X 12' (2-19 LENGTHS) \$1.71/FT.
1 3/4" X .058" X 12' (2-19 LENGTHS) \$1.91/FT.
1 7/8" X .058" X 12' (2-19 LENGTHS) \$2.06/FT.
2" X .058" X 12' (2-19 LENGTHS) \$2.06/FT.

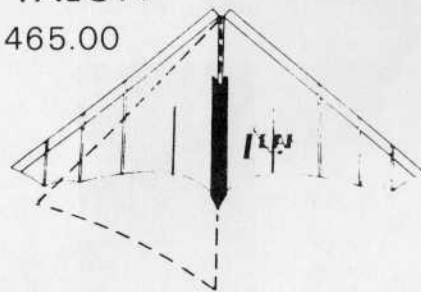
CABLE
3/32", 7x7 COATED STAINLESS STEEL \$.21/FT.

WHOLESALE CATALOGUE—\$1.00 REFUNDABLE

LEADING EDGE AIR FOILS, INC.
331 South 14th St.
Colorado Springs, Co 80904
303 632-4959

LEAF "STANDARD" SAIL & FRAME "CONVERSIONS"

Convert your
STANDARD glider
to a LEAF TALON
for only \$465.00



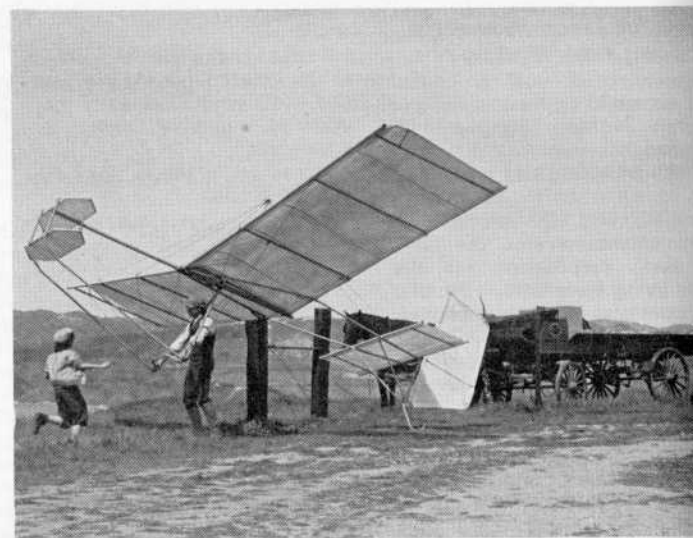
Special Features

RAISED KEEL POCKET TIP LIMITORS
4 BATTENS PER SIDE BRIDLE SYSTEM

LEADING EDGE AIR FOILS, INC.
331 South 14th St.
Colorado Springs, Co 80904
303 632-4959

DEALER INQUIRIES INVITED

NEWS



Wright Brothers Fly Again?

It takes a keen eye to spot the true heritage of the aircraft shown here. The unusual craft was built by Eipper-Formance, Inc., San Marcos-based ultralight manu-

facturer. The Quicksilver ultralight aircraft was specially designed and built to resemble the 1903 Wright Flyer. The mockup was used in Universal Studio's filming of a made-for-television movie "The Voyager."



Five Uses Demonstrated for Jet Wing ATV

Salinas, CA — Testing has been completed at Flight Designs on five configurations of the Jet Wing All Terrain Vehicle (ATV). The expansion of uses makes the Jet Wing one of the most versatile and unusual forms of transportation in the world.

Originally developed and marketed as an ultralight aircraft that can be flown off paved runways or sod clearings without a pilot's license, the Jet Wing ATV can now be transformed in minutes to four other kinds of recreational mobility. For example, in addition to being an ultralight land plane, any one of the three wings used on the Jet Wing can be detached for high performance hang gliding.

By removing the wing and bolting on a set of hand grip brakes, the undercarriage of the Jet Wing is switched over to a

sassy go-cart. With balloon tires it becomes a dune buggy with acceleration that will take your breath away.

When the wheels are replaced with floats, and a rudder is added, the undercarriage can be used as an airboat that is capable of speeds over 40 mph. Then, in minutes, the air rudder can be taken off and the wing reattached, converting the airboat into a sea plane that will take off at 23 mph and cruise at 35.

At the end of the day, the Jet Wing breaks down for transport on a car top or small trailer. It can be stored easily in a small garage.

"We don't know of anything in recreational vehicles that matches the Jet Wing for multiple uses," said Alan Levinson, President of Flight Designs.

For more information on the Jet Wing ATV, contact Flight Designs at Box 1503-R, Salinas, CA, 93902, or phone 408/758-6896.

NEWS

Why Winglets?

On the Centurion, Sport Aviation Mfg. calls them vortex limiters. Simply, they are a very effective vertical surface; but they do far more than that. As vertical surfaces, they contribute to stability.

Canted outward and with increasing slip angles, they increase spiral stability due to tip dihedral. Acting as additional tip area at negative angles of attack, they help produce positive pitching moment. Attached to and acting with billow shift, they help co-ordinate the turn.

Drag reduction is mainly due to the flatter billow allowed by the increase in yaw stability; but some reduction results from the increase in effective span due to the decrease in vortex size. This is particularly true at the higher angles of attack, with no tip drop in evidence in deep stalls or high slip angles.

Sport Aviation Mfg. research shows no negative influence on stability, however, the winglet's effect on performance seems highly sensitive to the relationship

of their size, shape, and location. Mainly the effectiveness of this stabilizer seems to be found in the fact that it helps in so many areas; producing an increase in performance, even though it is an increase in frontal area.

Mainair Sports Craft Bags Official World Record

The F.A.I. has confirmed our official altitude record of 4,892 meters. The record flight was made on a Tri-Flyer (trike)/Typhoon (wing) with Bob Calvert as pilot. The flight was done at Pleasington, England on January 27th, 1982.

Mainair is very pleased to achieve this on a trike and glider combination, and plans to work hard to maintain it. To that end, Mainair is producing a new 440 cc single place trike called the TriFlyer Challenger. This machine is being developed specifically for altitude and other record flights and will feature a one piece carbon fibre and Kevlar moulding which will completely enclose the pilot, engine, and airframe, giving a fully streamlined aircraft.

American Aerolights Develops New Instrument Panel

Albuquerque, NM — Eagle manufacturer, American Aerolights, has developed a five function instrument panel called the Aero Gage. The solid-state panel features five gauges: altimeter, rate of climb, airspeed, engine CHT, and engine RPM — with instantaneous, liquid crystal read-out displays. Powered by a 9-volt battery, the panel weighs approximately one pound and can be used on virtually all makes and models of ultralights.

The unit will be produced by an electronics firm in Albuquerque, under the guidance of American Aerolights. First deliveries are scheduled for July, 1982, at a suggested price of less than \$500 per unit. For more information, write American Aerolights, Inc., Dept. WA, 700 Comanche NE, Albuquerque, NM., 87107



Delta Wing Releases Dream

Delta Wing Kites & Gliders, Inc., has pleasure in announcing the release of their new beginner and intermediate glider, the Dream.

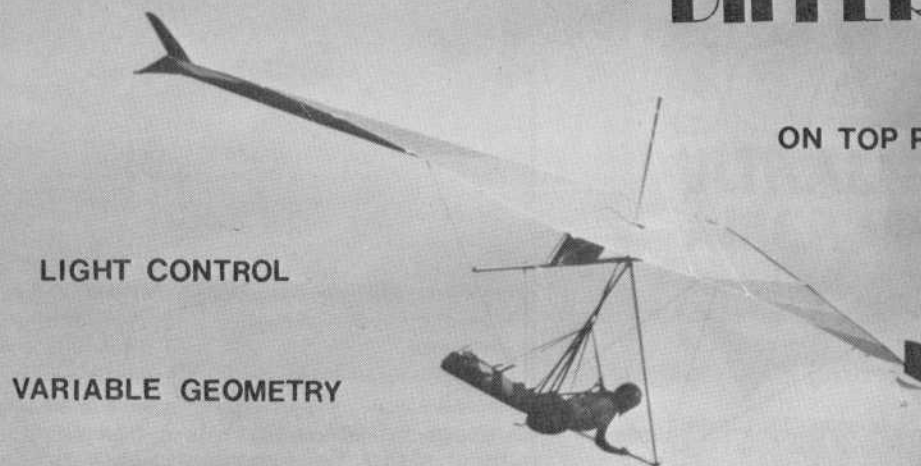
The new glider has been especially designed for this important market. Beginning with an X-series design, then detuning it and reducing the amount of double surface, the Dream has finally evolved as the most easily handled, forgiving glider imaginable.

With its exceptional static balance, easy take-off and landing characteristics, combined with light weight, easy set-up and great stability without any tendency to tip stall in parachute-type landings, the Dream is really the instructor's "Dream" come true.

Designed by Bob England, the Dream is presently being used by several schools for final feedback before the design is frozen for certification. Specifications on the Dream are as follows:

Square Feet	173ft ²
Span	33ft
Aspect Ratio	6.3
Weight	61 lbs
Price	\$1595

LOOKING FOR SOMETHING DIFFERENT?



ON TOP PERFORMANCE

LIGHT CONTROL
VARIABLE GEOMETRY

CENTURION

Pilot
Walter Lussi

SPORT AVIATION MFG. INC.
P.O. BOX 3975
SAN CLEMENTE, CA 92672
714 661-6153
678-4376

Free Information on Buying an Ultralight

On May 26th, 1982, CGS Aviation, winner of the 1982 Sun 'N Fun Award for Best New Design, offers free information on how to buy an ultralight.

Designer Chuck Slusarczyk says, "There are some basic questions the potential customer should ask himself before plunking down his hard-earned cash." That is what the CGS package addresses. It details what a person should consider when purchasing an ultralight.

The CGS Aviation package can be obtained by mailing to CGS a self-addressed, postage paid, legal sized envelope. Mail requests to CGS Aviation, Inc., 4252 Pearl Road, Cleveland, OH., 44109-4274.

AOPA To Form Ultralight Division

Aircraft Owners and Pilots Association recently announced it

is forming an Ultralight Division and will integrate this growing segment of flying into its membership.

The AOPA Air Safety Foundation is now conducting a feasibility study into issuing ultralight pilot certificates and establishing a central registry for the vehicles. Dissemination of safety information, standardized training and product reporting are also being studied.

Baker said that members of the ultralight community who have been active in the USHGA approached AOPA about representing their interests.

It will be several weeks before the full extent of activities of the Ultralight Division will be finalized. AOPA President John L. Baker said, "We can say this, the ultralight pilot will not feel like an outsider at AOPA and the FAA certificated pilot will have a better understanding of this rapidly growing community and will gain from the added support of these new members towards solving common problems."

FAA Approves AOPA Air Safety Foundation Certification Program

A certification procedure for pilots of ultralight aircraft is being developed by the AOPA Air Safety Foundation and the Federal Aviation Administration says this may be used instead of federal licensing.

John L. Baker, president of the Foundation, announced the plan after a series of discussions with ultralight manufacturers, ultralight pilot representatives and FAA officials, including Administrator J. Lynn Helms.

"We have assurances," Baker says, "that the program we are putting together will have the government's approval and thus eliminates the need for FAA actions to certificate the pilots in this new and rapidly growing area of flight." It is anticipated the Foundation efforts will preclude the need for individual state requirements as well.

Through the aircraft standards and testing activities the Foundation will validate handling characteristics, work to ensure minimum structural and construction standards and devise maintenance procedures.

MacCready to Address EAA Ultralight Convention

Hales Corners, WI (June 4, 1982) — Dr. Paul MacCready, world renowned developer of human and solar powered flight, will be the keynote speaker at the First Annual International Ultralight Convention held during the Labor Day weekend, September 3-6, in Oshkosh, Wisconsin.

"We are honored and proud to have Dr. MacCready, who has made monumental contributions to flight, joining us at EAA Ultralight '82," said Peter Strombom, Convention Chairman. "He is a giant in the aviation community whose research in ultralight flight will continue to have a significant impact on the future of all forms of aviation."

MacCready is probably best known as the designer and developer of the Gossamer Condor, the first successful man-powered aircraft in history; the Gossamer Albatross, the only man-powered aircraft to ever cross the English Channel; and the Solar Challenger, which made the historic 160-mile flight from Paris to England, relying solely on the sun for power.

Tom Peghiny Joins Flight Designs

Salinas CA — Tom Peghiny has been employed by Flight Designs to serve in the capacity of an experimental test pilot. Peghiny's primary responsibilities will be in the area of new product design, development and flight testing. Since arriving at Flight Designs, Peghiny has already begun work on the FD-2 ultralight, contributing to the final configuration and is assisting in the preparation of criteria for an extensive flight test program.

Peghiny has been active in hang gliding for 13 years and has won 33 first place trophies in the sport, many with aircraft he has designed.

Peghiny has flown a majority of the ultralight aircraft currently on the market and has also designed an ultralight plane of his own which Flight Designs will be evaluating for possible inclusion in their product line.

Morely Becomes Marketing Director for Flight Designs

Salinas CA — Mr. Tim Morely has been hired to serve as Director of Marketing for Flight Designs. Morely, 33, a veteran hang glider pilot will take charge of Flight Designs' dealer and training programs. He will also monitor all sales and production activity related to hang gliders and ultralight aircraft.

Prior to joining Flight Designs, Morely was with Wills Wing for one year as a factory service representative where he spent considerable time in the field with dealers teaching them how to fly, how to sell, and how to perform maintenance.



Chuck Yeager Visits Mitchell Wing

Chuck Yeager, famous WWII P-51 Fighter Ace, and first man to break the speed of sound, recently paid a visit to the High Performance Ultralight Proving Grounds at Porterville, California. Here he test flew the latest equipment available from Mitchell Aircraft Corporation.

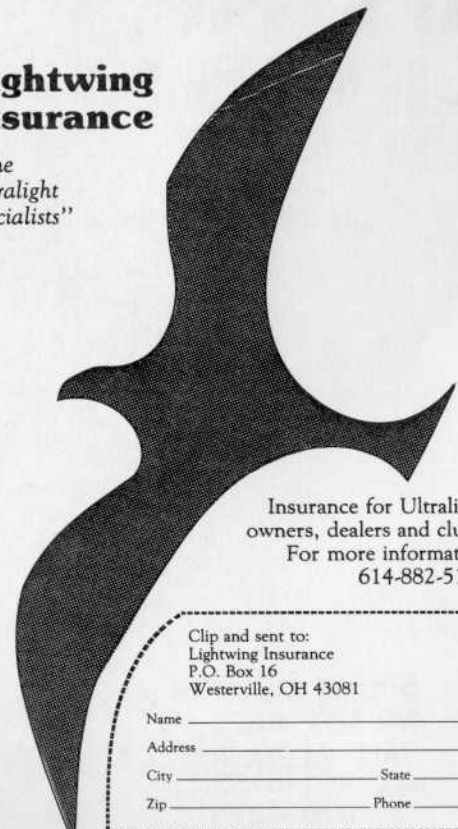
Yeager flew the P-38, B-10, and

U-2-RG (retractable gear). Preferring the flying wings, Yeager did say that the P-38 would be "ideal" as an aerial jeep for the agricultural and military markets.

For a further in-depth view of Chuck Yeager's response to this new and exciting facet of aviation, and a critique of some of the many ultralights available, read the article that will soon appear in *Penthouse* magazine.

Lightwing Insurance

"The Ultralight Specialists"



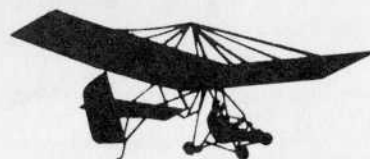
Insurance for Ultralight owners, dealers and clubs. For more information 614-882-5135

Clip and sent to:
Lightwing Insurance
P.O. Box 16
Westerville, OH 43081

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

WISCONSIN NORTHERN STATES

QUICKSILVER DEALER



- ★ Quicksilver dealer for seven years.
- ★ Complete ground school with certificate.
- ★ Large training facility, takes any wind direction.
- ★ FM radios for instructor-pilot communications.
- ★ Experienced in the use of floats.
- ★ Complete engine repair and tune-up.
- ★ Airframe repair with an extra large inventory of parts.
- ★ Weight shift as well as multi axis control trainers.
- ★ We test fly all new kits once built.
- ★ Will assemble customer's kits.
- ★ Will fly exhibitions and air show routines.
- ★ We care enough to sell the original Quicksilver, not "Quack."
- ★ Also dealers for Wills Wing, and Moyes hang gliders.

KITS LESSONS PARTS

**TOW KITE: GLIDER EXCHANGE
2531 CEDAR POINT DRIVE
JANESVILLE, WI 53545 (608)756-2957**



**SEALORD
ULTRALIGHT
AIRCRAFT FLOATS**

MODEL 100A —
For aircraft gross weight to 475 lbs.
MODEL 130 —
For aircraft gross weight to 625 lbs.

• Designed and engineered for maximal aerodynamic/hydrodynamic performance, especially in adverse wind and water conditions. • Advanced technology composite fiberglass sandwich construction gives exceptional strength and durability, for a gross weight per pair of @ 50 lbs. • Watertight

hatches for access to interior compartments. • Custom mounting systems available for easy installation to any ultralight aircraft. • Consult your ultralight dealer, or send \$2.00 to: Composite Industries, Inc., P.O. Box 8452, Kentwood, MI 49508, for detailed brochure and information packet.

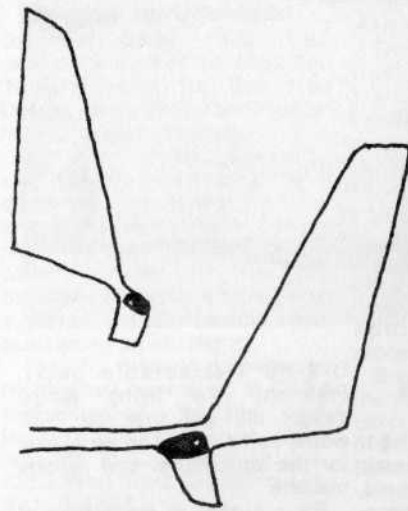
SEALORD ultralight flotation systems are presently in use on the following:

- | | | |
|-------------|----------------|------------|
| Eagle | Mirage | Vector |
| Hummingbird | Quicksilver MX | Weedhopper |
| Huski | Rally Marine | Wizard |
| Jetwing ATV | Swallow | |



WHITCOMB WINGLETS

by Richard Miller



Consideration of Whitcomb Winglets, which are one of the more popular modifications to ultralights, has been omitted from End Play. This is not because they do not work, for there seems to be no good reason to doubt the performance figures derived from the KC-135 test program. The conditions under which they work, however, are of particular significance. A look at The Aerodynamic Design of Winglets by K. K. Ishimutsu, the article in the November 10, 1975 issue of *Aviation Week*, or any equivalent technical literature will be adequate to convince anyone who examines them of the extreme care that has been exercised in resolving all the relevant variables to achieve the best possible results.

But, winglets are airfoils and like all airfoils, their efficiency is dependent not only on accurate contouring but on precise alignment with the airflow. An aircraft that is both massive and fast and which, moreover, spends most of its air time in rectilinear flight, presents us with the best possible combination of conditions insofar as the functioning of such surfaces is

concerned. As the mass of the aircraft is reduced, and to the extent it departs from rectilinear in its normal operating regime, the advantages to be derived from winglets decay. It would take some detailed investigation to find out where the lines cross and the surfaces become pure drag producers, but my guess is that it occurs a long time before one reaches the level of ultralight aircraft.

At least so far as small aircraft and models are concerned all the advantages in drag reduction appear to lie with diffuser elements and wing-tip sails. Being essentially horizontal surfaces their alignment vis-a-vis the airflow is assured so long as the wing is operating within its normal angle-of-attack range and there are none of the tracking problems in turning associated with large lateral surfaces near the center of gravity. The diffuser tip, at least, is no more difficult to fabricate, and both it and the tip sails offer substantially greater theoretical yields than do winglets. Finally, the fact that these two preferred configurations are functional as well as structural approximations of the wing tips of the sea- and land-soaring birds cannot be considered as simply fortuitous. The solutions to the problems we are at last beginning to acknowledge have been in the air all about us for a much longer time than we have sought them—there, waiting. It is simply a matter now of using them.

[The following is an addendum to Richard Miller's theoretical essay presented in two parts, appearing in the March/April and May/June *Whole Air* magazines. This offering is to explain why Whitcomb winglets were excluded from the longer "End Play" article just mentioned. —Ed.]

DEHYDRATION

by Dana Burnett

(Furnished via the Oklahoma Hang Gliding Association)

Fighting off dragon-thermals is a well-known cause of summer dehydration for the hang gliding community.

Water losses from sweating is important, but more trouble comes from the two minerals lost with this water: Sodium and Potassium. Drinking water helps to replace the fluid, but you need fruit juice (not fruit punch or fruit drink), gatorade or summer-koolaid. (Summer koolaid is similar to gatorade, but cheaper! Mix 1 teaspoon Morton lite-salt with 1 quart of water and koolaid mix.) This gives you the same protection against the heat as gatorade. Water and fresh fruit in the ice chest will give you a lift also!

Caffeine works against you, since it makes you urinate more, thus creating a greater loss of body fluid. Coke, Tab, Pepsi, Pepsi Light, Dr. Pepper, Diet Dr. Pepper,

Mountain Dew, Mello Yello, Royal Crown, Diet Royal Crown, tea and coffee all have caffeine and contribute to dehydration. There are some beverages that are caffeine-free, such as 7-Up (regular and diet), RC100, Root Beer, and Shasta fruit flavors. Read the label because the formulas change.

Alcohol causes water losses too — beer, wine and liquor may be a hang glider pilot's best friend, but they will not replace lost fluid and minerals.

If you take salt tablets, drink at least 2 quarts of water with each one. Most athletic trainers no longer recommend them. Salt tablets can do more harm than good, if you do not drink enough water at the same time.

Expect heat cramps or possibly heat exhaustion on hot days after long flights or just long waits on the landing field. Your ground crew is at risk, too, waiting on the hot landing field, sunbathing and drinking beer.

No doubt you are wanting to know the tell-tale signs of dehydration? Well, it comes in three stages:

1. HEAT CRAMPS -- symptoms — starts with muscle pains and cramps, especially legs and abdomen. Treatment includes massaging the muscles, and sipping on juice, gatorade or summerkoolaid to replace fluid and minerals.

2. HEAT EXHAUSTION -- symptoms — fatigue, pale color of skin, weakness, sweating, collapse. This can be serious. Treat this condition by moving to a cooler area, lying down and elevating your feet, sipping cool juice, gatorade, or summerkoolaid.

3. HEAT STROKE -- symptoms — increased body temperature, skin hot, dry and red, rapid pulse, no sweating, unconsciousness. This is a life-threatening condition! Immediately, move to a cooler area, remove outer clothing, bathe with cool water or alcohol, give sips of cool fluids.

Why waste the second day of your flying weekend feeling like a wet washcloth! Protect yourself against summer's ravages and get some air!

[OHGA Note: Dana Burnett writes this article with great authority, as she is a registered Dietitian, with a B.A. degree in clinical dietetics from Oklahoma University, specializing in sports nutrition.]

WE'VE GOT IT COVERED FOR YOU

In Our 23rd Year Serving Aviation

ULTRALIGHT *Flyer*



IT'S NEW: Objective reporting that's incisive, complete and fun to read.

IT'S GOT: New product information, pilot reports, tech tips, fly-in coverage, government actions, safety ideas, personal adventures, history, records calendar of events, photos, classifieds, a complete directory of manufacturers and more.

AND NOW: Ultralight Flyer is co-sponsoring the ARV Design Contest with Western Flyer. Ultralight Flyer readers know first the latest on this important international contest.

12 ISSUES - Only \$9 Canada & Mexico add \$4 per year
Other countries on request

Name _____

Address _____

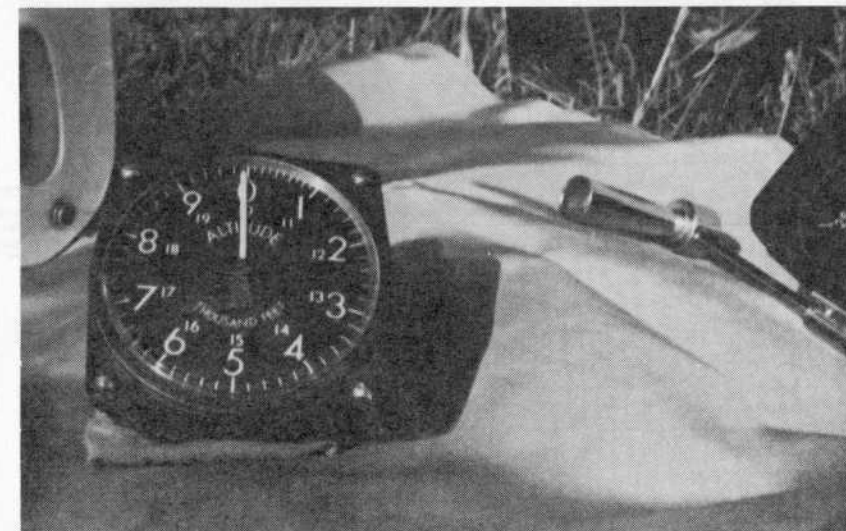
City _____ State _____ Zip _____

Please check one: MasterCard Visa Payment Enclosed

Card No. _____ Exp. Date _____

Send your form to
ULTRALIGHT FLYER
PO Box 98786-W
Tacoma, Wa 98499

13 good reasons why the **NEW** Altimaster IV should be on your flying machine



1. PRECISION JEWEL BEARINGS
2. ACCURATE
3. PRECISION GEAR TRAIN
4. TEMPERATURE COMPENSATED
5. LIGHT — 3 3/4 OUNCES
6. SMALL — 3" x 1 1/4"
7. RUGGED & DEPENDABLE
8. STANDARD AIRCRAFT BLACK FACE - 20,000' CAPABILITY
9. CAN BE MOUNTED ANYWHERE (EVEN ON YOUR WRIST)
10. CAN BE ZERO'D TO ANY GROUND ELEVATION
11. QUALITY BUILT
12. SPECIFICALLY MANUFACTURED FOR ULTRALIGHTS
13. RESISTANT TO DUST AND MOISTURE

SSE INCORPORATED

5801 Magnolia Avenue, Pennsauken, NJ 08109 • (609) 663-2234

*Dealer inquiries invited

But the **BEST** reason for using the ALTIMASTER IV is **SAFETY:**

ALTITUDE IS PRECIOUS. KEEP TRACK OF YOURS.

Stop guessing your altitude. The ALTIMASTER IV will tell you at a glance, accurately and reliably. Only \$89.95 at authorized SSE Dealers worldwide.

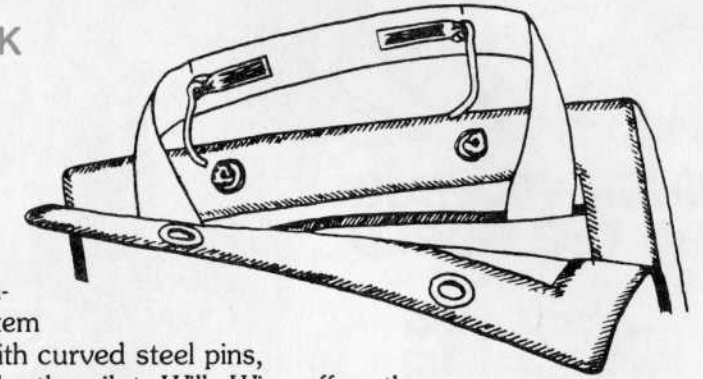
1281

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		
ELECTRA FLYER	77 Cirrus	3	600	400		UP SPORTS INC (ULTRALIGHT PRODUCTS)	77 Firefly	174	650	500
	77 Olympus	160	575	525	77 Dragonfly Mk. II		196	700	550	
	78 Cirrus 5	C	600	475	78 Firefly		154	800	600	
	78 Cirrus 5	B	750	450	78 Spyder		176	850	625	
	78 Cirrus 5	A	60	500	78 Condor		178	900	725	
	78 Olympus	160	625	550	79 Mosquito		166	800	650	
	78 Olympus	180	625	550	80 Firefly 2B		181	775	600	
	79 Dove	A	700	575	80 Comet		165	1325	1175	
	79 Trainer	---	400	300	81 Comet		165	1575	1450	
	79 Cirrus 5	A	650	625	81 Gemini		164	1450	1325	
	79 Olympus	160	725	650	WILLS WING	77 SST	100C	500	400	
	79 Floater	205	775	675		77 SST	100B	500	425	
	80 Spirit	200	1050	875		77 Universal	100A	400	350	
	FLIGHT DESIGNS	79 Lancer	190	900		675	77 X-C	185	525	450
		80 Lancer	175	975		900	78 SST	100C	70½	650
		80 Super Lancer	200	1025		925	78 Alpha	185	825	700
81 Super Lancer		175	1100	950		78 Alpha	215	825	725	
81 Demon		175	1475	1300		78 X-C	215	800	700	
HIGHSTER AIRCRAFT	80 Highster	205	1000	825		79 Alpha	185	800	675	
	80 Highster	190	925	825		79 Alpha	215	800	700	
MANTA PRODUCTS	79 Fledge	IIB	1200	1000	79 Omega	220	950	825		
	80 Fledge	IIB	1525	1325	79 Omni	187	925	750		
MOYES DELTA WING (U.S. MOYES)	77 Maxi I	200	700	625	79 Raven	209	1075	800		
	78 Maxi II	200	750	700	80 Raven	209	1100	925		
	79 Maxi III	200	875	700	80 Raven	229	1075	925		
	80 Stingray	200	725	725	80 Harrier	177	1375	1150		
	80 Maxi IV	200	825	725	81 Harrier	177	1450	1325		
AMERICAN AEROLIGHTS	80 Twin Eagle	---	3125	2875	EIPPER MICROLIGHT	80 Quicksilver	CM	3175	2850	
	81 Eagle, Z-Drive	---	3475	3100		81 Quicksilver	MX	4100	3725	
PTERODACTYL INC	80 Ptraveler	---	3425	3100	WEEDHOPPER	80 Weedhopper	B	3000	2675	

WILLS WING FLIGHT ACCESSORIES

PARACHUTE SAFETY LOCK

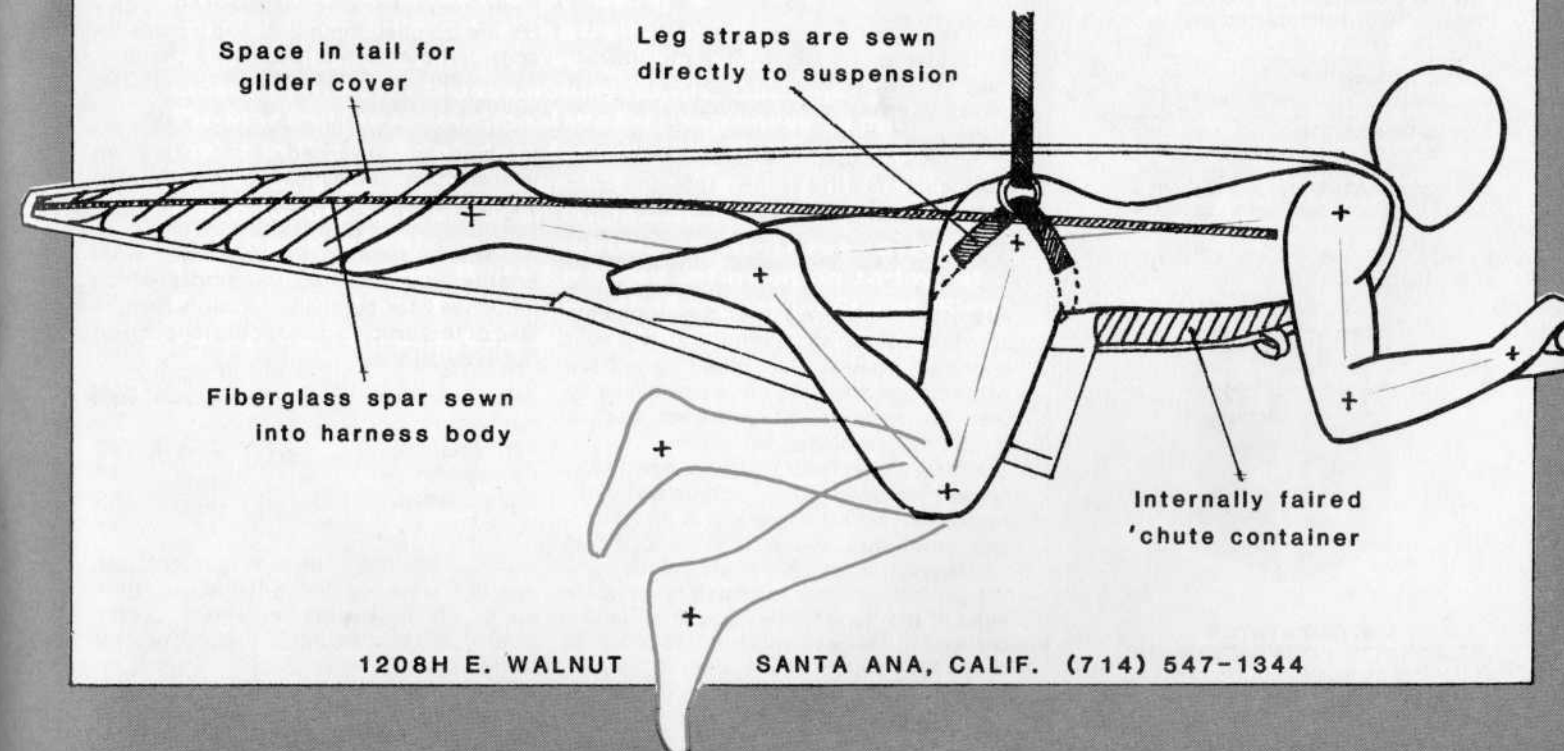


Whether due to the extra loads on the harness during high "G" maneuvers or improper packing, the risk of accidental deployment is a real hazard to both competition and recreational pilots. This system locks the deployment bag to the harness with curved steel pins, which can only be released with a firm pull by the pilot. Wills Wing offers the Safety Lock as standard equipment on the BULLETMAN and ENCLOSED 'CHUTE harnesses, and will install one on most deployment-bag containers for a charge of only \$10.00.

BULLETMAN BODY FAIRING

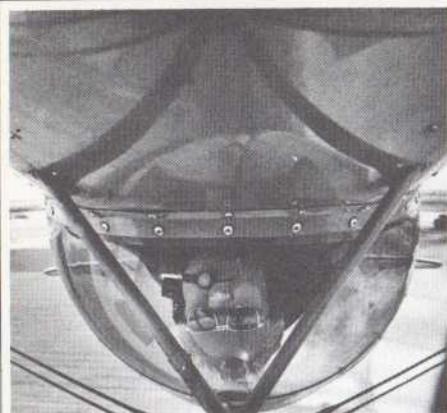
\$349.00

Developed for Wills Wing by Pfeiffer, the BULLETMAN body fairing is a practical, comfortable solution to the problem of pilot drag. Twin fiberglass spars are sewn into the sides of the harness offer total support with the use of only two main suspension lines. Entry and exit are less bothersome than with conventional designs, and the extra roomy tail section allows you to store things inside, out of the airstream. Drag tests of the BULLETMAN indicate a significant performance advantage can be obtained. Standard equipment includes the Parachute Safety Lock and a unique storage/transport cover with a special sleeve for battens and room for helmet, instruments, and et cetera.



1208H E. WALNUT

SANTA ANA, CALIF. (714) 547-1344



WHEN YOU TAKE ON THE WORLD

...you need a little help!

The U.S. team will be challenging the world's best pilots during the 11th World Aerobatic Championships to be held at Spitzerberg, Austria, August 8-22, 1982. Sending our team and their aircraft to Austria will depend on your financial assistance.

HELP THE U.S. TEAM

In 1980 our pilots swept all categories in world aerobatic competitions, winning individual men's, women's, and team titles. Your financial assistance will help them make a repeat sweep this year. All donations are tax deductible.

\$500.00 DONATION ... you receive a silver aerobatic team jacket and lapel pin.

\$100.00 DONATION ... you receive a golf shirt with embroidered aerobatic team logo

\$50.00 DONATION ... you receive a world aerobatic cap with logo

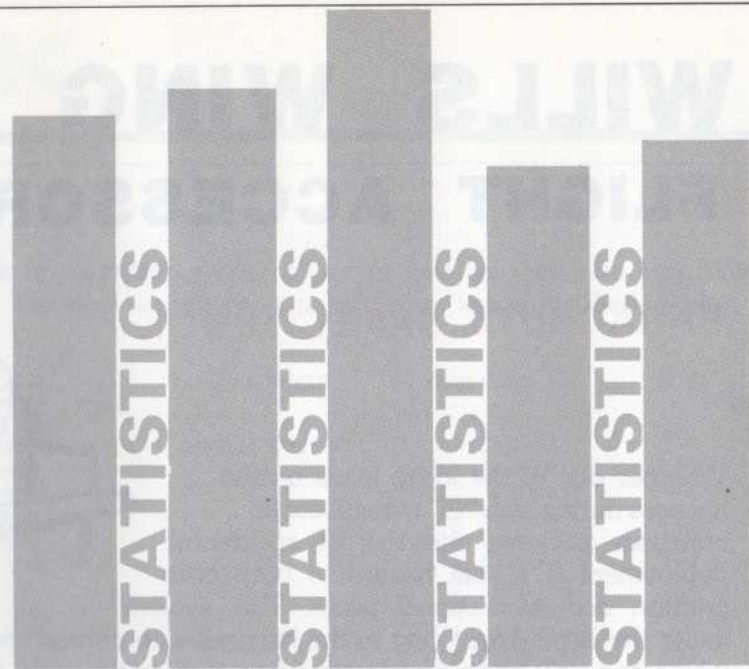
\$25.00 DONATION ... you receive a cloth patch with two decals

\$10.00 DONATION ... you receive a pair of USA aerobatic team logo decals

SEND CONTRIBUTIONS—THEY'RE TAX DEDUCTIBLE TO:



UNITED STATES AEROBATIC FOUNDATION, INC.
P.O. Box 229, Hales Corners, Wisconsin 53130
Phone 1-414-425-4860



In the May/June "World's Fair" issue of *Whole Air*, we surveyed for factors which relate to buying a glider and/or ultralight.

We received a relatively light response, totalling some 112 cards, of which 85 were complete enough to be used. The number one question asked which quality of a design was your highest priority in choosing that craft. Many of you felt you could not mark a single answer, and in retrospect, we agree. It is too important a thought to have to choose only one. So, we tabulated the responses two ways.

For those who checked several boxes, we gave a value for each one, equally weighted. On those for which you gave a numerical value of importance, we factored in the response with a weighted value. The other six questions did not have this difficulty.

WHAT — HOW — WHEN

Glider or ultralight, or both; new or used; and when was it bought is our first statistical area. Overwhelmingly, *Whole Air* readers are buying gliders, 86% of you. Only 14%, or about a sixth, are buying ultralights at this time, though prior surveys show a third do fly or have flown power, and two-thirds say they do now or expect to have an interest in a powered purchase. But to a large majority, those interested in future power developments are desirous of something that will soar once it is up. So, glider purchase percentages are really not unusual seeing that no proper self-launched soaring machines can be had yet.

Also, a great plurality buys *new* (74%) rather than *used* (26%). Incidentally, these responses were lumped for *both* gliders and ultralights. We wonder, again, just where is it that all the old, used gliders go? We *do* believe this response is valid for most of the hang glider population as our readership, while heavily Hang III or IV, still has many novices, too.

Sixty five percent bought in the last

year alone, 47% of those in the last six months. Eighteen percent bought more than one but less than two years ago, 8% the third year back, 3% the fourth, 5% the fifth, and one percent bought between 1976 and 1977.

COST GETTING YOU DOWN?

Readers concerned with cost were quite evenly split. Forty nine percent said \$2000 (glider) or \$5000 (ultralight) was *not* too much for them. Forty four percent said it was, but for 7% "cost is no object."

A whopping 77% save the funds before they buy, while only 23% borrow. This helps explain why sales can/should continue in spite of record high interest rates.

The clear majority consider themselves recreational/soaring pilots; 80% of our readers. An even 40% checked each "recreational" or "soaring," but only 3% are competition pilots, and a mere 8% consider themselves beginners. Another 12% categorized themselves as cross-country pilots.

Coinciding with the above, 65% plan to buy an advanced craft, 21% an intermediate, and almost no one, 1%, plan a beginner ship purchase.

PRIORITIES

Finally here is the table for what priority you assigned to factors which influence your purchase decision. See the lead of this article again for explanation on our tabulations.

Structural Integrity	29%
Handling	23%
Performance	19%
Craftsmanship	11%
Materials Quality	8%
Price	5%

All the rest were tiny percentages; interestingly considering the approach of many advertisements, only *one* person said "contest results" influenced his decision.

ProStar

ProStar... the highest performing of all the Progressive Aircraft company gliders. Designed with the high performance needs of the expert and competition pilot in mind, the ProStar can deliver superior sink rate and excellent glide. The handling also assures the most demanding pilot with crisp, precise control and response.

The ProStar features the innovative hardware of the ProAir, but with a sailing of a higher aspect ratio, and lower twist. This is achieved by using a special white sail cloth with a trailing edge reinforcement. Even the keel pocket velcro-closes in front for cross-country flights. Both the ProStar and the recreational ProAir use a heavy 14 mil mylar in the leading edges for precise camber control. All models use interchangeable air frames and break down to just 12 feet for air shipments.

The ProStar, now available in three sizes, 130, 160, and 195. Write for more information today, at Progressive Aircraft Company, 4544 Industrial Street, Simi Valley, California 93063, or call 805/583-1014.

Progressive
aircraft company



FLY
THE

JETWING



Write Or Call Us For More Information On The JETWING:

FLIGHT DESIGNS INC.

**P.O. Box 1503-W
Salinas, CA 93902
(408) 758-6896**

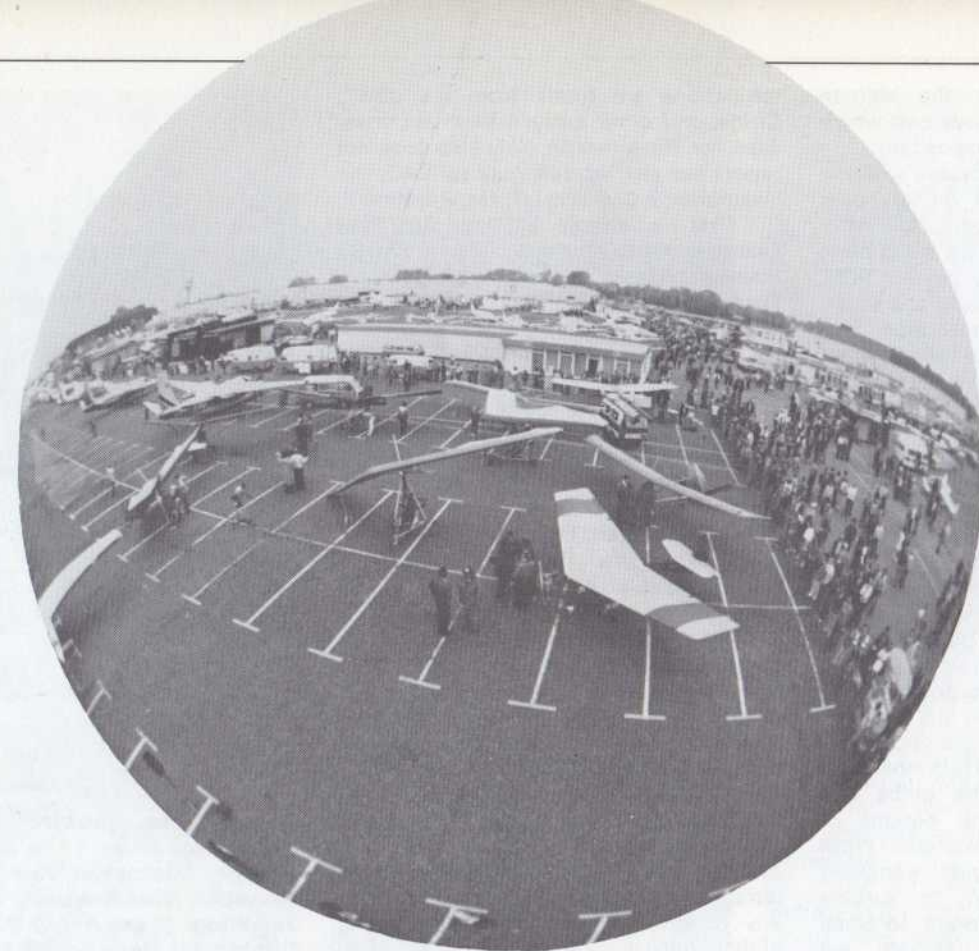
AN ALL TERRAIN VEHICLE

● Five Exciting Forms Of Transportation

1. It's a versatile ultralight aircraft that you can fly without a pilot's license. (Some training is required.)
2. Detach the wing and you have a competition hang glider for unequalled soaring.
3. Attach hand brakes to the undercarriage and you have a fast go-cart or dune buggy.
4. Put the wing back on, add floats and you have a sea plane.
5. Take the wing off again and you have a 40 mph air boat.

● The conversions take only minutes.

**THERE ISN'T ANYTHING ELSE LIKE
IT IN THE WORLD**



HANOVER AIRSHOW

The Internationale Luftfahrt-Ausstellung (ILA '82) offers the aviation enthusiast everything under three roofs, and ultralight flying as well as the law passes legalizing ultralights in Germany/by Dan Johnson/photos by Dan Johnson and Dieter Locke

From Hamburg, in the north of Germany, near Denmark, to Hanover is about 200 kilometers. At Autobahn speeds of 160 kmph, less speed reductions for cargo laden trucks, the drive was only an hour and a half to ILA '82.

The Internationale Luftfahrt-Ausstellung, or International Aerospace Exposition, was in Hanover (Germany) May 18-25, 1982. ILA is a World Class Airshow alternating as it now does with the famous Paris Air Show (see *Whole Air*, July/August 1981).

Primarily it is a business show, with seemingly endless rows of very professional displays extolling the achievements of the aerospace industry giants. And many countries from all over the world present their aviation wares to be

considered, compared, demonstrated, and purchased.

Sophisticated German electronic devices fill the three enormous exhibition halls. They are sprinkled everywhere between manufacturers of gleaming helicopter rotor blades; digitized, goldplated European defense systems; jumbo airliner landing gear components which reach for the peaks of the high ceilings; full color TV picture navigation aids; compact, self-contained survival systems; biz-jet interior floor plan mock-ups; satellite communication and weather-gathering stations; and much more. Of course, quality German cuisine was readily available on site, with German sausage and snack stands being very popular eating places while one observed the sky show. In

addition, one could find dozens of souvenir merchants peddling all sorts of aviation goodies from T-shirts to model airplanes to space program posters.

Outside the halls, a relatively small military display was located by Hanover's beautiful and disturbingly vacant airline terminal. Only the German military was present, a purposeful low-profile participation which contrasts sharply with Paris, where we are told the military displays use 80% of the airport exposition real estate.

The friendly side of the display was not olive drab, but French red, white, & blue Alpha jets alongside shocking red British Hawk jets. The colorful nine and ten craft aerobatic teams, called the Patrouille de France and the Red Arrows, put on a

dazzling low-level show, the altitude dictated by a 1500 meter overcast which remained for most of the exposition.

One of the most memorable airborne demonstrations was by a military pilot billed as the World's Aerobatic Helicopter Champion. While all the many helicopters did steep bank turns (way beyond 90°), zooming dives, backward flight and so on, and while the Dutch Grasshopper drill team performed a wonderful series of tight helicopter formation maneuvers, none matched the flight of the German air force officer.

Never having seen the likes of it, this writer was positively astounded by the sight of a helicopter in low flight (below 500 feet) performing over-the-top loops, linked barrel rolls, wing-overs, and stunning dives at the ground which began from hovering flight, then suddenly pitching far past vertical pulling out so near the ground as to seem an exotic lawn mower. It cannot ever be forgotten!

Moving eastward from the terminal and military display area, one could view business aircraft aplenty. In fact most such hardware from around the globe was present here, though the nations of Germany and America dominated. From pure jets to fan jets to piston-engined twins, big and smaller, to turbine helicopters, lots of helicopters, to small single-engined business aircraft, we eventually made our way to the sporting side of the show.

Actually not at all isolated to one side, the sport aviation picture was revealed as being most alive and very well in Germany and elsewhere on the continent. Indeed some portrayal of world aviation figures might illustrate the importance of aviation in West Germany. (Note: Excluded from all

tabulations are totals from the USSR, China, and other eastern bloc countries. Also, for some reason, Italy also does not report her civil aircraft data to ICAO, the International Civil Aircraft Organization.)

First we can look at World Civil Pilot Licenses. North America claims 658,000 licensed pilots, contrasted to 183,100 for Europe and 1,021,000 for the entire world.

In single and twin-engine piston aircraft, Germany ranks No. 2 at just over 7,000 craft; France is Third at just under 6,000; and the United Kingdom Fourth at over 5,000. America dominates convincingly with over 230,000 craft. In world-wide totals, USA claims well over 70% of all aircraft. But...

While the leader status is unquestionably American in powered craft, the balance sways the other way in sailplane gliders. We were informed (via the German Aero Club) of 7,000 gliders and 1,000 motorgliders flown by over 40,000 pilots in Germany alone, as plainly contrasted with some 15-25,000 pilots in the USA flying under 3,000 gliders.

Since ultralight flying has just been legalized (more on this below), no useful estimates can be made for how sport aviation minded Germans will react to ultralights. We were also not able to get any definitive figures on German hang gliding, but it is a sizeable, growing market, with excellent sites, craft, and pilots. It, like the newly sanctioned ultralight scene, is regulated, requiring licenses. This undoubtedly restricts some growth, but is such a way of life in Germany that most aspirants do not feel intimidated by such bureaucratic red tape.

The daily airshow bears little



(Above) The Firebird M-1/(Below) Clockwise from 11 o'clock — MX, Sherpa, Microstar, Sky Rider Trike, Hummer, Weedhopper, and (center) Jet Wing. (Next page) Setting up for filming by German NDR television/German Eipper representatives, the Lockes and their craft.



resemblance to Oshkosh, or other American renditions. In lieu of a tightly packed, precisely scheduled, stage-like aerial entertainment, the Hanover airshow was a dawn to dusk review of most displays of the exposition. The routine was a bit more relaxed but repeated two or more times during the day. Participants changed slightly each day. Ultralights flew in five to fifteen minute segments. Brands included the (American) Eipper Quicksilver MX, Flight Designs Jet Wing, Weedhopper, and Maxair Hummer; plus (German) Microstar, Sherpa, Sky Rider trike, and Firebird M-1.

Escorted from parking positions scattered around the large outdoor display area by Follow Me trucks, the ultralights leaped from the runway, turned and pivoted, climbed and dived to the audience's apparent delight, drawing applause that could almost be discerned over the whine of two cycle power. With the legalization of ultralight flying now completed, Germany and other countries which will very likely follow the German lead, may flock to ultralights as they have done to sailplanes for genuine low-cost aviation. It is little wonder really, given their interest in flying and yet \$90 per hour rental costs for a two-seater Cessna 150.

Hang gliders were also on display at ILA '82, though their impact was reduced as the Hanover area is terribly flat, thus the hang glider population mostly living elsewhere. The German Alps, not too distant from metropolitan areas like Munich, would have produced much more participation it would seem, a similar situation as we could expect in the U.S. The German DHV Club is quite active and has helped spawn interest in hang gliding.

Drachenflieger magazine, the official German publication for hanggleiter Pilotens, was on sale at Hanover, and shows itself to be a very proper magazine with technical features, color photos, and generous advertising, though many of the gliders advertised are U.S., French, or British imports.

So in Germany it is significant that ultralights now join hang gliders in permitted, legal, yet low cost flight. It may very well be that for ILA '84, ultralights and powered hang gliders (trikes) may flood the display area and flight demonstrations as has begun to occur in America. And Germany may very likely challenge America for producing quality equipment. Even world ultralight ownership may lodge Germany into a leader position.

Since ILA '82 transpired at the same occasion of the passage of German LBA (Counterpart to the American FAA) laws allowing the flying of ultralights, it is useful to run down the requirements and restrictions which come with the privilege.

1- Following most other opinion, German ultralights may not exceed 100 kilograms (220 pounds).

2- Ultralights must be flown only from approved airports or other facilities. Any airport used must first be approved by its local management. It is also meaningful to say that many more German airports are totally used by sailplanes than by powered craft, and managers at these airports may disallow ultralights. But one can also apply for operation from virtually any field as an "airport," so in time, special places may harbor most ultralights.

3- The pilot, though not licensed as a PPL, must still pass a written exam for a Private Pilot's License, excepting areas that do not pertain, like navigational aids.

4- He or she must also log 20 hours airtime at his/her home site prior to flying elsewhere.

5- All flying must be done under 150 meters (just under 500 feet).

6- The craft must pass a yearly inspection for structural integrity and to assure unauthorized modifications have not been made.

7- A compass, airspeed indicator, and altimeter are required instrumentation.

8- Maximum fuel capacity is 20 liters (or about 5 1/4 gallons).

9- A noise restriction is imposed. The craft may not create more than 60 decibels of noise at full throttle at 150 meters height. In 1985, this will be reduced to 55 Db. Of course, one could limit one's throttle to qualify, but besides risking one's license, the yearly inspection would require a return to the limited position. Sixty decibels is quite a low volume. For example, Dieter Locke's Quicksilver MX (see cover photo) is a stock Eipper with reduction drive, and was evaluated at a 72 Db level.

According to Locke, a permanent throttle restriction may be necessary, or use of one of the German three bladed props could help. Explaining German procedure, Dieter said, "Nothing is legal here till a law permits it, as opposed to the US where it is legal till a law forbids it." He felt other European countries will follow the German lead with the exception of France which he claims is "... very wide open," and Italy, where ultralight and hang glider flying is also wide open, but subject to sudden illegality if the government wishes.



THE SKYTING CRITERIA

by Donnell Hewett

[The following article is a further amplification of a concept presented by the same author in the March/April *Whole Air*. The concept is unproven by years of experience, but certainly offers a new and different look at methodology. Hopefully dialogue will be generated, written or spoken, and the state-of-the-art in towing technology will be furthered.]

The article "Skyting" in the March/April issue of *Whole Air* explained how the use of a skyting bridle could solve the problem of lockouts, but it never did really define what was meant by "skyting." I hope that I did not leave the impression that skyting was nothing more than towing a hang glider with the bridle described in that article. Skyting is more than simply using a particular bridle arrangement — more, in fact, than towing itself. Skyting is a philosophy — a concept — a mode of flying.

Specifically, skyting is defined as *flying a hang glider in a simulated gravitational field*. Instead of using towing simply as a means of getting a glider into the air, skyting uses towing to create an artificial gravity through which the glider flies freely. Skyting, therefore, has exactly the same properties as free-flight hang gliding, except for the fact that its gravity is artificial instead of natural. As a result, hang glider performance and handling characteristics, as well as flight safety, are identical for skyting as for free-flight hang gliding.

From its definition, you can see why skyting should not be confused with other forms of flying. Regular free-flight hang gliding is not skyting because the gravity is real — not simulated. Regular towing is not skyting because no attempt is made to simulate gravity. The use of a particular bridle system is not skyting because it takes more than a bridle to simulate gravity.

All right then, what is skyting? How can one go about simulating gravity? What is the procedure for developing a practical skyting system?

Well, the first step is to recognize that, in order to simulate gravity, a skyting system must apply an external force to the pilot-glider system. Furthermore, this force must have exactly the same characteristics as gravity so that when it is combined with the force of gravity the resulting artificial

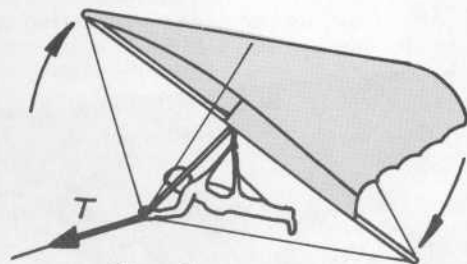


Figure 1

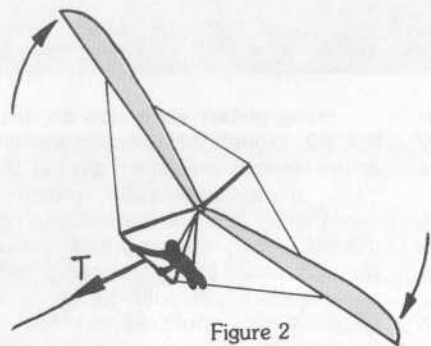


Figure 2

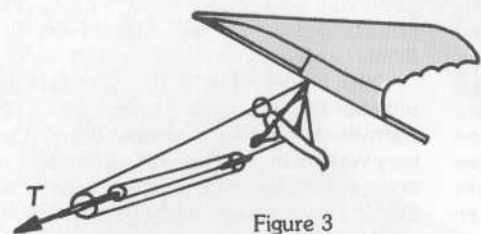


Figure 3

weight has the same properties as normal weight. Then and only then can one consider the resulting artificial gravity to be an accurate simulation of real gravity.

Notice that there is nothing within the definition of skyting that requires the use of towing. (Skyting can be performed without towing.) Nevertheless, towing is one of the most practical methods of implementing the skyting concept, and in the discussion which follows we shall use the following "towing terminology." The term "tow force" shall be used to denote the force supplied by the skyting system which is combined with normal gravity to produce the simulating gravitational field. The term "tow vehicle" shall signify any device (car, boat, ultralight, winch, human, et cetera) which generates the tow force and supplies the power and energy required by that force. The term "towline" will refer to any device which transmits the tow force from the tow vehicle to the pilot-glider system.

The second step in developing a skyting system is to identify those characteristics of gravity which the tow force must also exhibit. There are four such characteristics:

(1) **CONSTANT DIRECTION** — The direction of the force of gravity never changes. (It always acts straight down.) Therefore, the direction of the tow force must also be constant. This means that the direction of the towline must remain constant regardless of how the glider moves. And this means that either the glider cannot move relative to the tow vehicle, or else *the towline must be long compared to the motion of the glider.*

(2) **CONSTANT MAGNITUDE** — The magnitude of the force of gravity is a constant. (An object's weight never changes.) Therefore, the tow force must also remain constant in magnitude, regardless of how the glider moves. In other words, *the tension in the towline must never change.*

(3) **DISTRIBUTION** — The force of gravity is distributed throughout a system of particles with a force on each particle proportional to its mass. (Gravity pulls harder on more massive objects.) Therefore, *the tow force must be*

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 flattest 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.



Wings for Man

without it? Will you fly

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

distributed between the components of a pilot-glider system with the force on each component proportional to its mass.

(4) APPLICATION POINT — Although gravity acts throughout a body, the result is the same as if the total force were applied at a point called the "center of mass." Therefore, *the tow force must also be applied at the center of mass of each component of the pilot-glider system.*

These are the four characteristics that a tow force must possess in order to be useful in simulating gravity. It follows, from the definition of skyting, that these are also the criteria for determining whether a flying system is a skyting system. A system that meets these requirements is called a "pure" skyting system because the whole flight is performed under artificial gravity. A more practical, or "hybrid" skyting system would allow certain portions of the flight to be conducted under normal gravity. In order to do this, provisions must be included for making a safe transition from the skyting mode of flight to and from the free-flight mode. The third step in developing a practical skyting system, therefore, is to identify the basic requirements for safely entering and leaving the skyting mode of flying. Again there are four such requirements:

(5) SLOW TRANSITION — In making the transition to and from the pure skyting mode of flying, the tow force must be allowed to vary. But this violates one of the basic requirements of skyting. The only way to retain the skyting philosophy and still allow the tow force to vary is to insist that *the variation be slow compared to the reaction time of the pilot and the response time of the glider.* Then and only then will the flying system approximate a pure skyting system throughout every phase of the flight.

(6) RELIABLE RELEASE — In order to completely terminate the skyting mode of flying and begin the free-flight mode, the skyting system must include a releasing mechanism. In order to be safe, *the release must be both reliable and convenient.* (The pilot must be able to release himself from the skyting system whenever he wants.)

(7) WEAK LINK — Because mechanical devices fail and humans make mistakes, *every skyting system should be equipped with a completely infalible safety valve that automatically frees the glider from the skyting system in the event that a malfunction of the system produces a potentially dangerous situation.* Such a device is called a "weak link" and should not, itself, be mechanical or rely upon human operation lest it, too, fail at a critical time.

(8) SAFE LEARNING METHOD — Last, but not least, is the requirement that *a skyting system provide a method for safely learning how to use it.* This is probably the most important transition of all — the transition from inexperience to experience. In keeping with skyting's basic philosophy of making slow transitions whenever possible, this learning method

should include a gradual advancement plan whereby the pilot completely masters each level of skyting before proceeding to the next.

So there you have it — the skyting criteria. Any flying system which meets all eight of these requirements is able to simulate gravity throughout all phases of its flight and to make safe transitions to and from normal free-flight hang gliding. Since flying under these conditions is essentially equivalent to free-flight, then as long as a towing system meets these requirements, it will be just as safe as free-flight hang gliding. Of course, it is impossible for any towing system to meet all of these requirements under all conceivable circumstances, but the closer a towing system comes to meeting these requirements and the broader the range of flight conditions under which it can meet these requirements, then the safer it will be.

In order to see how closely current towing systems come to this "ideal," let us evaluate some of today's towing alternatives according to the skyting criteria.

OUR SKYTING SYSTEM — As far as I know, our skyting system is the only towing system which even *attempts* to meet all eight of these requirements. We satisfy conditions 1, 2, and 5 by using a long, elastic towline whose tension is further regulated through dynamic control of the tow vehicle's speed. Requirements 3 and 4 are met by the skyting bridle described in the March/April *Whole Air*. Our release fulfills requirement 6 by completely disconnecting the skyting bridle from the pilot and the glider with one quick pull on a sleeve located near the pilot's stomach. Our weak link (requirement 7) consists of a loop of braided nylon fishing twine of the proper size to break at the desired tension limit. And we are currently working to develop a training program to meet the number 8 requirement.

CONVENTIONAL TOW SYSTEMS — There are several different towing "schools" throughout the United States, and I am sure that every one of them considers their own towing system to be the best one in the world (otherwise, they would change). Although each school will have to evaluate itself in order to see how it individually rates according to the skyting criteria, I suspect that the following generalizations will be true:

(1) Most schools automatically meet requirement 1 when they use a long towline to reach high altitudes. (2) The better schools use a winch to keep the towline tension constant. (3) None of the schools distributes the tow force properly. (4) None attaches the bridle properly. (5) Very few schools consider the importance of making the towline tension change slowly. (6) The better schools use reliable releases, but place them on the control bar. This is fine as long as the pilot keeps his hand on the release lever, but even experienced pilots have been killed trying

to find or reach such levers in emergency situations. (7) Many schools use no weak link. (8) The better schools have certified instructors and well established, safe training programs.

As you can see, some of the schools are very strong in certain skyting areas, but all of them have some glaring weaknesses. Unfortunately, strength in one area cannot compensate for weaknesses on another. Obviously conventional systems have a long way to go before they can really meet the stringent requirements of the skyting criteria.

THE BHGA SYSTEM — The British Hang Gliding Association seems to be the only major hang gliding organization seriously pursuing research in safe towing methods. According to articles in their *Wings!* publication, they have recently decided to channel their efforts into towing development. They are communicating with one another, compiling information on towing, evaluating towing systems, developing a training program, and even writing a BHGA Tow Launch Operations Manual. Although they still recommend "PATIENCE" (because there is still much to be done before their work is finished), I am convinced that it will not be long before they shall have established a really safe towing system. In order to see where they now stand, let us evaluate their current system (as I understand it) according to skyting criteria:

(1) If they are not already using a long towline, I am sure that they will do so, as soon as they decide to tow to higher altitudes. (2) I am not certain, but I strongly suspect that they will be using a winch to keep the towline tension constant. (3,4) Bill Brooks and Howard Edwards have recently developed a bridle system which uses a spreader bar to distribute the tow force to the pilot's hang strap near the center of mass of the complete pilot-glider system. (5) I do not know what provisions, if any, they have included to prevent abrupt changes in towline tension. (6) I assume their release mechanism is reliable, but the activation lever, like that on conventional towing systems, is located on the control bar. (Upon release, the bridle system remains attached to the glider, pulling upward out of the way by a bungee cord.) (7) If they do not already use a weak link, I am sure they will, as soon as they realize its importance. (8) As mentioned previously, they are now in the process of developing a safe training program.

From the above evaluation, it is obvious that the British are well on their way to developing a viable skyting system and will soon be well ahead of everyone else in skyting development (whether they choose to call their system "skyting"). But it does not really matter what a system is called, nor does it even matter whose particular skyting system might be considered the "best." What really matters is that people stop towing with systems that do not meet the skyting criteria and start towing with systems that do.

CLouDBASE Box 144 Lookout Mtn. TN 37350



CLouDBASE SPAGHETTI HARNESSES

Comfort, Simplicity, Beauty, Reliability. From Beginners to Expert. Easy launch, no pilot distraction! All custom built (see measurements). Fully adjustable, with 20 suspension points. Individual leg movements. Floatation foam, locking karabiner, dual wrap-around security and top quality Perlon rope.

This is the most custom, deluxe harness you can buy. Only \$155, pre-paid or C.O.D. permitted.

Please add \$7 for shipping and handling. Specify first, second, and third color choices.

Options: Glove pockets, \$10
 Storage/Ballast bag, \$25.

Supply these measurements (bare feet): Floor to shoulder, to inseam, to kneecap (inches). Chest, waist, and weight.

INTERMEDIATES

Gemini, Javelin, Harrier II

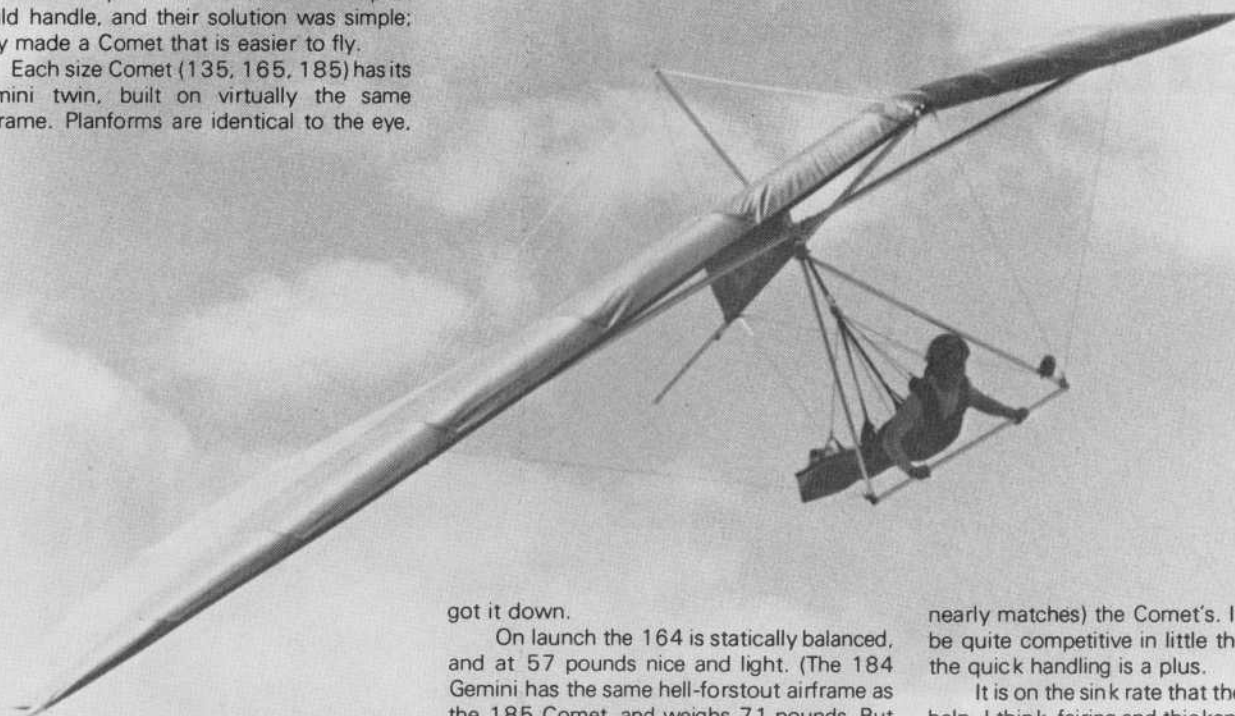


Gemini

By Wade Leftwich

If you ever manage to fly over a Gemini, you will probably mistake it for a Comet. In designing their new intermediate/recreational glider, UP evidently wanted to offer as much performance as a low-time pilot could handle, and their solution was simple; they made a Comet that is easier to fly.

Each size Comet (135, 165, 185) has its Gemini twin, built on virtually the same airframe. Planforms are identical to the eye.



though the Gemini's nose angle is 118° versus the Comet's 120°. The 165 and 185 models share all spars and ribs. (UP must have saved a good bit in tooling costs on this one.) The bottom surface ends forward of the shifting cross-spar (the Comet, of course, has an enclosed crossspar), which is secured to the keel with a tang rather than a cable as on the Comet. The rigging is snug — none of the Comet's disconcerting floppiness on the launch ramp. While all Comets have Mylar inserts in the leading edges, it is a hundred dollar option on the Gemini; non-Mylar Geminis lack the Comet's applied leading edge panel.

The Gemini flown in this test bears the model designation 164M — 164 squares, with Mylar. The glider was just bought by one of our students at Lookout Mountain (he said it was okay for me to fly it), and it is a pretty one: yellow leading edges, dark blue bottom surface, a rainbow span and black trailing edge — not what you would call understated. The hardware is Comet hardware, nice and functional but nothing especially trick. And just like the Comet, this Gemini and the dozen others I have seen have exceptionally clean sailwork: drum tight, with no wrinkles, puckers or flutters on the ground or in the air. After however many thousand Comets they have made, the people in the UP sail loft have

got it down.

On launch the 164 is statically balanced, and at 57 pounds nice and light. (The 184 Gemini has the same hell-for-stout airframe as the 185 Comet, and weighs 71 pounds. But the 164 is rated for pilots hooking in at up to 200, and a 210-pound instructor here gets a decent sink rate out of the 164. The only person who needs a 184 is someone really big.) The glider gets into the air easily. At the training hill, we have seen some pretty half-hearted runs turn into nice flights.

The Gemini stalls extremely gently. It never drops the nose or tries to fall off on a tip in a straight-ahead stall, just mushes and mushes and finally starts to yaw around. If you push way out in a slow turn and then try to roll out, the Gemini will settle into a flat mush; I could not get it to slip from a tip stall. All in all, it is about as forgiving as glider can be.

I soared the Gemini in a light wonder wind and in 15-mph ridge lift, and had a terrific time. Flying at a 185-pound hook-in with Harriers, Comets, and Demons, the Gemini took me to near the top of the pack in sink rate conditions. The glider rewards a light touch in handling — no shoulder motion, just a little swing with the feet. I found it best not to try to slow down too much when working light lift — a little speed did not seem to hurt the sink rate, and made the glider feel more solid in turns and give better feedback. The Gemini pretty much coordinates itself in turns; a very light push out is plenty. Overall the handling is very much like a 165 Comet's, just a lot lighter and quicker.

The Gemini's sink rate matches (or very

nearly matches) the Comet's. I think it would be quite competitive in little thermals, where the quick handling is a plus.

It is on the sink rate that the Mylar inserts help, I think, fairing and thickening the leading edges between the ribs. Subjective comparisons between Mylar and non-Mylar Geminis give the Mylars an edge in sink rate, speed, and turn efficiency, and a much gentler stall — well worth the cost of the option.

The tradeoff in the Gemini performance is in the glide ratio at speed. While the Gemini high-speed glider is very good — penetrating a 20-mph headwind is no problem — it just is not up there with a Comet's. That is the difference between a single-surface and a double-surface glider, and the main reason (along with tighter wires) that the Gemini is easier to fly. Landing a Comet in any field smaller than an airport requires steep slipping turns on approach, because if you try to dive at the downwind end of the field the glider will not get down — it will just go faster. The Gemini will dive when you need it. In ground effect it shows the same energy retention as the Comet: it will coast a long, long way.

At the Lookout Mountain flight school we have put quite a few new Hang II pilots on Geminis. None of them has had problems with control or landings, and all are pretty ecstatic about their glider's performance. A day or two on the training hill is all it takes to get acclimated to the quick handling. The Gemini is an excellent first glider that will continue to be exciting as you add to your skills and meet new challenges. And what better way is there to get lots of airtime than at the top of the pack?

Harrier II

By Gary Engelhardt

Prior to my evaluation of the Harrier II, I must say that I have been a Wills Wing advocate from my first flight on a Raven. Most of my airtime has been on Wills' products, however, I have had a Comet for the last year or so. The transition from a 185 Comet to a Harrier II was one of sheer flying joy. After flailing hips and legs to get that Comet to turn in tiny East coast thermals, the ease of arm movement to achieve the same effect with the Harrier II was welcome. The Harrier II used in this evaluation was a 177 without mylar.

SET UP

The Harrier II comes full length in its shipping tube. The cover bag has a full length double zipper closure and well-made pads for control bar and keel protection. Control bar assembly is completed with a single wing nut and bolt. The keyhole tang for the nose wires is easy after a try or two. However, after inserting the kingpost I found it much easier to rig the top front-to-rear wire by first removing the lower nose tang to reduce tension. Another technique to rig the top keyhole tang without removing the lower wire, is to pull the kingpost back with one hand while guiding the keyhole tang to its standoff. Once a technique is established and the tricks of the glider mastered, set-up should only take a maximum of ten minutes.

As on most gliders with cambered ribs, crosstube tension is applied after the ribs are inserted. I found that having the wings spread about three-quarters of their extension allows easy insertion of the ribs. If a rib hangs up, do not force it, instead luff the sail gently a foot or so push gradually on the rib. If it still resists, remove it, reposition the wings, and try again.

The defined tips are like those on the Duck. A short piece of one inch tubing is permanently constructed into the leading edge, extending out the rear about three inches. Surrounding this tube is a rubber sleeve holding pressure on a large ball bearing that rides in a hole that matches a hole in the three-quarter inch tube plug-in tip. The ball bearing locks the tip in like the old Electra Flyer crosstube "bullets." Two caps sewn to the coverbag protect the sail from the one inch inserts.

Overall the set-up is well thought out and simple. Technique, as with any glider, provides the most efficient set-up.

MATERIALS

The Harrier II is several pounds lighter than its predecessor. The decrease in weight realized is due to a larger diameter crosstube avoiding the extra sleeve. Downtubes are made of .083" wall legs of shorter length than the original Harriers. Ribs consist of 3/8" aluminum and fiberglass shafts. Rib tension is held now by a double cord instead of the stretched bungie. A spanwise sail layout tops off a well-manicured Wills Wing finish.

LAUNCH/HANDLING

Tight wires and perfect static balance make the Harrier II "cake" to launch. The shorter "A" frame will be welcome to the pilot with the same characteristic.

Generally the tall control bar of Wills' gliders was one "secret" to their handling. This Harrier II handles as well if not better than the original. My first seconds of flight on it probably looked a little wild since I had been used to kicking my Comet into turns. Both pitch and roll pressures are delicately light and could provide for hours of effortless soaring in all conditions. Response in roll is rapid and the shifting crossbar is fluid.

The feedback from the Harrier II is so exact that coring a thermal is child's play. It is just so easy to feel your way into lift that it nearly defies description. I believe learning to realize and utilize lift in a Harrier II would improve any pilot's skills.

PERFORMANCE

In the several flights I made with the Harrier II, I was generally happy with its performance. In thermally conditions, I could slow down and make the coring turns to gain altitude quickly. At times I nearly caught gliders which had entered the same thermal as I, but from several hundred feet above me.

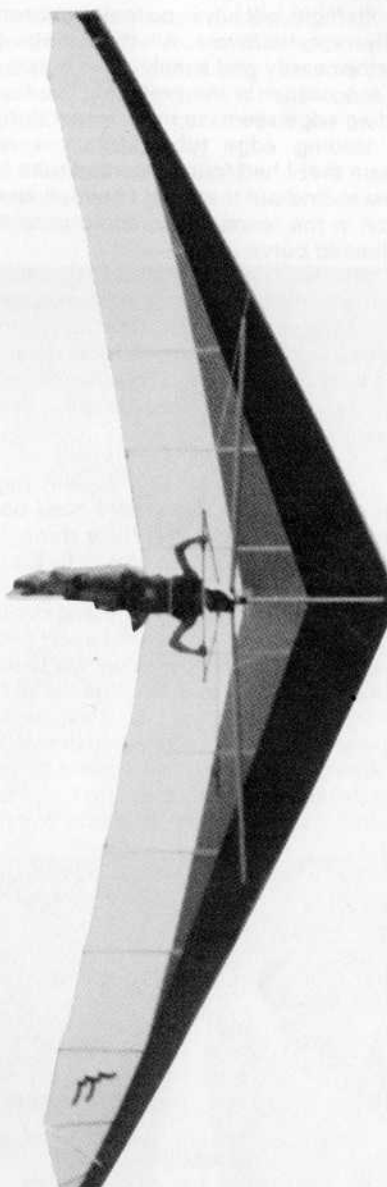
In a smooth wonder wind one evening, I topped out with Terry Tweedy who was flying his Harrier I, loading it about 40 pounds lighter than I. Chuck Toth (in a 180 Duck and about 20 pounds lighter) was the only glider higher in that wonder wind flight. Actually I was surprised with its performance, considering no mylar in the leading edges.

LANDINGS

Landings can be a sore spot for a pilot, especially if his/her friends are watching intently to see if he/she pulls it off successfully. The Harrier II can be landed well by any pilot without special concern. This glider retains energy well in ground effect and the light pitch pressure can lull one into an early flare. To resist an early flare, get the glider into ground effect with L/D speed. As the speed decreases, raise the nose slightly and feel the tips flying. This will also reduce your speed somewhat. Hold this angle of attack till your speed looks and feels like a launching speed. If you are not sure of the speed, give a slight pump of the bar to feel an upward acceleration. Your final flare should be firm and initiated higher than normal on the downtubes. It will stop dead!

SUMMARY

The Harrier II is an excellent choice for an intermediate or advanced pilot. Learning to fly should be fun and easy and the characteristics of the Harrier II fill the order. It does not make much sense to have to work hard in the air when you can fly a glider that does what you want now instead of later. Wills Wing makes quality hang gliders that handle great. You can put that in your book and log it!



Javelin

By Tom Phillips

SET UP

Lifting the Javelin off the car rack is a pleasant experience, its light weight and foam leading edges taking the pain out of getting started. The bag is a nicely done, quality job, which could give you the impression that the glider inside must be the same. Laid out on its back, the glider sets up similarly to most others of this class, American-style. First the control bar is joined by bolt and wing nut at one corner. Then it is best to upright the Javelin on the bar without yet pinning the nose wires. Spreading the wings one at a time, alternating from one to the other, should get them spread to about 80% in two moves. Opening them too much makes rib insertion difficult. Place the defined tip tubes at this point by lifting the tip of the sail and sliding the tube out of the leading edge pocket and plug it into the hole provided. Go all the way through the leading edge tube so that it feels solid. The bungee will hold it in place. Check the bungee will hold it in place. Check that the kingpost has raised into place and that the luff line support strap is at the top. Pull the rear kingpost wire down and snap it into the karabiner on the keel. Then walk around to the nose and attach the front flying wires at the nose plate with the push pin and safety. If you checked for kinked never-kinks and pull down on the keel, you will find that this is the easiest way, as these wires are tight.

Ribs are next. Starting from the root,

the longest ones were a little difficult to get in all the way on our test glider. The rest were OK and all secured with bungee pulls. Again, after checking for kinks, the crossbar goes back next. First pull the wings out as far as they will stay, then grasp the bar near the center and push back toward the king post. The teflon-type slider block works easily and slips into place where it is secured by a push pin and safety. That is it.

Preflight will have you looking at some really nice hardware. All the fittings go together easily and simply make it easy to get too casual in the preflight. The foam leading edge seems to make inspection of the leading edge tube difficult. I was certain that I had found a dented tube but came to find out that what I had felt was a notch in the foam, cut to conform to the preloaded curve.

Ground handling the 168 Javelin again was easy. Its light weight and short span were very pleasant. The hang strap was so long, that with my harness, I had to tie a knot in the primary, but it was brute enough to inspire confidence. Static balance was fine.

FLIGHT

I approached my first Javelin flight with some caution. Normally I have been flying the newer double surface ships, but had been unable to make time to fly for the preceding two months, so I felt rusty. Also, the lift that day was light and cycling up and down with some very good pilots having to work hard to stay up. My launch went perfectly, or so it felt, and I also felt the rust flake away as the Javelin responded to my first turn along the ridge. I knew in that first turn that I could go with confidence as close to the hill as I normally do, and that I could get up. I hook in at just

over 190 and as I made passes on the ridge, and 360's in the light bubbles, I felt that I was gaining on some of the others who had a height advantage and higher performance ships. As the lift cycled up and down I was able to conclude that the sink rate was very good and that had I been in the larger Javelin (208 ft²), I could have had a clear edge over some of the others in the air.

The lift cycled down making things quite crowded so I headed out to get some altitude and room to wring out the Javelin. As I pulled in on the bar, I looked up at the sail and tips. At trim speed the sail is very clean and tight. At bar-to-the-knees speed, there is just a little flutter in the tips. As the bar is pulled in, speed picks up smoothly. The glide at high speed seems good and bar pressure is strong but not excessive. Tracking at high speed was straight ahead.

Stalls were abrupt, the pitch down, after pushing out all the way from trim, was steep. I fly my cocoon feet-high and as I went over in the stall, I felt my feet touch the keel as I free-fell before the luff lines kicked in and yanked up the nose. The stall was straight ahead with no tendency to drop a wing.

Roll reversals were quick and easy with light pressure and no lag. Yawing flat turns also were easy using the bicycle turn style. This is a thermalling ship that will not tire you.

Landing proved to be very pleasant. In zero wind, I hit the bull's eye with a full stop flare with which I was proud.

All in all, I do not think that I could have picked a better glider to fly after a too long lay-off. The Javelin is an easy glider all around. It inspires confidence in a rusty advanced pilot and should do the same for students and intermediates.

Second Opinion

by Randee Laskewitz

My first flight on the 168 Javelin was in February of 1982, on the beach at Monterey, California. I had decided the glider looked good and felt good, while ground handling. But my flight attempts on the beach with very little wind proved to be frustrating to a novice rated pilot whose experience is largely launching from cliffs. So I did not even count my beach flight in my log book, though I remember the occasion vividly.

I first mountain launched the Javelin on March 8, 1982, in remembrance of Marty Alameda, whose funeral was that day. His death affected me greatly, and as I flew I was thankful that I had ever known such a fine person, and I reflected on this man throughout the flying experience. My first flight was a sled ride from Raccoon Mountain, at Crystal Air Sports in Chattanooga. I later soared the Javelin, my very first soaring flight, at Lookout Mountain.

The Javelin is a finished glider. The hardware is nice, and the sail is very clean with no wrinkles. I had a bit of difficulty getting the pre-formed ribs in the foam leading edge pockets, due to my lack of experience with this kind of batten/rib. Also, I about-tore my fingers up, trying to get the rib bungees pulled back around the rib tips. I found it much easier to pull the bungee back with a hook (kind of like a boot hook). Now that the Javelin has a little more airtime, it is easier to get the ribs in and to pull the bungee back.

I also had problems getting the nose wire push pin in place. Again, this is probably due to my lack of experience. The large wheels which I installed on the basetube made it quite a reach.

The teflon slider on the keel makes the final assembly easy, also protecting the keel from hardware abrasions. I have noticed some of the nut caps have fallen off the junction plate bolts. It is too bad those things never stay on very well.

I had a little trouble launching the Javelin due to the fact that I had not flown a glider so statically balanced. The nose wanted to pop up on launch. I also saw one other pilot have the same problem; due more to poor launch technique than glider design I am sure.

The in-flight handling characteristics of the Javelin are very pleasant. It turns easily and there seems to be a lot of positive feedback from the control bar. This was the first glider I had ever flown with a shifting cross-spar. They certainly make turning easy. It is a bit lighter in handling than my Alpha, the only other glider on which I have accumulated any airtime.

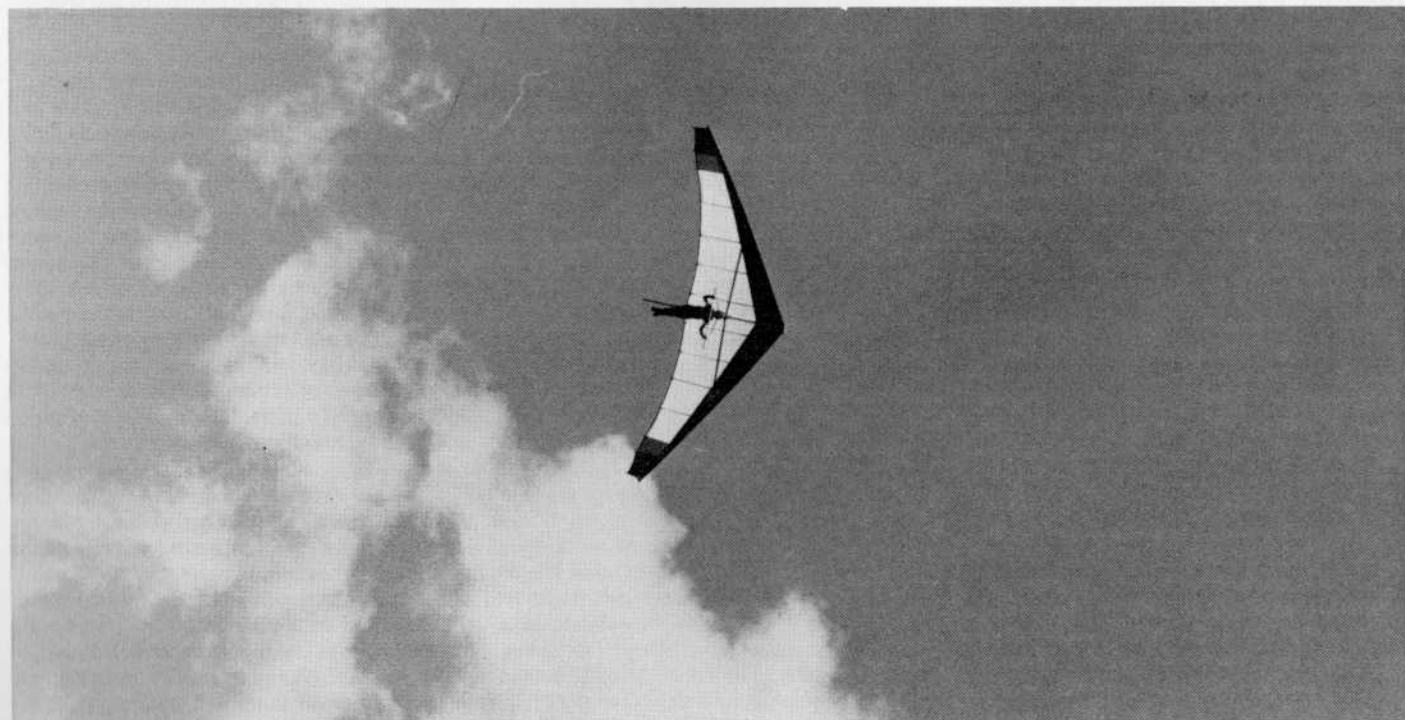
On landing, the Javelin is also very nice. You can slow way down in ground effect, and land easily. I have not yet nosed-in the glider, and the last time I flew the Javelin, I did not even have wheels on the basetube. Talk about pressure to perform!

No problem, though. I missed the bull's eye by only a few feet, and had a perfect landing.

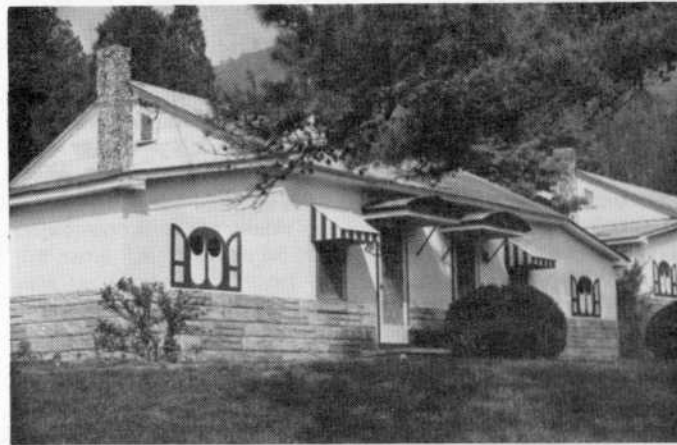
The carrying bag for the Javelin is padded where the control bar hardware would rest on the sail, and it has a double zipper for ease in getting into the bag. The glider is heavy for me to carry in the bag. In fact, I have one heck of a time with it. I guess I need more weight-lifting lessons if I am going to muscle these modern gliders. So far I have found that with enough groaning and straining on my part, somebody will give me a hand moving the glider from my car to the set up area (thanks fellas).

Overall, the Javelin is a quality intermediate glider. I look forward to logging more airtime on it.

Center structure details for the three gliders; clockwise from upper left, Flight Designs Javelin, Wills Wing Harrier II, and UP Sports Gemini.



CRYSTAL



The Bunkhaus

THINKING ABOUT OUR Fly-Work Program? Here's the deal:

First to explain the busy part: We require 15 hours of work per week (on non-flyable days), in exchange for a bunk in our flier's BUNKHAUS. The type of work is in accordance with your skills as the maintenance of our resort requires many talented hands.

We also ask for a 'happiness deposit,' (we're happy to get it and you're happy to get it back), of one month's rent, \$120, that is promptly refunded on a weekly basis or end of the month basis, as your hours are completed. Please, we ask that your stay with us be a minimum of one month.

Now for the picturesque part: Our BUNKHAUS is a spacious 12 bunk room with two complete shower/toilets, with color T.V. and In Room Movies! Our resort is located in Raccoon Mtn Valley, surrounded by mountain ranges. We are situated on 6 acres of uniquely terraced land, one of the highest points is located in the BUNKHAUS; 4 acres are made up of densely wooded terrain. We are even considered in the 'country,' yet we are only 10 minutes from beautiful downtown Chattanooga via expressway.

Crystal Flight Resort is within walking distance as is the new Alpine Slide, Water Slide, and Horseback Riding.

Since the Fly-Work Program was initiated, many of the fliers that have permanently made Chattanooga their home, have stayed and worked with us, while getting themselves situated job-wise in nearby areas.

Now for the 'party' part: The relaxed atmosphere, convenience of flying sites, and all-around hassel-free environment have brought CASM Motel guests and BHers back again and again.

Restaurants and shopping areas are located nearby and should you require transportation, it is available.

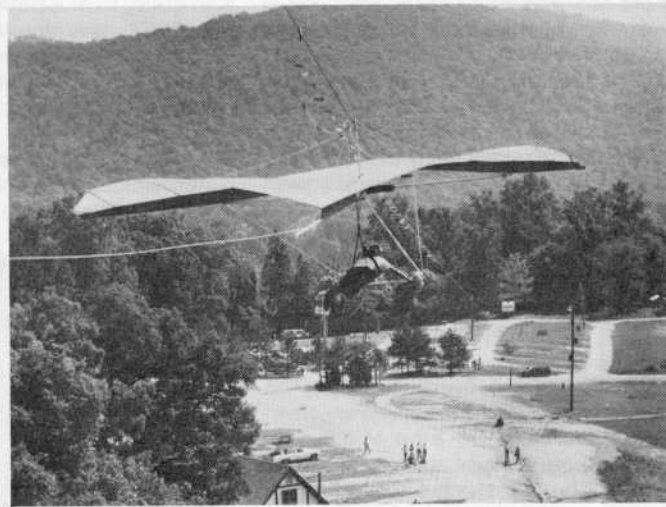
So, if you should have some constructive time on your hands, are self-supporting for a reasonable time, and want to

get that flying time in that you've always dreamed about, please contact us as soon as possible.

4328 Cummings Highway
Chattanooga, TN 37409
Phone 615/821-2546 daily



POSITIVELY STIMULATING



POSITIVELY, AS IN absolutely... guaranteed. And we mean it. Positively, you'll be stimulated on the Crystal Hang Glider Simulator. Stimulated to learn the wonder of flight, but all in complete safety. The Crystal Hang Glider Simulator is our one-of-a-kind, patent pending, revolution in training.

The Simulator has created not only more students, but better students. When more folks will even try hang gliding, it's good for our business and good for your sport. But when students can also learn more, safely, like launch technique, stalls and recovery, turns, and landing approach and flare, they become better students more quickly and confidently.

Crystal had its best year, safety-wise, in 1981, and that's while sales grew an unprecedented 45 percent. More students graduated from Raccoon Mountain in less time and with more knowledge than ever before.

So you see, we're positively simulating. Positively also means beneficial or helpful. Stimulating simulation, that's the Crystal Hang Glider Simulator.

"Crystal" is also sales, services, repairs, ratings, gliders, trikes, ultralights, and accessories. All our brand names are the most respected in sport flying. Crystal... professionals since 1974...

Call 615/825-1995 today or write:
Route Four, Cummings Hwy., Chattanooga,
TN 37409. (Notice: National marketing of
Crystal's Simulator is now underway. If
your shop is interested in this system,
contact Tom Phillips ASAP.)



POSITIVELY SIMULATING

BENNETT TRIKE

The Bennett Delta Wing Trike continues its refinement/by Dan Johnson/photos: Bill Bennett



Early 1981 saw Bill Bennett's Delta Wing Kites & Gliders Inc., entering the ultralight arena by placing the Bennett/Soarmaster trike unit on the market. Of course, the idea was to promote sales of the Delta Wing hang glider line, as well as the new hardware.

Indeed, back in 1980, as American Aerolights, Weedhopper, Eipper, and Pterodactyl were just firing up their engines of production, Soarmaster in Phoenix was experimenting with the European-devised phenomenon of what is generically called a "trike." CGS Aviation was also looking at trike production, but went the other way, as now evidenced by their Hawk airplane.

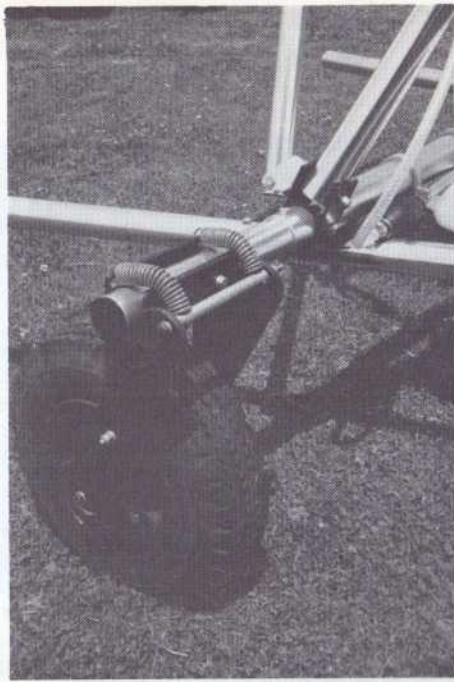
Manta joined Bill Bennett in supplying Soarmaster with hang gliders, a Fledge II and Phoenix 6D respectively. The 1982 perspective shows both Manta and Bennett now in production of their own trike units.

At that time, January of '81, Bennett had negotiated with Soarmaster for distribution rights to the new rig, and Delta Wing built the Soarmaster unit in Van Nuys under a contractual arrangement. This continued for some time as "Uncle Bill" honored his contract with Soarmaster. In the fall of 1981, when the Sep/Oct *Whole Air* first presented flight reports on a trike, the model was a Bennett/Soarmaster. It was virtually unaltered from the first unit supplied by Soarmaster. This was to change, in the nature of our always evolving industry.

That earlier unit was very basic. A network of two side rails, an axle, two boom tubes (risers) merging to a single boom, a front support tube, a front wheel steering assembly, a seat frame, and a half dozen engine mount tubes. The front wheel was a solid rim, about eight inches in diameter, with two rear spoked wheels for main gear. We estimated its weight at 65-70 pounds. That was with a Yamaha 97 cc single cylinder engine. Simple. Basic.

We had no Phoenix gliders to add so we bolted on a Wills Harrier 177. This conversion was quite easy attesting to the viability of making any modern hang glider into a part-time ultralight. It worked, too. We very tentatively tried out the rig, much as an early morning swimmer tests the water with an exploratory toe. Gosh, it not only flew, matter of fact, the experience was most exhilarating.

The little Yamaha only earned a 200



fpm rate of climb, but we only wanted it to push us up a grand or so (5 minutes), so we could shut it off and do some soaring. That worked, too, though admittedly the performance suffered from the sharply increased drag and the 70 extra pounds. Still we were enthused. A self-launched soaring machine had been born, in our minds. Crude perhaps, but a bona fide first step. At least it flew pretty much like our hang gliders. The evolution began.

Even on that first outing, one pilot wanted brakes, another electric start (which implies a battery). All of which in turn probably indicated a bigger engine to bear the extra weight. And then, naturally, the frame had to be beefed up to deal with the extra thrust. Finally the glide/sink was deteriorating so a better (hence heavier) wing was needed. Before we knew it, the desire for electric start was turning a selflaunched soaring rig into an ultralight.

But in the effort of development it is necessary to achieve the steps one can, even if that means one is temporarily travelling another direction. Refinements in the basic trike are important now, before we can return to the ultimate (?)... a selflaunched soaring machine. This is what the folks at Delta Wing are doing.

We saw little changes in the airframe of the trike unit till the larger engines began to appear. But now Delta Wing has begun modifying this and that.

One important addition to widen field usability of the Delta Wing Trike is suspended gear. In the doing, they have begun using a solid rim main gear wheel. These are very strong for side loads, much more so than the spokes. But they suffer in bumpy grass/dirt fields. So larger wheels are now being fitted.

Of course, in choosing larger engines, quite a search was on, using several brands for a time. Finally, however, Delta

Wing has settled on two versions of the Fuji Robin, *the most popular engine in Europe*, where, by the way, trikes greatly outnumber "Conventional ultralights." The stout 34 horse twin cylinder Fuji drives a big diameter prop, which besides running reasonably quietly, packs a mighty thrust. The advertisement says 1200 fpm, and we have no reason to doubt that at all.

"But," you say, "I don't like that yaw action or that foot throttle!" Well, we found them to be no trouble at all, the yaw action *can* be used to advantage in crosswind landings. With regard to the foot throttle, the factory logic says that the throttle is part of the engine carriage, not the glider. But if you *still* do not wish to have these features, Delta Wing can and will sell you a trike with a no-yaw (anti-torque) bracket, and hand operated throttle.

We really like this capability to "roll your own." Order it the way you want — engine, wheels, throttle, attach bracket, even the wing can be varied according to your desires. You may choose an X-200, which will handle the gross weight easier; this quality is especially important for you larger pilots. Or go with an X-180, even an X-160 if you are of smaller stature or you wish to have higher cruise speed capacity. Another factor enters in here. That is your desire to be able to fly the X as a glider only, which of course you can, unless you weigh only 110 pounds and you chose the X200. You will find the big X more than you bargained for on launch, landing, ground handling, or in strong conditions. However, as a point of fact, you will have little, if any, trouble with a big X while "triked."

This brings us to flying characteristics. Climb in the seat after a careful preflight of *both* wing and trike carriage. You will find the seating position comfortable, except your helmet may contact the single (top) boom tube. It has been padded, but the posture still can feel uncomfortable on the ground. This will not last long, however, as the usual flight posture will not place your helmet on the boom.

The lift off is typically trike, as the ground roll is long-ish, and the rotation sudden and convincing. When those 34 horses are let go, the propulsion seems almost straight up. Let it be. By that we mean, do not pull in abruptly nor (especially!) let off on the throttle. The control bar will float back toward you as the carriage swings up, nose-wheel-high. This is exactly what you want, and no need is present for you to pull the bar more rearward. If you have not prevented the bar from moving aft, you also will experience no danger should the engine sputter and die — you will already be at trim speed or faster, perhaps a bit more back for pre-flare speed, and all is safe and ready for a landing. In our experience, trikes land easiest with power off, anyway.

But the Fuji Robin runs fine, hardly at a whisper, but acceptably noise-reduced.

So, this leaves you climbing... fast. We mean it when we say we have no dispute with the 1200 fpm advertised climb rate. Wow! The *only* machine that could keep up at EAA-Lakeland was the similarly powered Manta Foxbat. But once climb is completed, the X vs. Fledge shows another dramatic difference. The X handles very lightly (*we find this pleasant*) in both pitch and roll. Of course, this is heightened by the trike weight addition, but it was the *finest* handling trike package we have flown.

Some, like the Foxbat pilot, Billy Armor, find extra stability satisfying, and we cannot argue, *if* your goal is straight and level cross-country flight. But our preferences are turning, maneuvering, and possibly working some thermal or wave lift. Oh, it still cruises fine, but you, understandably, do have to exert an extra bit of control. Even so, the control lightness will keep you from feeling fatigued.

Then, here we are, approaching the field again. It is time to consider the landing. It is so easy. Fly yourself into a good glide path approach. Assume a rather rapid sink rate, power off, of about 400 fpm, and a glide of 6:1 to 8:1 will result (depending on atmospheric conditions prevailing). Once you have found the glide angle that will get you to your destination, throttle back to idle thrust. Leave it there, unless an emergency changes things.

If you have done this far enough back, you will have plenty of time to check out the craft's feel in this mode. Now fly it like a glider; a tandem flight gives the best approximation. Keep it moving into ground effect and flare like you would on your hang glider. Do not concern yourself with the forward motion still present, that is why wheels are below you.

Park it crosswind, lay down one tip into the wind, tie it securely to upper rigging (no sense chaffing the important lower wires), and begin telling everyone about the thermal that got away... (thanks for the ride, Bill).



DELTA WING KITES & GLIDERS
(213) 787-6600 TELEX 65-1425
P. O. BOX 483, VAN NUYS, CA 91408

POWERED BY FUJI-ROBIN ENGINES, THE 24 C.C., 22 H.P. & 34 C.C., 34 H.P. TRIKES RUN COOL, QUIET & DEPENDABLY WITH CLIMB RATES OF 500 to 1200 F.P.M. THESE GREAT ENGINES ARE USED ALMOST EXCLUSIVELY IN ENGLAND & EUROPE AND ARE AVAILABLE WITH ELECTRIC START AND TUNED PIPES.

NEW SPRING ARM INDEPENDENT SUSPENSION

STEERABLE NOSEWHEEL

EASY CROSSWIND TAKEOFF AND LANDING

1 BOLT INSTALLATION TO ALMOST ANY GLIDER CAR TOP TRANSPORT

1982 ARIZONA AIR RACE

DELTA WING DOES IT

TWO YEARS IN A ROW!!

1st FINISHING FLEX WING TRIKE



QuickSilver MX WORLDS APART FROM ALL THE REST

QuickSilver MX is worlds apart from all other ultralights for several good reasons.

First, there's engineering. QuickSilver MX is the only ultralight that can boast a 10-year heritage of design and engineering refinement. Top-quality materials—all of aircraft-grade specifications—are used throughout.

Second, consider ease of construction. Every QuickSilver MX arrives as a complete, ready to assemble kit. It takes just a single weekend to go from carton to cloud level.

Finally, there's performance. QuickSilver MX's husky, dependable 30hp engine takes you skyward at 600fpm. The single "joystick" flight control, combined with maneuverability, quick roll rate and the finest sense of being one with the machine.

Learn more about our exceptional aircraft, send \$4.00 today to the address below. You'll receive a complete information packet and the location of your nearest Eipper Formance dealer.

QuickSilver MX.
Worlds apart from all other ultralights.

(Flight training required)



Rugged, Dependable Powertrain



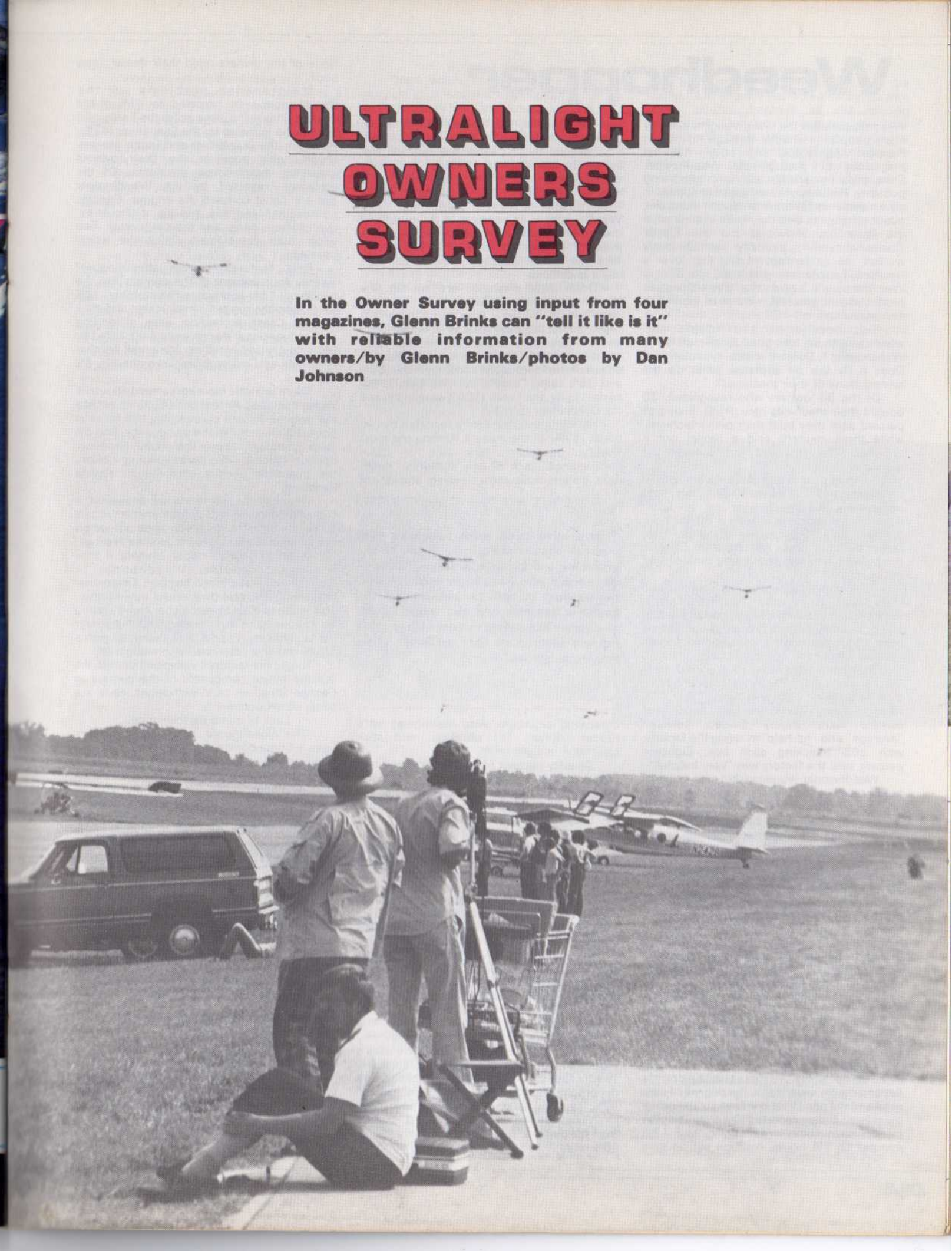
Single "Joy Stick" Flight Control

Eipper Formance inc.
1080 Linda Vista Drive, San Marcos, CA 92069

QUICKSILVER MX
The Original

ULTRALIGHT OWNERS SURVEY

In the Owner Survey using input from four magazines, Glenn Brinks can "tell it like is it" with reliable information from many owners/by Glenn Brinks/photos by Dan Johnson



Weedhopper

Weedhoppers are the first ultralights seen by many people — whether through articles in *Popular Mechanics* and other national magazines or through the Weedhopper Company's remarkable efforts in obtaining publicity. Pictures of Weedhoppers appear in advertisements for other products, in articles about ultralights and they even appeared at the Paris Air Show (as did the Eipper Quicksilvers). The publicity has obviously worked, as some reports say that over a hundred people are employed producing Weedhoppers, and the Weedhopper produced the greatest number of replies to our owner survey — 33.

But, beyond all the hoopla and advertising hype, how good an aircraft is the Weedhopper? Does it meet expectations? Does it fly like an airplane? What do the owners think of their machines?

Of the 33 owners who responded, 30 bought their machines new (91%). Sixty one percent said they built their own machines, while three percent said a dealer put it together. The rest did not answer the question.

Building time is one of the advantages of ultralights and one which finds its way into advertising. A Weedhopper ad in *Sport Aviation*, for example, claims a 40-50 hour building time. Our owners disagree. They report building times ranging from 50-400 hours, with an average building time of 137 hours.

Forty eight percent of the owners said they had problems building their Weedhoppers. Seven owners complained of late or missing parts, while other complaints were about the rigging instructions, scored cylinder walls, and quality of parts.

The instructions rated a "very good" from 3% of the owners, 33% said they were "good," 27% said "fair," 12% said "poor," and 15% rated the instructions as "very poor." The owners were evenly divided between "average" and "no help" in rating the factory, with 36% checking each box. Eighteen percent said the factory was "very helpful."

Weedhopper workmanship was not very highly rated by the owners. Six percent called it "outstanding," 39% "good," 27% "mediocre," and 18% called it "poor." In comparison, 56% of the Nomad owners rated the workmanship "outstanding", as did 47% of the Easy Riser owners.

Perhaps because of its airplane-like stick control and conventional tractor engine, rear elevator and rudder planform, almost two out of three (64%) Weedhopper owners are licensed pilots. They fly between once a month and 2-3 times a week, for an average of three times every two weeks. They have from 45 minutes to 45 hours on their ultralights, with an average of 19 hours.

Most (58%) fly from 30 minutes to an hour at a time, with 18% flying for 30 minutes or less and 18% flying for an hour or more. Fifty two percent fly from airports and almost all of them (88%) taught themselves how to fly ultralights.

Set-up time varies tremendously depending on experience, the degree of care used and the need to hurry. Even so, the range of set-up times reported by Weedhopper owners is unusually large ranging from 17½ minutes to 3½ hours. Average set-up time

was 66 minutes, the longest of any of the ultralights in the survey. Sixty seven percent said two or more people are required for setup. In comparison, 89% of the Rally owners report that two or more people are needed, while only 12% of the Easy Riser and Pterodactyl owners think so. The Weedhopper is somewhere in the middle of the ten ultralights surveyed, in this regard. A majority of owners (64%) call the set-up "average," while 15% say it is "easy," and 12% say it is difficult.

Once their machines are set up, the Weedhopper owners do not agree on how easy it is to fly. Thirty nine percent say it is "easy" to fly, but 30% say it is "a little tricky," and 3% say "very tricky." Eighteen percent call it "average." This places the Weedhopper ahead of the Pterodactyl and Easy Riser (38% and 35% rated "easy"), but well behind the easiest to fly, the Lazair (100% easy to fly) and the Quicksilver (93%).

Handling problems were reported by two thirds (67%) of the owners. Among the most popular complaints are lack of climb performance, lack of roll authority, push-right, go-left, nosewheel steering, and lack of

"There have been some problems with owner dissatisfaction, and those problems are being addressed. Some of the people who have been unhappy with the product or with the company in the past are happier and the more recent customers are calling us now with glowing reports instead of hate mail. So we're making progress."

crosswind capability. Also mentioned were rudder friction, tail vibration, and stick clearance in right turns.

Seventy percent of the owners have had some sort of in-flight failure or accident. While this is a higher figure than for many of the machines we surveyed, others are close. The Easy Riser is about the same, with 71%, and the Pterodactyl is right behind with 63%. Most of the others were about 33-50%. Of the Weedhoppers that did have in-flight failures, almost all were due to engine failures. Some reported having the engine quit several times. A total of 64% of the owners reported having the engine fail. Other in-flight failure reasons were gusty winds and one pilot said he stalled into some 43,000 volt power lines.

Almost all of the Weedhoppers used the stock Chotia 460 engines, but a few switched over to Sachs, OMC or Yamaha. Eighteen percent of the owners regard the 460 as "very reliable," 36% say it is average, and 27% call it "unreliable."

Fifty five percent of the owners say they use the stock Weedhopper prop, one uses a Woody's prop and one uses a Blackhawk. Twenty four percent had the prop break, and the prop ratings are "excellent," 15%; "good," 42%; "fair," 21%; "poor," 6%; "very poor," 3%.

Weedhopper dealers got good reviews from the owners, with 12% rated "very good," 18% rated "good," 12% "fair," and 6% "poor."

None of the owners rated their dealer "very poor."

Maintenance problems on the Weedhopper were reported by 45% of the owners. This is the same as for the Eagle, and almost the same as for the Easy Riser (47%). However, the Quicksilver and Lazair are way ahead, with none of their owners reporting maintenance problems. Of the problems reported by the Weedhopper owners, most concern the engine. Specific complaints include tuning difficulties, overheating, parts, and the carburetor. Two pilots also complained about the wheel bearings.

Best features of the Weedhopper? Twenty four percent of the owners like the handling, 15% appreciate the stability, 12% each liked the rugged construction and stick control. Crash protection, ease of landing and conventional design were each listed by 9%, and ground handling, the small number of cables and trailerability were cited by 6% each.

There is a little more agreement about the Worst Features. Almost half (45%) do not like the engine. Fifteen percent say the finish is poor, 9% do not like the sail quality, and 6% each complain about the tricky handling, ignition system, difficulty in keeping it clean, the customer service, and the crosswind handling.

When all the questions are answered, it comes down to a value judgement on the part of the owners. Do the advantages outweigh the disadvantages? To sum up their feelings, we asked the Weedhopper owners if they would buy another Weedhopper or recommend that a friend buy one. One owner in three (33%) said they would buy another. This is the second lowest owner loyalty rating we encountered in our survey, nowhere near the Quicksilver, Wizard, and Lazair, all with a 100% positive response to this question.

To get the factory's viewpoint on this, we put the major complaints of the owners to George Strother, of Weedhopper. Here are some of his comments:

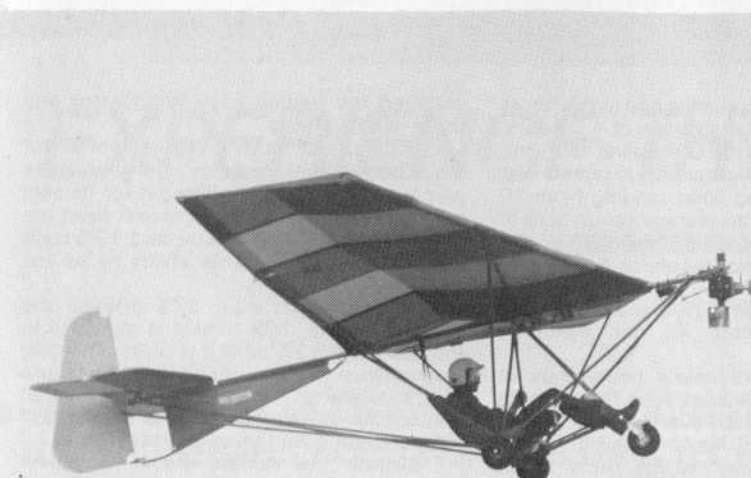
Lack of climb performance...
"The Weedhopper in the past has always been a home construction kit, where you did quite a bit of cutting and drilling and fabrication yourself. It's been our experience with airplanes in the field that the aircraft weren't always just exactly what we had in mind when we sent out the bundle of tubing and the rule book. As a result, several of the airplanes we've seen have had pretty dismal performance because of not being built to the specs.

Now, by going with the tractor configuration, we put the pilot on the center of gravity, so changes in pilot weight do not change the trim of the aircraft. But, it does give us a disadvantage in climb rate, because of the thrust going over the high drag portion of the airframe. The C model Weedhopper has a significantly better rate of climb than the B model home construction kit did, if the kit was built properly."

Lack of Roll authority...
"If the airplane is rigged properly, the roll rate on the Weedhopper is actually quite high. There is a greater roll rate and greater roll authority on the C model than there was on the B model, because of improved wingtip design. But the B model has roll performance that is comparable to most other ultralights if it is properly rigged and trimmed — the washout set correctly and equally on both

sides."
Wrongway nosewheel steering...
"Yes it is backwards. However, it is a simple, lightweight, low cost system and the majority of ultralights out right now don't even offer a nosewheel steering. I will agree that it could be confusing for a high time pilot. We have people who are badly disoriented by it in the first couple of hours of ground handling. We felt it's a reasonable compromise."

Lack of crosswind capability...
"With any two-axis control aircraft, you have a limited crosswind capability in terms of lining up on a landing strip. Takeoff and landing operations should be conducted directly into the wind. In the few hours that I have, I have not encountered any conditions where I didn't find that the control response was adequate to handle whatever crosswind or turbulence conditions I've encountered. Maybe these guys are trying to set down straight down a runway in a crosswind condition."

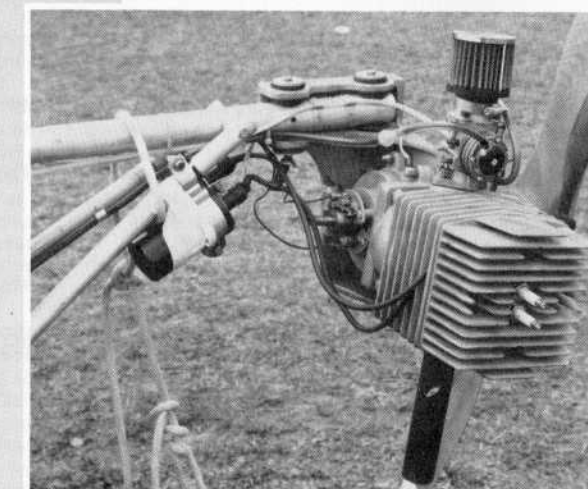


Rudder friction...
"Here again, I'd have to state that the aircraft, or at least the majority, out in the field are homebuilt kits. On the ones we have here, two fingers on top of the control stick are sufficient, both on the original style kit and on the new C model that's all fabricated at the factory. If you have holes drilled wrong and you bind pins, I guess you could have a tremendous amount of friction, but the system doesn't inherently have much friction in it."

Stick Clearance in right turns...
"On the B model Weedhopper, the center fuselage brace was a straight piece of tubing, and at full control deflection, you could cause the stick to touch the tube. I've never experienced that in flight. In order to correct that problem on the C model Weedhopper, we use a curved fuselage tube that makes it impossible for those to contact. And we're in the process of developing a retrofit kit that we will offer for the B model that will allow that curved brace to be added."

Engine...
"Some of the earliest aircraft with the round head engines had some problems with power output because of the casting techniques involved in keeping the liner aligned with the ports in the casting. On the newer square head engine, that problem has been largely resolved by a different casting technique that holds the liner in alignment. Round head engines do overheat — one of the problems with the design. Some of the roundheads seem to function very well, but there is an unacceptable percentage that don't produce adequate power."

Low owner loyalty...
"There have been some problems with owner dissatisfaction, and those problems are being addressed. Some of the people who have been unhappy with the product or with the company in the past are now happier and the more recent customers are calling us now with glowing reports instead of hate mail. So we're making progress."



Quicksilver

The Quicksilver is probably the most successful (or most popular) ultralight on the market today. Hundreds are sold every month to everyone ranging from sport pilots to the military. The Quick started off as a hang glider, and was available as a factory-built or could be homebuilt from plans. While it had a certain following, the Quicksilver never achieved great popularity as a hang glider because it was more trouble to transport than a conventional Rogallo.

When the ultralight boom hit, the Quick experienced a rebirth. Its semi-rigid wing, conventional planform with tail and aerodynamic control (It used weight shift for pitch and a rudder connected to the harness for coupled roll and yaw.) made it a natural for motorizing. Finally, it became so popular that Eipper-Formance discontinued its line of hang gliders to concentrate solely on the

Quicksilver.
After a change in company ownership, Eipper has modified the Quicksilver into a high performance ultralight with a 30 hp reduction-drive Cuyuna engine, a control stick and independent 3-axis control. Eipper has spent large sums of money to build their company and sell their ultralight, and their efforts have made them the industry leader.
So what do the owners think of all this? Do they think they have simply been roped in by all the advertising or are they satisfied with their machines?

Only 15 Quicksilvers owners responded to our survey, a surprisingly low number in view of the many Quicksilvers that have been sold. We cannot determine why more of the owners did not respond, but we can report what those 15 owners had to say.

Eighty seven percent bought their Quick

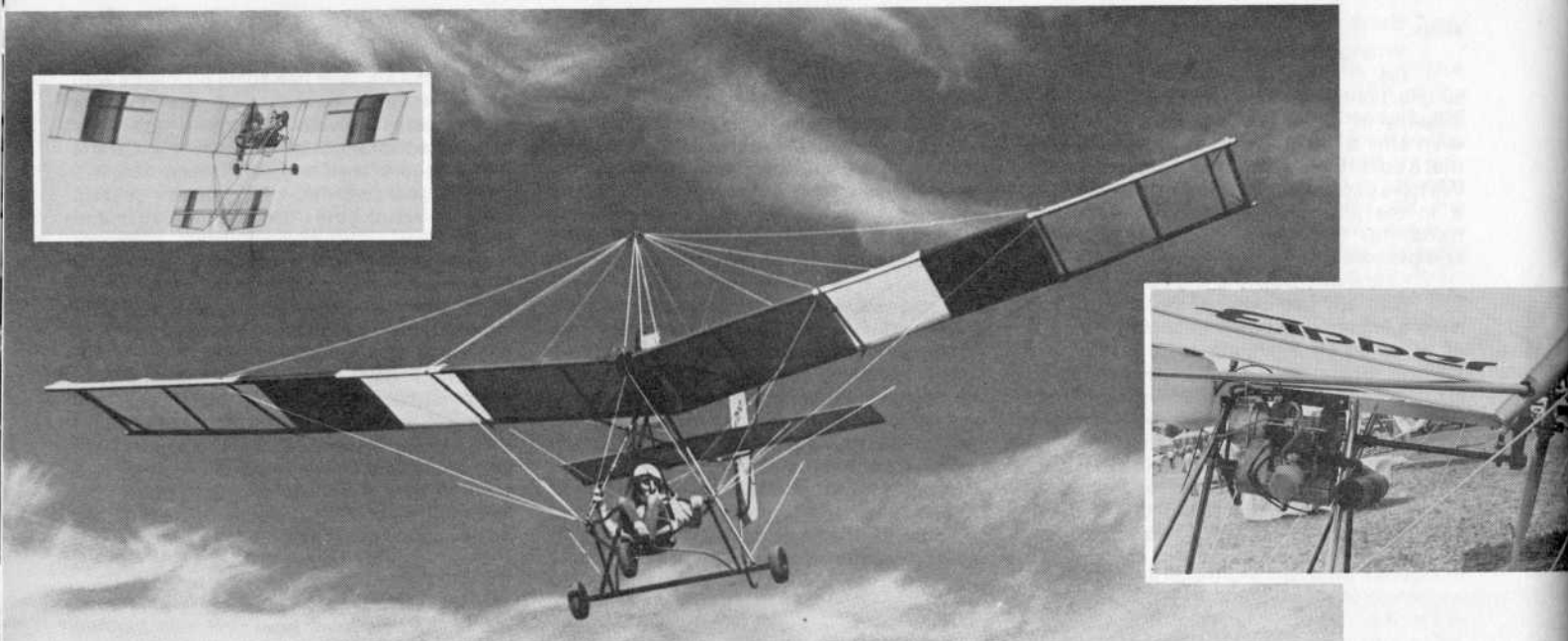
new, and 67% were assembled by the owners. Seven percent said their machines were factory assembled and 13% were put together by dealers.

Building time was reported as ranging from 20 to 40 hours, with an average of 28 hours. This is the second lowest building or assembling time on our survey, bettered only by the Eagle's 8 hours.

Thirteen percent of the owners report problems in building their Quicks, again a very low figure compared to most of the other ultralights we have surveyed. The problems reported include converting the Quick to the short break-down, rigging the tail, the fuel pump on the DoubleQuick and the trim tab.

The instructions were at least satisfactory to all of the owners, as none of them called the instructions "poor" or "very poor." About half (47%) called them "very good," 20% rated them "good" and 7% said they were "fair." The owners were evenly split in rating the factory, with 27% each saying the factory was "average" or "no help at all." Thirteen percent

Continued on page 44



thought the factory was "very helpful."

Eipper dealers got a "very good" rating from 27% of the owners, "good" from 33% and 7% each rated their dealers "fair" or "poor." Comments such as "He has all the parts in stock and is knowledgeable on maintenance of aircraft," and "He is dependable and tries to help you out as much as he can," were given as reasons for the "good" and "very good" ratings, while one owner who rated his dealer as "poor" said it was due to poor dealer attitude.

Quicksilver owners fly fairly often, averaging about twice a week, with a range of once a month to 3-4 times per week. The owners have from one to 150 hours of flight time in their machines, with an average of 59 hours. Most of the owners (60%) fly for 30-60 minutes at a time. A third fly for more than an hour per flight, while 7% usually fly for a half hour or less.

Almost all of the owners (87%) fly from airports, but only 40% have a pilot's license. Eighty percent learned to fly ultralights from

an instructor. They got from one to ten hours of instruction, with an average of 4.3 hours.

Set up time on the Quicksilver falls into the mid range of the ultralights in our survey. The owners reported times ranging from 20 to 60 minutes, with an average set-up time of 37 minutes. Sixty percent of the owners said it takes two or more people to set up the Quicksilver. Overall, the set-up rated and "easy" comment from 67% and an "average" rating from the rest. No one called it "difficult."

The owners are nearly unanimous in rating the Quicksilver's handling. Ninety three percent call it "easy to fly" and the remaining 7% call it "average." No one rated it "a little tricky" or "very tricky" to fly. Thirty seven percent had some handling problems, but these were mostly in ground handling and one owner wanted more nose-down pitch authority. The owners report an average fuel consumption of 1.4 gph.

Forty seven percent of the owners experienced some sort of in-flight failure or accident. Most of these were ground loops from taking off in a crosswind. One pilot had a rudder cable break and landed safely by

grabbing the trailing edge flying wires and using wing warping.

There is not much disagreement about the Quicksilver's best features. Seventy three percent of the owners praised it for its safe handling qualities. Twenty percent liked the quality, 20% called it reliable and 13% each like the simplicity and its ability to be car topped.

On the minus side, 27% disliked the Yamaha engine, 20% think it is awkward to transport and 13% think it is noisy. The only maintenance problem reported was a failure of a recoil starter. One owner also noted that the engine is inconvenient to bench test without setting up the whole machine.

Overall, the owners are in complete agreement on their evaluation of the Quicksilver. They responded with comments like, "I don't think there is a safer, easier to fly and better built ultralight made," and "Quality product" and "...very easy to fly and maintain, economical to repair, it car tops, factory very cooperative." When the responses were tallied there was no dissent. Every one of the owners (100%) said they would buy another one or recommend one to a friend.

concerned. Five of the ultralights we surveyed took less time, and four took more.

A quarter of the owners said they had a problem with the construction. This is one of the lower figures in the ultralights we have surveyed, and most of the complaints deal with the instructions. The owners who mentioned them said they would like more illustrations. Three of the owners said some parts were missing, two said some parts were mis-drilled and one said the 'Dactyl was tricky to rig.

Overall, the instructions got a "very good" rating from 25% of the owners, a "good" rating from 31%, "fair" from 13%, "poor" from 13% and 6% called them "very poor." Most of the owners liked the factory's customer service, with 63% calling the factory "very helpful," and 13% calling it "average." Six percent of the owners said the factory was "no help at all."

Continued on page 46

Pterodactyl

Millions of years ago, Pterodactyls were flying reptiles, noted for their great wingspan. Today, Pterodactyls are ultralight aircraft, noted for their generous wingspan and for their climb rate and cross-country ability. The first ultralights to fly across the country were 'Dactyls. Pterodactyl began the movement to large engines on ultralights when it introduced the 340 cc Sachs engine, and today, a reduction-drive Cuyuna-powered Pterodactyl Ascender holds the unofficial altitude record for ultralights at 21,210 feet.

Despite the opportunity to expand the company rapidly in the ultralight boom, owner Jack McCornack has purposely kept Pterodactyl relatively small, and allowed it to grow very slowly. He also has a policy of allowing a lot of development time before

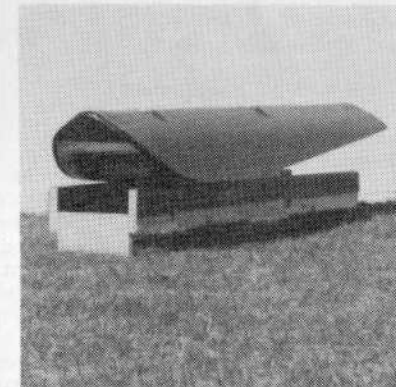
introducing a new product. Together, those policies should allow Pterodactyl to sell a well-proven product with good quality control. Do they? Fifteen owners responded to our survey, commented on their machines and told us whether or not Pterodactyls are Pterkeys.

Ninety four percent bought their machines new, and 69% built them by themselves. Twenty five percent were built by dealers. (As usual with these surveys, when the percentages do not add up to 100, it means that some of the respondents did not answer the question.)

Building time ranged from 26 to 160 hours, with an average building time of 78 hours. This puts the Pterodactyl right in the middle of the pack as far as building time is

ULTRA-FLOATS

THE LEADER IN FLOATATION FOR ULTRALIGHTS



EXPERIENCE THE ULTIMATE

DON'T BE LIMITED BY WIND DIRECTION OR VACANT FIELDS

- **ULTRA-FLOATS** INCREASE THE NUMBER OF AVAILABLE "AIRPORTS" AND OFFER THE SAFETY OF LONG, UNOBSTRUCTED RUNWAYS.
- ALWAYS TAKE OFF AND LAND DIRECTLY INTO THE WIND.
- DESIGNED FOR MAXIMUM HYDROPLANING EFFICIENCY, EACH SET WILL FLOAT OVER FOURTEEN HUNDRED POUNDS SO YOUR ULTRALIGHT RIDES HIGH DRAWING ONLY A FEW INCHES OF WATER. THIS ENABLES THE AIRCRAFT TO GET ON THE STEP QUICKLY, ALLOWING INCREDIBLY SHORT TAKE OFF RUNS.

ULTRA-FLOATS ARE NOW FLYING ON:

- QUICKSILVER
- HUMMINGBIRD
- WEEDHOPPER
- EAGLE
- HUMBBUG
- WIZARD
- HI-NUSKI
- ROTEC 2B
- MORE COMING!

FOR INFO PAK SEND \$3.00 TO:

**ULTIMATE ULTRALITES
& FLOAT CORPORATION**
A DIV. OF ULTIMATE AIRCRAFT & ACCESSORIES, INC.

**JOIN THE RANKS OF
THE SEAPLANE PILOTS**

2964W NORTH FORSYTH
ORLANDO, FL 32807
305/678-5015

Workmanship on the Pterodactyls was also appreciated by the owners, with 88% calling it "outstanding" (50%) or "good" (38%). Only 6% called the workmanship "mediocre," and none of the owners called it "poor."

About a third of the Pterodactyl owners came from general aviation, with 31% holding a private or student pilot's license. Half of the owners taught themselves how to fly, while 44% said they received instruction. The amount of ultralight instruction ranged from 30 minutes to eight hours, with an average of 3.5 hours.

Pterodactyl owners fly an average of just under twice a week. Thirteen percent usually fly a half hour or less, 44% fly from 30-60 minutes, and 38% usually fly for more than an hour. Over two thirds (69%) sometimes fly their ultralights from airports. The owners have from 15 to 123 hours in their 'Dactyls, and on the average, have accumulated 55.6 hours. They reported using 1-2 gph, with an average fuel consumption of 1.5 gallons per hour.

The owners report a range of set-up times from 25 minutes to 2 hours, with an average of 53 minutes. This is one of the longer set-up times, and exactly equal to the times for the Wizard and Rally. However, only 12% of the owners say that two or more people are needed for set-up, a tie with the Easy Riser for the lead in that category. Most of the owners accept the set-up, with 31% calling it "easy" and another 56% calling it "average." Only 6% called the set-up "difficult."

Thirty eight percent of the owners said the Pterodactyl is "easy to fly." This is a fairly low figure compared to the other ultralights in our survey, and is perhaps due to the pitch sensitivity of the flying wing design, as the Easy Riser and Mitchell Wing also did poorly

in this area. Forty four percent said the Pterodactyl is "average" and 6% called it "a little tricky" to fly. No one called it "very tricky."

Handling problems were reported by 31% of the owners, placing the Pterodactyl square in the middle of the ultralights in this survey. Three of the owners found ground handling difficult without a steerable nosewheel, two had problems with pitch damping, one complained of slipping in turns, and one had "just normal gusty wind problems."

Sixty three percent of the owners have had some sort of in-flight failure or accident. Almost all of these were due to pilot error according to the owners, with incidents such as "landing" a few feet in the air, stalling during landing, or dragging a wingtip in crosswinds. Two had engine failures with subsequent successful landings and one had a nosewheel brace wire break, with no damage.

Most Pterodactyl dealers were well-liked by the owners. Twenty five percent got a "very good" rating, 31% were rated "good," 19% "fair," none "poor," and only 6% rated the dealer "very poor."

The following comments illustrate how the dealers earned their ratings: "lent me tools... would have helped build it if I needed it... let me use his yard." "wouldn't let ya leave with wings till ya know how it flies... he demonstrates." "Promises, but no action... very slow." "Excellent pilot, unselfish about giving his time to others..."

There is not enough room to list all of the hints and suggestions offered by the owners, but here are a few of them: "Build carefully, learn slowly." "Keep airspeed up — 32-35 mph." "Platinum plugs and good oil." "Dealer in Las Vegas has jig for flying wires." "Be

prepared to add ballast to nose." "Safety wire and safety clip on anything that could go through prop — including muffler springs." "Reinforce bolt holes in fabric with leather patches." "Fly at dawn, then fish all day."

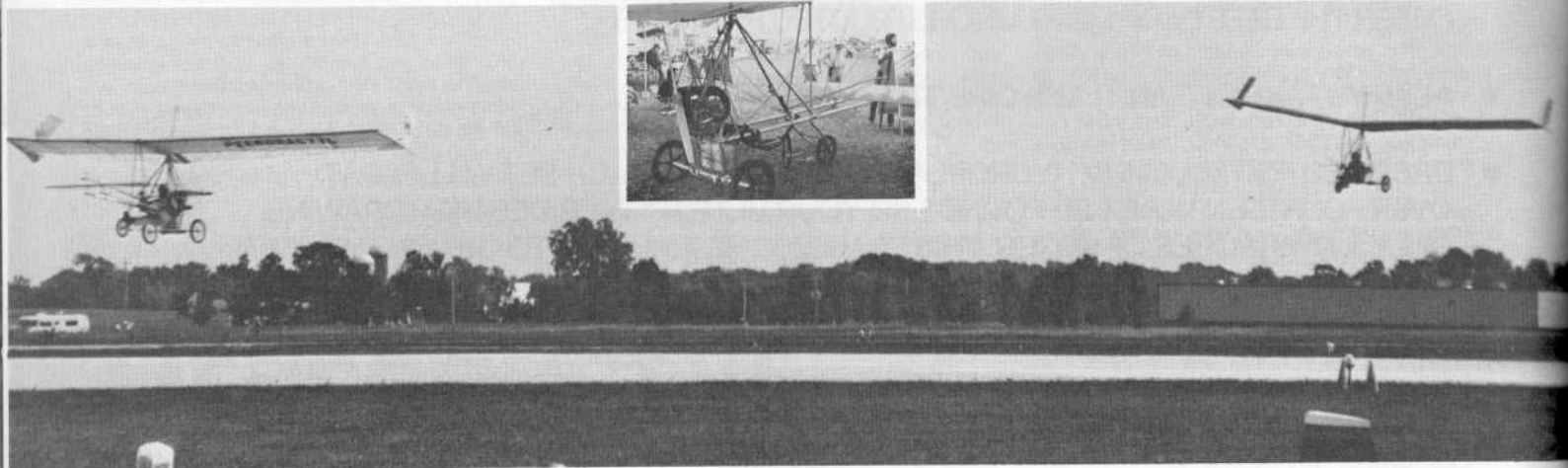
Two aspects of the Pterodactyl lead the list of "Best Features." Forty percent of the owners like the power and rate of climb, and the same number like the Pterodactyl's portability and the fact that it does not need a trailer.

Other frequently mentioned best features include rough field capability, speed range, wing design, safety record, stability, durability, engine, and ease of flight.

Only two things were mentioned by more than one owner as "Worst Features," the ground handling and the noise level. Likewise, very few owners reported maintenance problems. Two had problems with the Sachs engine, one had a crack in an exhaust pipe and one said he had to adjust the carburetor frequently. Eighty eight percent called the engine "very reliable," and 6% called it "average."

And now, one final number, the important one. How many Pterodactyl owners, after owning and flying their machines, think that they are good enough that they would buy another one or recommend one to a friend? Ninety four percent of the Pterodactyl owners answered "yes." That's a very high figure, for owner loyalty, trailing only the Quicksilver, Wizard, and Lazair, that got 100% positive response.

According to the owners, "After flying the Manta Fledge off mountains, I knew that it was the one to host a motor." "...the Pterodactyl is the best all around ultralight for performance, handling, ease of set-up, portability, cross country-ing and looks." "I have just ordered a P-Turkey Canard with reduction... my third P-Fledge. I love 'em."



Eagle

The Eagle is the only canard in our survey. Canards have been touted as the answer to the common stall/spin accident. In theory, the canard, operating at a higher lift coefficient and higher angle of attack, will stall first, making it impossible to raise the nose further and stall the main wing. "If you cannot stall," the theory says, "you cannot spin."

The Eagle uses a hybrid control system with its canard, relying on a combination of weight shift and a harness-operated flap on the canard for pitch, with control bar operated wing tip rudders for coupled roll and yaw. Supporting all of this is a wing, which if not identical, is clearly derivative of the Electra Flyer (now American Aerolights) Vulcan hang glider.

Does this marriage of hang glider and ultralight technology work? Does the canard provide safe and easy handling? Is it a practical ultralight? These are some of the questions we expected to answer when the

Eagle was included in the survey. While a larger response would have given us a more exact idea of its strengths and weaknesses, we do have the opinions of the 11 owners who responded to our survey. Here's what they reported.

The Eagle is available only as a factory built plane, with the final assembly done by the owners. The assembly times reported ranged from 2 to 15 hours, with an average time of 8 hours. This is the shortest building or assembly time of any of the ultralights on our survey.

Continued on page 48

DEMON

**FLIGHT
DESIGNS**

P.O. BOX 1503
SALINAS, CA 93902
(408) 758-3844

A Division of
Pioneer International

The DEMON sets up with two pip pins, ten minutes from car rack to hook in. It's got aluminum/fiberglass composite battens, streamlined nose cowling, span-wise sail cloth, custom handled glider storage bag with separate batten bag, and lots more.

GET YOUR HANDS ON A DEMON. AND PREPARE TO BE POSSESSED!

A C C E S S O R I E S

WE THOUGHT YOU'D LIKE TO KNOW —
If it has to do with flying, look to

FLIGHT DESIGNS

What you need now —
And even more in the future.

- Custom cocoon harnesses, with internal chute bag, 2 stage ballast containers, glider-bag storage pockets.
- Top quality helmets.
- Full line of instruments.
- Boat-towed para sails for water fun.
- Complete stock of T-shirts, flight suits, hats, etc.
- Wallets, windsocks, posters.

Send for your \$2. TOTAL FLIGHT catalog today
Refundable with first purchase.

FLIGHT DESIGNS - For The Future.
A Division of Pioneer International

**FLIGHT
DESIGNS**

P.O. BOX 1503
SALINAS, CA 93902
(408) 758-3844

Nine percent of the owners reported having difficulty in assembling the Eagle, and 18% complained of a lack of instructions. The 9% having problems putting the Eagle together also was a very low figure, bettered only by the Lazair, with none of those owners reporting problems.

The instructions rated a "good" from 18% of the owners and 9% each rated them "poor" or "very poor." No one rated them "very good" or "fair." Twenty seven percent of the owners thought the factory was "very helpful." Eighteen percent said it was "average," and 9% said it was "no help."

On the average, the owners fly once or twice a week, and most (73%) fly for 30-60 minutes at a time. They have accumulated up to 70 hours in their Eagles, with an average of 20.2 hours logged.

They are almost evenly split on flying from airports, with 45% reporting that they sometimes use airports, and 55% saying they never do. Only 27% of the Eagle owners have a private or student pilot's license. A majority (82%) learned to fly ultralights with an instructor, receiving from 15 minutes to 30 hours of instruction. The average instruction time was 8 hours.

If the Eagle was at the top of the heap for initial construction or assembly time, it was near the bottom for field assembly or set-up time. The owners reported set-up times ranging from 30 to 105 minutes, with an average of 64 minutes. Only the Weedhopper (66minutes) had a longer reported set-up time.

In addition, 73% of the owners say that two or more people are required to set up the Eagle. Only the Lazair (75%) and the Rotec Rally (89%) had a higher percentage of owners reporting that two or more people are required for set-up. Overall, the set-up was rated "easy" by 18% of the owners, "average" by 55% and "difficult" by 27 percent.

Twenty seven percent of the owners considered the workmanship "outstanding," 55% called it "good," and 9% rated it "mediocre" or "poor."

Handling qualities are one of the chief attributes claimed for the canard, and in this regard, the Eagle does fairly well. Sixty four percent of the Eagle owners say it is "easy to fly," nearly giving it a tie with the Teratorn and

Rally (67%). Thirty six percent called the handling "average," and none of the owners called the handling "a little tricky" or "very tricky."

In a related question, we asked the owners if they encountered any handling problems. Eighteen percent said yes and mentioned pitch control and roll authority in rolling out of turns. The 18% response on this question was beaten only by the Nomad and Honcho, with a 5% response, but that is not a fair comparison, because many of the Nomad and Honcho owners said they had not yet flown their planes.

Fuel consumption on the Eagles averaged 1.5 gallons per hour. Forty five percent of the owners had an in-flight failure or accident. There was no pattern to these. Most were bad landings caused by pilot error, wind gradient or the like, and two were caused by engine failures, one of a Chrysler and one of a Zenoah.

Eagle dealers did very well in the owners' estimation, with 36% rated "very good," and another 36% rated "good." "Fair, poor" and "very poor" ratings were each earned by 9% of the dealers.

The canard topped the list of "best features," listed by 55% of the owners. Thirty six percent liked the portability, 18% each listed ease of flying, safety and stability and 9% each listed takeoff performance, quality, and the dual engine setup.

On the minus side, the owners did not like the set-up time and the engines, with 27% each listing those as the "worst features." Also listed were handling (18%), lack of 3-axis control (18%), speed, weak landing gear and the factory (9% each).

Among the hints given by the owners were suggestions to use a digital cylinder head temperature gauge, and to release the bungees on the tip rudders and raise the rudder stops to aid streamlining of the rudders and handling. Another owner suggested simply "airspeed, airspeed, airspeed."

Maintenance problems were reported by 45% of the owners and involved bolts loosening under vibration, frequent engine maintenance and the recoil starter.

When the comments were completed, the majority of the Eagle owners were positive

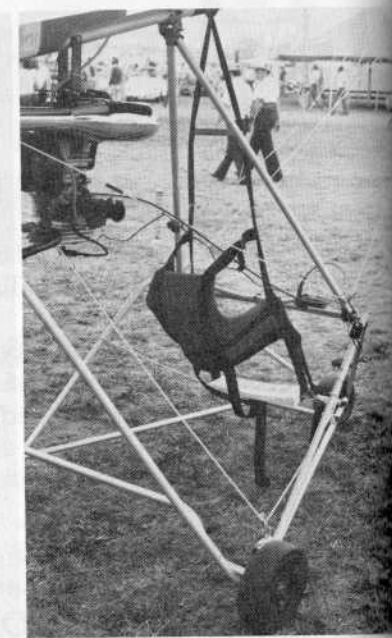
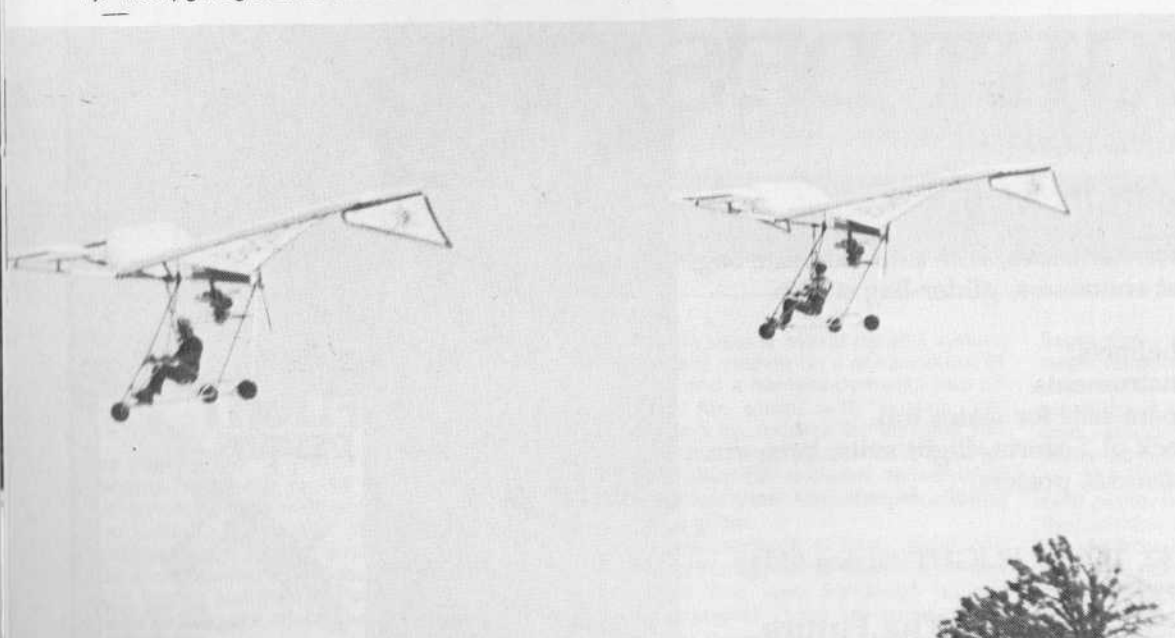
about their machines. Eighty two percent said they would buy another or recommend one to a friend. This places the Eagle near the top in the test of owner loyalty, somewhat behind the Pterodactyl (94%), but well ahead of the Teratorn (67%). Does the canard work? Apparently so.

This survey of Eagle owners will be the last in our series. In a cooperative effort by Ultralight, Whole Air Magazine, Ultralight Flyer, and Hang Gliding, we have questioned the owners of ten different ultralights. Of these ten, we have provided a detailed analysis of the responses on the Weedhopper, Pterodactyl, Quicksilver and Eagle. Information was also gathered on the Easy Riser, but was not included in this issue.

The usefulness of a survey like this depends on the number of responses. The fewer the responses, the more likely it is that one or two of the owners could change the results. For this reason, we decided to set a lower limit of 10 responses, and give the detailed results only for ultralights that had a larger number of owners answer our survey. The Eagle is the last such ultralight. The general trends of the owners' comments on all of the ultralights were presented in the initial summary article (see March/April 1982 Whole Air).

Now that this first ultralight industry survey has been completed, we hope we have started a trend. The idea was to get the people who know best, the owners, to tell us about their machines and how they compare to their advertisements. We think that presenting the unbiased opinions of the owners is a service to prospective buyers, to other ultralight owners, and to the manufacturers, who can learn how their products are being received. In these surveys, we have been willing to report the negative comments as well as the positive ones. That is important. No ultralight is perfect and we think that freely talking about shortcomings as well as good features is an important function of the ultralight press. We invite editors of other ultralight publications to follow our lead, poll their readers and run their own owner's surveys. If you have any comments or suggestions on this survey, or for future surveys, please send them in. We would like to see them.

DELUXE



Yes, I would like to subscribe to WHOLE AIR

<input type="checkbox"/> Money Enclosed	Charge Card Number: _____
<input type="checkbox"/> Bill Me (In Advance)	Expiration Date: _____
<input type="checkbox"/> Visa	Is this a renewal? <input type="checkbox"/> Yes <input type="checkbox"/> No
<input type="checkbox"/> Mastercard	

\$9—1 year \$16—2 years \$22—3 years Published Bi-monthly
(Canada, add \$4/year--Other Countries, add \$8/year, write for Air Mail rates)

Name _____

Address _____

_____ Zip _____

Mail To: Box 144, Lookout Mtn., TN 37350

TRIKE CROSSROADS



Geoff Ball with Mainair's Tri-Flyer. Pod remains in place when rig is folded/photo: Noel Whittall

by Noel Whittall

It really did not take very long for the "trike" power unit to evolve into a sub-species of the genus "airplane" rather than an accessory for a hang glider.

Less than a year ago the usual trike enjoyed at most 18 or 20 BHP coaxed from a sometimes reluctant two cycle motor, and could be hooked onto just about any reasonably maintained flex-wing. Climb rate would usually be in the order of 200 fpm (in spite of claims of double that from some manufacturers) and comfortable cruising speed between 25 and 35 mph.

Now the latest rigs will climb at 1,000 fpm, cruise at 55 mph or more, and the wing portion is never flown alone as a hang glider. The whole outfit is referred to as a rig and provided one accepts that it is an aircraft in its own right and does not mourn the automatic loss of innocent simplicity, then there is a helluva lot going for it.

A by-product of this advancing sophistication is the move into an era of epic flights reminiscent of the pioneering days of Lindberg and Wiley Post. Already Bob Calvert has coaxed a Tri-Flyer trike outfit up to a wave-assisted 16,500 feet, and as I write this I am aware of machines which are being fitted with outsize fuel tanks preparatory to attacks on speed records over some of the classic longdistance European routes. I am all for it really — it is great to discover that for people with other than vast corporate incomes, aerial adventure did not end a couple of generations ago.

Here's a rundown on the British market piece at present:

1.

HIWAY Tredegar, Wales

First on the scene with a trike in Britain. Started off with the now obsolete 160 cc Valmet-powered machine which was frequently temperamental. Changed to the

reliable 250 cc Fuji Robin which continues in production. Also offered is the little 150 cc Hiro engined lightweight unit. This uses a high-output water cooled Italian power unit with neat integral reduction drive, but has been slow to reach the customers. Interestingly it is the only outfit to go against the trend for bigger and heavier motors.

Hiway trikes are usually matched with their Demon wing, the resulting aircraft being notably sweet to control, but maybe not as fast as some of the opposition.

2.

HORNET Bradford, Yorkshire

Hornet makes trike units only — like Hiway they use the "bi-pole" layout, i.e. two main vertical tubes. Maybe slightly more drag than the mono-pole designs, but much more rugged. Uses strong welded-socket construction, and 250 or 330 Robin power. Usually flown with the "Nimrod" wing (a strengthened Comet).

Hornet has just produced a dual trike with the 440 Robin twin, and has a neat prototype powered with Len Gabriels new English made 260 single.

Keen innovators, Hornet was very early on the scene with a streamlined pod plus snow skis for winter work.

3.

MAINAIR SPORTS LTD. Shawclough Road, Rochdale, Lancashire

Mainair's Managing Director, John Hudson, really has his act together when it comes to supplies for Hang Gliding and Triking. Not only does he produce the best catalog in Europe (send \$3), he stocks a range of equipment which comprehensive to say the least.

Their "Tri-Flyer" started life as a simple monopole kit for home assembly, in which form it is still very popular. However, anyone who knows him could have

foretold that this would only be the beginning for John who now lists a 330 plus a 440 tandem model in the range.

Convinced that the trike configuration is the route for Microlights (ultralights) to go, Mainair are now moving on into higher technology. With the co-operation of major sponsors, Fothergill and Harvey Ltd., a large company specializing in glass and carbon fiber development, John is currently developing a racing trike with a hot 440 engine. Still under wraps, this outfit should blow a few minds when it is wheeled out. Bob Calvert, British hang gliding Champion, is the works pilot, backed up by ex-British team member, Geoff Ball, so the effort will not fail for lack of talent in the driving seat!

4.

SOUTHDOWN SAILINGS Brighton, Sussex

Southdown's "Puma" is the rate-of-climb machine. A wing developed from the Lightning, but exclusively for power, its rather deep airfoil combined with their 330 cc monopole trike permits the sort of climb-out that makes small Pipers and Cessnas look like ground hoppers. One thousand feet per minute is quite realistic, but of course, top speed is lower than that of some of the flatter wings.

Still some way from production is the "Savage." This is a trike/wing combination which uses a system of levers to provide orthodox joystick control rather than the push-pull bar common to all other trikes. Although it has already taken the air, Southdown admit that further development is necessary to get the inputs and feedback feeling right. Assuming the problems can be overcome, there should be a ready market for the Savage among 3axis pilot who are otherwise unprepared to attempt to adapt to a trike's reversed controls.

5.

ULTRA SPORTS Truleigh, Sussex

American Cup Star, Graham Slater runs Ultra Sports, and was responsible for getting Frank Tarjani's original monopole design onto the market. Probably the first to feature in-air restart, the Ultra Sports Tripacer is an excellent performer with either a 250 or 350 Robin. I have some airtime on both models, and for me one of the highlights of last year was powering out of our local municipal airport on a Typhoon/Tri-pacer outfit for a highly illicit tour of my neighborhood at 1500 feet. Christmas Day was the occasion, snow a foot deep everywhere, and the winter sun showing itself clearly for the first time in weeks. Harry Unsworth and I had ascertained that there was no commercial or regular sport flying that day, and took the opportunity to fly over our home area which is normally impossible because of controlled airspace. Pure magic, and worth the subsequent reprimand from the Authorities (who were really very understanding in the circumstances).



The author loads his HiWay trike/photo: Rosita Whittall

6.

FLEXI-FORM Urmston, Manchester, Lancashire

Hughie McGovern and Mike Hartley are two of hang gliding's lost souls. Two years ago they made the "Sealander," a crossboomless glider with a pronounced tail, similar to the Aolus. Then they became seduced by the pleasures of triking, and discovered that the Sealander suited the needs of power very well: it was fast, stable, light to handle, and with the reflex at the tail, was less inclined to yaw at speed than gliders with tip washout. Very soon it also occurred to them that because landing speeds are independent of leg speeds when wheels are employed, the wing could be made smaller and thus still faster. The double surface was steadily extended, until the end product is now about a 160 square foot, 85% double surface, and cruises at an honest 55 mph, with 65 possible without the airfoil deforming excessively. The name has changed to the "Striker" and Flexi-form's order book is comfortably full. The shame from a purist's point of view is that they do not make hang gliders any more.

THE OTHERS

Chargus produces a gigantic two-seat training trike in limited numbers, using the 440 Robin Twin, and a number of others manufacture outfits on a one-of-a-kind basis. The workmanship spans the range from excellent to downright crude, but they do all fly, which is more than can be said for many 3-axis homebuilts. Various power units are used, but currently the Fuji Robin range is King, although I feel these engines are heavier than is necessary. Len Gabriel's new 260 single with dual ignition and electric starting is a particularly welcome newcomer to the scene, and promises to become popular. It is one of the first signs of anyone in the trike business applying true aircraft engineering philosophy to the product, and it deserves to succeed. However, one area where development is still sorely needed is silencing. All the single cylinder twocycle engines are too noisy — the twins are usually better. Steve Hunt (ex British Microlight Ass'n. Chairman) developed systems for the Fuji's which are both compact and release good power. Unfortunately they soon fall victim to their own vibrations and break up. Other mufflers are variously too noisy from day one, too large to be easily mounted thus

developing fresh cracks as fast as the old ones can be welded up, or just downright limit engine power. On reflection, I owned one which combined all those faults.

In spite of its shortcomings, the trike is far and away the most popular form of microlight aircraft in the UK. They are, after all, foldable and flyable, and that is what most sport pilots want.

Sad Footnote

One of the pioneers of powered flexwings, Howard Edwards, died in a triking accident last week. I do not yet have details, but Howard's innovative thinking will be sadly missed. He developed one of the few truly soarable trike-related systems which the pilot flew prone, and had a sink rate of little more than 200 fpm with the power off.

It is the poor sink rate of the ordinary trike when the power is off (around 400 fpm), that led to us treating them purely as powered aircraft and concentrating on speed and climb. Howard's experiments showed that it was still possible to develop a powered glider within the format. I am sorry that he will not be able to lead us any further along that particular road to the air.

Photo by Battina Gray



WE HELP YOU FLY!

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

I include my check or money order as follows:

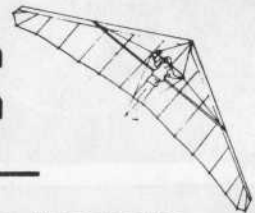
- \$29.50 FULL MEMBER (\$32.50 foreign) — as a full member you receive 12 issues of *Hang Gliding* magazine, pilot liability insurance, and all USHGA membership benefits.
- \$22.50 SUBSCRIPTION (\$25.50 foreign) for one year.
- \$40.00 SUBSCRIPTION (\$43.00 foreign) for two years.
- \$57.50 SUBSCRIPTION (\$60.50 foreign) for three years.

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

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

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

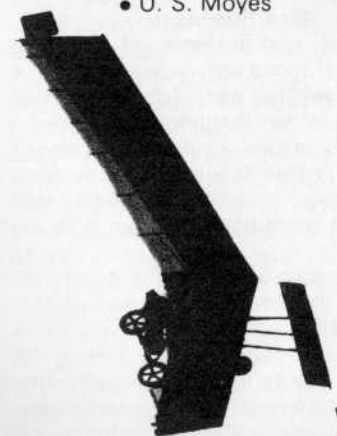
AIRWISE INCORPORATED



Instruction • Sales • Service • Accessories
Related Equipment
Promotion Airshows

HANG GLIDERS — all major brands, featuring:

- Flight Designs
- U. P. Sports
- U. S. Moyes



ULTRALIGHTS, featuring:

- Pterodactyl
- Goldwing
- Flight Designs

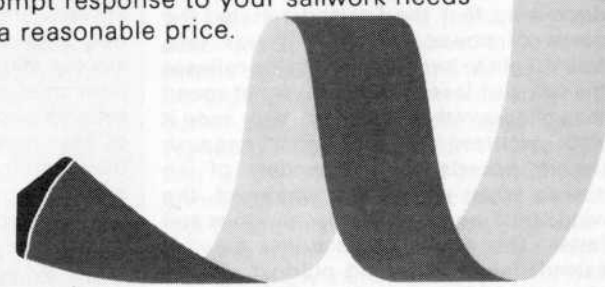
15 Long Ridge Road
West Redding, CT 06896
Phone 203/938-9546

SAIL REPAIR

Custom sewing and manufacture of stitched products are two of the services available from Aerial Dynamics.

But it's sail repair and construction to which that name owes its increasing familiarity.

Aerial Dynamics performs this integral function on a small shop basis. Less bother than dealer networks and more personal than distant manufacturers. By direct contact of customer to craftsman, Aerial Dynamics can provide a prompt response to your sailwork needs at a reasonable price.

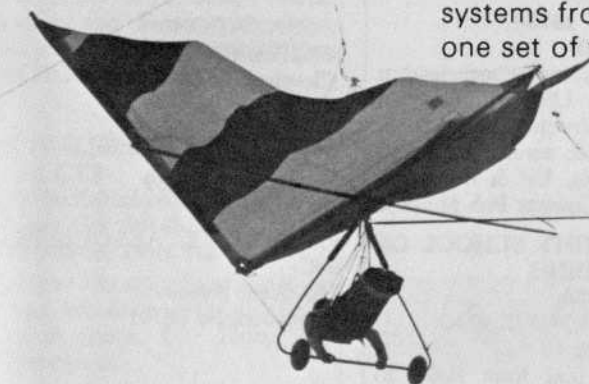


Aerial Dynamics

P.O. Box 151, Wildwood, GA 30757. 404/820-1962

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.²) 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

DIRECTORY

READER: This source listing is provided by *Whole Air* and all participating dealers. It will provide you with a geographically organized listing of reliable businesses with which to deal, and from whom everything from lessons to equipment can be obtained.

NE

ECO FLIGHT HANG GLIDERS & MICHIGAN MOTOR-GLIDERS

493 Lake Street
Benzonia MI 49616
616/882-5070

Visit our Frankfort area shop in Michigan's hottest soaring area. USHGA and FAA Certified Instruction. Wills Wing, UP, Flight Designs, Sensor, Pterodactyl, Manta, Windsurfer represented.

AERIAL TECHNIQUES

Route 209
Elenville, NY 12428
914/647-3344

Come visit Elenville. Learn to fly at our new training facility or challenge the mountain with you thermalling and X-C skills. Complete inventory of gliders, accessories and replacement parts. Quicksilver ultralight sales and instruction. Open all year.

SPORT FLIGHT

9041B. Comprint Court
Gaithersburg, MD 20760
301/840-9284

We're the pros in the mid-Atlantic area. Representing most major brands. Complete line of accessories. Repairs. Beginner through Advanced foot launch.

SOUTHEAST MICHIGAN HANG GLIDERS

24851 Murray Drive
Mt. Clemens, MI 48045
313/791-0614

Dealer for: U.P., Delta Wing, Soarmaster and the incredible Eagle. Tow instruction on the Yarnall Sky Hook. New Soarmaster Trike Gear in stock.

ECO-FLIGHT GLIDERS

17390 Redman Road
Milan, MI 48160
313/439-8637

Specializing in Gemini Power Systems including the Hummingbird. Dealer for major glider manufacturers, parts and accessories. Certified Instruction.

ULTRALIGHT SPORT FLYING

2915 S. Logan Street
Lansing, MI 48910
517/882-2468

Powered ultralight training headquarters for mid-Michigan. Dealers for Eipper Formance (Quicksilver, DoubleQuick, SeaQuick, and the MX) and the award winning MIRAGE by Ultralight Flight. Sales, service.

AIRWISE INC.

15 Long Ridge Rd.
West Redding, CT 06896
203/938-9546

Stormville (NY); 919/226-6712
Quality lightwing products and services. Hang Gliding instruction, novice to advanced, by USHGA instructor/observer staff. Comprehensive ultralight training program (CFI-dual airtime/Pagan syllabus). Flight Designs, UP, Moyes, Pterodactyl, Goldwing.

SWEET SKY, INC.

ULTRALIGHTS AND HANG GLIDERS
Downingtown, PA 19335
215/269-5109

David Starbuck and Judy Hopkins, USHGA Certified Instructors. Serving the Philadelphia area since 1974. Experienced, personalized instruction and attention to all of your flying needs.

MID-WEST SCHOOL OF HANG GLIDING

11522 Red Arrow Highway
Bridgman, MI 49106
616/426-3100

USHGA Certified Instruction in the oldest school in Mid-West -- foot launch, tow, motorized. Sales and full service at the home of US Moyes. Three-quarter mile from Warren Dunes.

ULTRALIGHT FLIGHT SYSTEMS

15 Dean Street
Deposit, NY 13754
607/467-3110

Training programs for beginner thru expert by USHGA Certified Advanced Instructor. Specializing in glider sales & service for Flight Designs, Wills, UP & Robertson Harnesses. Contact Bob Murphy.

AERIE FLIGHT SCHOOL OF HANG GLIDING

Rt. 7, Box 305A
Cumberland, MD 21502
301/729-6622

We'll take you from Basic to Cloudbase, using state-of-the-art teaching principles, and full-time USHGA Certified Instructors-Observers. Carrying Dealerships for major brands of Glider, parts, & accessories.

ELMIRA AIRSPORTS

959 Oak Street
Elmira, NY 14901
USHGA Certified Instructions. Specializing in sales and service for Wills Wing, Ultralight Products, and the Eagle. Please contact Marty Dodge.

MORNINGSIDE FLIGHT PARK

Rt. 12, RFD #2
Claremont, NH 03743
602/542-4416

Complete flight facility with camping and swimming. Top notch instruction, USHGA Certified. Precision repairs for airframe and sail. Gliders & accessories in stock. Dealer for Bennett, Flight Designs, Moyes, Odyssey, UP, Wills, Wizard. Powered ultralight instruction available.

MOUNTAIN WINGS

Box 1022/Main Street
Kerhonkson, NY 12446
914/626-5555

Elenville area's newest and largest shop for hang gliders/ultralights. Located just off Route 209 on Main Street, our product lines include Flight Designs, ProAir, Manta, Seedwings, Stratus. Comprehensive instruction programs/audio visual aids.

CONNECTICUT COSMIC PRODUCTION

14 Terp Road
East Hampton, CT 06424

LIGHT FLIGHT, INC.
20032 Sixteen School Road
Wellsville, OH 43968

CGSAVIATION

4252 Pearl Road
Cleveland, OH 44109

WINGS & WHEELS

RD 2 Box 56
Valencia, PA 16059

PARACHUTE ASSOCIATES INC.

145 Ocean Avenue
Lakewood, NJ 08701

SE

FLORIDA WINGS

Route 2, Box X403
Avon Park, FL 33825
813/453-7749

Distributors for Moyes Gliders, Tow Systems and builders of the Swivel Tow Bar. Instructions, service and accessories. Dealers: Write for info on our tow bar systems.

KITTYHAWK KITES

P.O. Box 386
Nags Head, NC 27959
919/441-6247

Learn to fly safely over soft sand dunes through gentle Atlantic breezes. Beginner, Novice packages and ratings available daily. Complete inventory of new gliders, accessories and parts in stock.

CRYSTAL AIR SPORTS CRYSTAL FLIGHT RESORT

Route 4, Cummings Hwy.
Chattanooga, TN 37409
615/825-1995

STOCK: Wills Ravens, Harriers, & Ducks—Eipper Quicksilvers—Flight Designs Jet Wings & Demons—Bennett Trikes. Complete Training in the world's only FULL FLYING SIMULATOR. Huge accessory stock. Used gliders & ultralights. Bankcards accepted.

CRYSTAL AVIATION

ATLANTA
13225 Highway 19, North
Alpharetta, GA 30201
404/475-5609, 7843

CRYSTAL AVIATION—BIRMINGHAM

P.O. Box 20235
Birmingham, AL 35216
205/987-0200

CRYSTAL AIR SPORT MOTEL

4328 Cummings Highway
Chattanooga, TN 37409
615/821-2546

Quiet and comfortable lodging. Water beds, pool, weather reports. Shari's SKY GEAR Gifts, T-Shirts, Jewelry and Famous Munchies. "Come to the Center of Lift!" Visa and Mastercard accepted.

ULTRALIGHT FLYING OBJECTS

195 North Main Street
Jasper, GA 30143
404/692-5611 Ext. 318

Powered Ultralight Sales and flight school. Weedhopper C Quick Build Kits In Stock. Buy Today, Fly Tomorrow.

LUBON ULTRALIGHT AIRCRAFT

Rt. 8, Enoree Hill Circle #17
Greer, SC 29651
803/244-5886

Sales, Service, Instructions for entire line of UP products, featuring the Comet and the Gemini. Serving the Greenville, Spartanburg and Piedmont area of South Carolina.

FRIGATE AIRCRAFT

18639 SW 107th Avenue
Miami, FL 33157
305/252-1706

American Aerolights Eagle, Flight Designs Jet Wing, UP, Moyes, Wills Wing with complete sales (new & used), service and lesson packages. Come see us in our new 4,000 square foot showroom.

FREEDOM SPORTS

Rt. 1
Creston, NC 28615
919/385-6711

Contact Steve Coan for Sales, Promotions, and Demonstrations of the finest soaring equipment in the industry.

SCOTT'S MARINE

226 Old Statesville Av. Box 339
Huntersville, NC 28078

LOOKOUT MOUNTAIN FLIGHT PARK

Route 2, Box 215W
Rising Fawn, GA 30738

AERO ADVENTURES

P.O. Box 1181 — Zephyrhills
Airport Zephyrhills, FL 33599

SOUTHERN AIR TIME, INC

Box 93701 Martech
Atlanta, GA 30377
Gwinnett County Airport
Lawrenceville, GA

NC

MID-AMERICA GLIDERS, INC.

141 Cleveland Cr.
Granville, IL 61326
815/339-6771

We offer professional instruction and top quality equipment. Beginning, Intermediate, Advanced and motorized lessons. Complete line of gliders, parts, and accessories.

SIMPSON MIDWEST ULTRALIGHTS

Route 1, Box 114WA
Fisk, MO 63940
314/686-3578 or 785-9236

Dealers for Risers, Lone Ranger, Weedhopper. Kits or plans for elevators, pod/landing gear for Riser, hammock seats, wheel pants, aircraft tubing, hardware. Catalog — \$2. Experience with motorized only.

MINNESOTA GLIDER

2530 Nicollet Avenue
Minneapolis, MN 55404
612/870-0096

Representing most powered and non-powered gliders and accessories. Specializing in Ultralight Products, Weedhopper, and Goldwing. Experienced rigid wing builders, airframe and sail repair. USHGA Certified Instructors.

BOOK NOOK

4738 Main Street
Lisle, IL 60532

NORTHERN SUN

2277 W. County Road "C"
St. Paul (Roseville), MN 55113

GLIDERS & GADGETS

Rt. 3, Box 197
Liberty Landing Airport
Liberty, MO 64068

TOW KITE: GLIDER EXCHANGE

2531 Cedar Point Drive
Janesville, WI 53545

SC

TRUE FLIGHT

3043 Given Avenue
Memphis, TN 38112
901/324-9121

Mid-America headquarters for powered ultralights. Also dealers for all major glider manufacturers. Glider accessories, repair, and instruction. Sub-dealership inquiries welcome.

SKYDIVERS OF TEXAS INC.

2553 Valley View Lane
Dallas, TX 75234

ULTRALIGHT POWER GLIDERS INC.

2010 Sarah Street
Houston, TX 77054

McELFISH PARACHUTE SERVICE

2615 Love Field Drive
Dallas, TX 75235

SOUTHERN AIRSPORTS

1101 "A" Power Blvd.
Reserve, LA 70084

LONESTAR HANG GLIDERS

2200 "C" S. Smithbarry Road
Arlington, TX 76013

NM

ASPEN HANG GLIDERS & ULTRALIGHTS

P.O. Box 7115
Aspen, CO 81611
303/963-1504

Motorized and foot launch USHGA instruction, sales, service. Eight years in business -- 6,000 students taught. Dealers for Bennett, Wills, Flight Designs, Ultralight Products, Manta, Kasperwing, and Soar-master.

INFINITY HANG GLIDERS & ULTRALIGHTS

898 South 900 East
Salt Lake City, UT 84102
801/359-SOAR, 572-3111

GOLDEN SKY SAILS

572 Orchard Street
Golden, CO 80401
303/278-9566

USHGA Certified school including power and towing. Complete airframe and sail repair facilities, custom fabrication. Distributors for Wills and Golden Prone Harness.

WASATCH WINGS, INC.

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

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

TREASURE VALLEY HANG GLIDERS

5104 Albion
Boise, ID 83705
208/336-9492 eves.

USHGA Certified Instruction; Sales of UP, Wills, Flight Designs, & Centurion gliders; Service & Accessories; Ratings & Site Information. "Come Fly With Us! Southern Idaho Offers Great Soaring!"

SOUTHERN COLORADO SCHOOL OF HANG GLIDING, INC.

P.O. Box 7427
Pueblo West, CO 81007

SM

PAGE ONE NEWSSTAND

11200 Montgomery NE
Albuquerque, NM 87111

ULTRALIGHT AVIATION INC

10250 North 19th Avenue
Phoenix, AZ 85021

SKY BOUND HANG GLIDERS

10250 N. 19th Avenue, Suite J
Phoenix, AZ 85021

NP

CAPITOL CITY HANG GLIDERS
3248-A 39th Way, NE
Olympia, WA 98502
206/786-9255 or 206/456-6333
Dealer for Wills Wing, Manta, and Moyes. All accessories. Qualified service, repair, and assistance. USHGA Certified Instruction.

HANG GLIDERS WEST DILLON BEACH FLYING SCHOOL
20-A Pamaron Way
Ignacio, CA 94947
415/883-3494

We sell and service all major brands and parts, accessories, USHGA Certified Instructors, Observers. Now offering Powered Ultralight instruction, all equipment provided. After the sale it's the SERVICE that counts. Hours: 10:00 to 5:30.

SEATTLE SAILWINGS
7130 California Avenue SW
Seattle, WA 98136
206/935-4539, 8-10 M-W, 7-10 Th
Dealer for Flight Designs, Moyes and the new Sensor 510. USHGA Certified Instruction.

RISING STAR GLIDERS
1023 S. Adams, Suite 107
Olympia, WA 98501
206/456-3441
Considering foot-launched soaring? We at Rising Star are experts in the field. Learn to fly on the latest and safest gliders. All training materials provided. DEALERS FOR WILLS WING... with the new Duck on hand.

SKYWORKS HANG GLIDERS & ULTRALIGHTS
527 Sinclair Frontage Road
Milpitas, CA 95035
408/946-7115
We offer complete lesson programs, certified instruction, demos, equipment new and used, repair facilities. Major brands available. Specialty — The ATV Jet Wing.

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

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

MISSION SOARING CENTER
43551 Mission Blvd.
Fremont, CA 94045

THE HANG GLIDING COMPANY
391 Dolliver
Pismo Beach, CA 93449

AEROSAILS
800 Mercer
Seattle, WA 98109

NOLAND ULTRALIGHT AVIATION
682 Calabasa Road
Watsonville, CA 95076

HANG GLIDER EQUIPMENT CO.
P.O. Box 16142
San Francisco, CA 94116

SP

ULTRA SPORT, INC.
12780 Pierce No. 14
Pacoma, CA 91331
213/896-1805

The only powered ultralight school with a simulator allowing the learning of basic flight maneuvers BEFORE free flight. Complete lesson course, powered sales and service. Free information on request.

HANG FLIGHT SYSTEMS
1208-K E. Walnut Street
Santa Ana, CA 92701

FLIGHT REALITIES
1945 Adams Avenue
San Diego, CA 92116

WILLS WING
1208—H E. Walnut Street
Santa Ana, CA 92701

ELSINORE VALLEY HANG GLIDING CENTER
31381 Riverside Drive
Lake Elsinore, CA 92530

HANG GLIDERS OF CALIFORNIA
2410 Lincoln Blvd.
Santa Monica, CA 90405

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

WINDSPORTS INTERNATIONAL INC (Formerly Southern California School of Hang Gliding)
5219 Sepulveda Boulevard
Van Nuys, CA 94538

orient

JAPAN SURFING PROMOTIONS
3-17-17 Hatori, Fujisawa City
Kanagawa JAPAN 251

europe

NOVA-AIR Aero Sport Systems
Am Bahnhof
8531 Illesheim
West Germany
Tel. 09841-8883
We sell and service all models of equipment. School instructor is special-rated by USHGA (I-IV) and is German Instructor/Observer.

VOL LIBRE DIFFUSION
16, Rue Bardinet
75014 Paris, FRANCE

AK/HI

TRADEWINDS HANG GLIDING
Box 543
Kailua, HI 96734
808/396-8557
Learning programs for beginners through advanced. USHGA Instructors and observers. Rental gliders to visiting ADVANCED pilots. Makapuu Ridge Clearances. Sales and services for Wills Wing and Moyes.

MAUI SOARING SUPPLIES
Rt. 2, Box 780
Kula Maui, HI 96790

canada

HIGH PERSPECTIVE R.R. #2
Claremont, Ontario
CANADA L0H-1E0

ONTARIO HANG GLIDERS
801 Woolwich Street
Guelph, Ontario
CANADA M1N 6J2

CANADIAN ULTRALIGHT AIRCRAFT
P.O. Box 640
Lumby, British Columbia
CANADA V0E 2G0

MULLER KITES, LTD.
3443 12th Street, NE
Calgary, Alberta
CANADA TZE-656

BIRDMAN ENTERPRISES
7939 Argyle Road
Edmonton, Alberta
CANADA T6C-4A9

AVIA SPORT
342 Boul. Tadoussac
St-Fulgence, Quebec
CANADA G0V-1S0, or
1045 Rue Principale
St-Paul d' Abotsford, Quebec
CANADA J0E-1A0

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

DEALERS...RETAILER...SCHOOLS:
Several levels of participation with *Whole Air* are available. 1st/Magazine sales; all businesses with retail sales may purchase magazines for resale. Excellent margin, credit for unsold copies, free UPS delivery (over 20 copies), and Distributor rates (over 50 copies). 2nd/Directory Advertising; very reasonable, uniform appearance, all address information and 25 words copy, 3rd/Aero Market Places (1st issue May/June '82; very limited space, and qualifying conditions); National Class Dealership listing, far-forward position in magazine, reasonable rate, display type space, choice of copy material.

Write for more information.
See Classifieds elsewhere.

CLASSIFIEDS

* 20¢ per word
* First order pre-paid. If multiple runs desired, indicate the number of times; you will be billed for all insertions after the first.
* P.O. Boxes, phone numbers, prices, make (brand), model, size, and zip code all count as one word each.
* Minimum order: \$3.00
* Bold type face words 30¢ each, capitalized words 25¢ each, \$3.50 for each inch of line (artwork) illustration/logo, \$5.00 for each inch of photographic display.
* Deadline is first day of month preceding cover date. Example: May/June *Whole Air* has a deadline of April 1st.
* Send to: *Whole Air Classifieds*
Box 144
Lookout Mountain, TN 37350

VIDEO ENTERTAINMENT AOLI, COMET CLONES, AND POD PEOPLE! — The 1981 International Cross Country Hang Gliding Competitions in the Owens Valley of California © 1982. You are there for pilot's briefings, blown take offs, dust devil destruction and crash landings in Nevada! Ride the truck up to Gunter launch where seventy pilots set up at once! See thirty gliders work one thermal! Fly inside a pod! Watch sailplanes enter a gaggle! Soar the White Mountains with Eric Raymond in the Sunseed! Awesome! Sixty minutes of selected footage. VHS/Beta: \$59.95. Rick Masters, P.O. Box 3094, Shell Beach, CA 93449.

23, MXB

USED GLIDER SERVICE
Looking for a used glider? Selling yours? In 213 and 714 Area codes, call Doug Hertzog's Hang Glider Referral Service, at 213/436-4891.

MXB

CRYSTAL SPRING/SUMMER SALE
Herron (red/gold)-\$850 Alpha 185 (rainbow)-\$700
Harrier 147 (w/o/y)-\$1200 Comet 185 (w/p)-\$1600
4 SST's, package \$995 Seahawk 180 (r/o/y)-\$650
Centurion, demo-\$1700 Demon 175 (all y)-\$1500
Demon 175 (w/r/o)-\$1600 Duck (db/g wedge)-\$1895
Duck (autumn)-\$1995 ProStar 160 (demo)-\$1850
X-180 (demo)-\$1850 demo Quicksilver-\$2995
new DoubleQuick-\$3295 new Quicksilver-\$3195
Call Crystal today and ask for Tom, Randee, or Gary. They'll describe these aircraft further, and answer all your questions. Then pick one and save, save, save! Call 615/825-1995, seven days a week, 8:30 am till afternoon.

24B

HANG GLIDER EQUIPMENT COMPANY
For All Your Hang Gliding Needs. 3627 Taraval, San Francisco, CA 94116. 415/992-6020.

22B, MXB

EMPLOYMENT
Interested in becoming a COMMERCIAL ultralight pilot? Register now! Pilot/crews needed nationally for a variety of assignments. Send full resume including photograph of your ultralight (air shot?), engine specifications, xerox of engine and flight log and accident notes. Send information and resume to: Ultralights, P.O. Box 189, Newbury OH 44065.

MXB

SPECIAL USE DEMOs
ProAir ProStar 160 (special inlay work on lower surface, blue and white; see ad, pg. 21) \$1795
Bennett X-180 (beautiful sail, see ad, pg. 39) .. \$1795
Seedwings Sensor 510-180 (extremely little airtime on this \$2195 glider) \$1895
Bennett Yamaha 100 Trike, with bracket (one hour airtime; good potential as motorglider) \$1595
Seagull 10 Meter (well-worn, but mountain airworthy — BARGAIN — as is) \$595

Contact *Whole Air* offices at 615/825-5274 Monday thru Friday 9:00 am till 6:00 pm. These craft have mostly been used for *Whole Air* evaluations, and are excellent low-time buys. Shipping tubes available; you pay freight.

GOT A GLIDER TO SELL?
Try **WHOLE AIR CLASSIFIEDS...** lowest rates in the industry to advertise a glider.

SAIL REPAIR AND CONSTRUCTION SAIL INLAY DESIGNS† CUSTOM SEWING

AERIAL DYNAMICS is owner-operated and seeks to provide service and products to pilots on a small shop basis. Less bother than going thru dealer networks, it is also more personal than too-distant manufacturers. By direct contact of craftsman to customer, AERIAL DYNAMICS can provide reasonable prices, quality work, and prompt service. Expansion of these services is anticipated in the future. For further information, call Dennis van Dam at 404/820-1962. Or write AERIAL DYNAMICS, P.O. Box 151, Wildwood, GA 30757.

MXB

HARNESS WANTED

Wanted: Used supine Sky Sports. Brian Cornelius, 221 Walnut Lane, Apple Valley, MN; 612/432-3339.

MOYES MEGA II
172 with mylar reinforced leading edges. Perfect trainer. Good solid ship. \$800 with bag. Jim Coan 919/385-6364.

ATTENTION ALL FLYERS! APPLY NOW

Positions available now at Crystal's Job Corps at the Flyer's Hostel. Barter work for lodging. Good deal, great flying, fine friends. Check it out now! Write or call Shari at 615/821-2546; or write at 4328 Cummings Hwy., Chattanooga, TN 37409

MXC

AVAILABLE NOW

Sales person (Clothing-Jewelry), Office clerk, Lifequard (seasonal), Chambermaid, Gardener/Groundskeeper. . . all at the Crystal Air Sport Motel in Chattanooga.

MXC

CHATTANOOGA SAILBOARDING

Ya traveled to Chattanooga to do some serious flying, BUT them southwest blues got you down? Fly on the water!

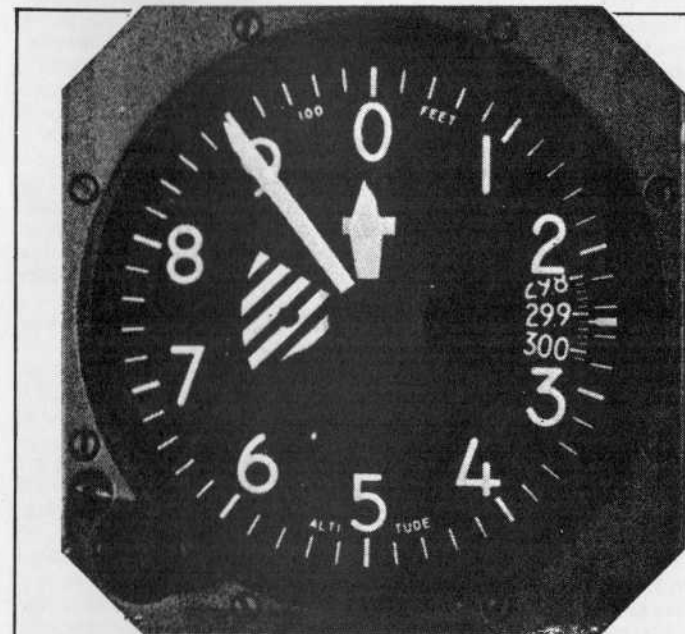
You'll be surprised at what kind of a blast Boardsailing is. Sales, lessons, and rentals available via Crystal Flight Resort, starting May 1st. Order one now for a full season of fun in the sun. Call Denny at 404/820-9738 or Crystal at 615/825-1995.

MXB

ULTRALIGHT WINNERS!

CGS Aviation will feature winners of local, regional, and national competitions in our advertisements and articles. If you have won a competition or set a record using a CGS power system, send a picture of yourself and your ultralight including all pertinent data to substantiate (altitudes, speeds, point notations) to CGS Aviation, 4252 Pearl Road, Cleveland, OH 44109.

MXB



AIRCRAFT ALTIMETERS

- ACCURATE & SENSITIVE
- 20,000 FEET
- 20 FOOT INCREMENTS
- BAROMETRIC SET KNOB
- 3" DIAMETER, 16 OUNCES
- \$98.00 (U.S. Funds Only)

U.S. add \$4 shipping/packing for each instrument ordered; Foreign orders add \$10 shipping for each. Certified Check or Money Order. Please allow 3-4 weeks for delivery. Personal checks take 6-8 weeks for processing.

Dealer Inquiries Invited

B & B Enterprises

P. O. Box 3114W
Hialeah, FL 33013

PRODUCT LINES

CHATTANOOGA, TENN. — Well, as Johnny says, "We've got a good show for you..." No movie stars in this column, but gobs of hang glider poop. Since we've devoted extra pages to the powered scene this issue, we'll keep this edition of *Product Lines* more glider oriented. By the way, for those that couldn't guess, the magazine is motor-focused as this Jul/Aug issue sells at Oshkosh. We want to play our part in promoting hang glider flight to the vast audience that attends EAA's major airshow. Trouble is, at that event, everyone is pretty tuned-in to ultralights or other engined aircraft, and in flat Oshkosh, hang gliders just kinda get overlooked. So last year it worked well to flash the passers-by with ultralight info, then slip in glider news/products/people as part of the reading material. It really surprised us how many pilots are indeed caught by hang gliding once they realize how far it has progressed. They're further impressed when the fact is presented, that hang glider design has inspired much ultralight technology (a situation which most of the ultralight community avoids discussing — makes them look less original). Following the usual spring buying rush, many hang glider shops with which we're in touch, have reported sales slumps, some minor, some really slow. In our opinion many factors are involved, but one is a small but noticeable number of sales lost to power. The purchase of one ultralight, say by two hang gliding friends, ties up the glider spending dollars of both friends for a couple years. Another more major explanation, we think, is that ultralight companies are doing a better job at promoting/publicizing their wares to the general public and airplane pilot community. Not that all those folks who buy ultralights would have bought gliders, still a few new customers lost here and there slowly begins to take its toll. The problem, as we view it, is partly that hang gliding promotes outside the sport very, very little. So *Whole Air* aims this issue at the Oshkosh attendee, hoping also to promote "free flight" to those masses. The balance of issues for 1982 will return to good ole hang diving. Returning to hang gliding right now, the contest scene is fresh again. 1982 began, I suppose we could say, with the Fort Funston Air Race, sponsored by Walt Nielson's Hang Glider Equipment Company. First place was captured by lovable Dan Raccanelli on Flight Designs' new Titan (more on this below). Second was also a Titan, followed by 2 Comets, and 2 Ducks. Shortly after this ridge running event, the SoCal League or manufacturer's meets began. Sixteen teams of 3 pilots each were fielded. Some were manufacturers, some schools, and some independent. Eight rounds were required to qualify for national points. The flying took place on May 8/9 and 15/16, and used what Uncle Bill called the "quiver system," meaning that you could fly whatever type craft worked best, with certification not required. The UP Team Cometed to first place, flown by Mark Bennett, Kevin Kirnihan, and Gene Blythe. Second was the Wills Team, with Kells, Meier, and Pearson Ducking ahead of the third place, X brand Delta Wing Team. Bennett was tickled as the otherwise effective "seed" system initially put his team in 14th place, only for them to emerge in the No. Three slot. While we're talking teams, the American Team for the American Cup in England has been decided, and are in Britain as this is written. The choice was Mark Bennett (Comet), Jeff Burnett (Comet), Bruce Case (Duck), Doug Lawton (Sensor 510), Chris Bolger (Demon), and Stew Smith (Duck or Sensor 510, but it seemed the 510 finally got the nod). We wish 'em well in beatin' the Brits. Got to keep the trophy in the U.S. after being out-flown the first two of three Cups. So to help contend with the talented English pilots, Americans will use ex-BHGA'er Brian Milton as coach. That should be interesting. The event is way north of London, so equipment had to leave early in June (to clear customs and be shipped north) if all was to make it to Yorkshire Dales by June 12-20. Of course, *Whole Air* will cover the event, with aerial photographs from US Team member, Doug Lawton, and English perspective by our British Editor, Noel Whittall. Go guys! (Sorry Noel.) On hot contests, the cool Masters has also gotten a date assignment. Joe Foster relayed news of a probable date fluctuation but the major competition will begin about the 14th or 15th of September. Many international pilots are expected. Yet another major is Grouse. The 6th Annual Grouse Mountain World Invitational Championships (why are the names always s-o-o-o-o long?). It'll be July 21-25 inclusive with a mandatory pilot's meeting on July 20. Cost is 175 US\$ or 200 Canadian\$ with sponsorship again by Labatt's Beer putting up a \$5000 purse with half of that rewarding somebody's first place finish. Contact Richard Blackmore at 604/733-4793 in West Vancouver, BC. Regionals are also popping up; (see Calendar, pg. 10) one such is Tennessee Tree Toppers (Reg. 10) on July 3/4/5. The one-on-one competition will use the remarkable new ramp at the club's Hensen Gap site (more on this bit of unorthodox construction in the Sep/Oct *Whole Air*). The club will also have its annual boat party bash the second Saturday in August. Finally in other contests, results were given to us on the Allegheny X-C Challenge saying Fred Booher took

the marbles on an X-180, furthering the reception to Bennett products since the X-series was released. Also the Carolina X-C Contest showed Tom Ives (Fledge) leading with a 55 mile flight from popular Tater Mtn on May 1st. Two days later, Stew Smith made 50 miles from Grandfather (a site record). It was a good day for G-father as the Team of Joe Foster, Aer Stephen, and Stew Smith accumulated 104 miles over the barren backside after each gaining 7 grand. Incidentally, the word is that only four Raven Awards are left. And if the word is raven, it's time to report that Wills Wing has finally retired their Raven, replaced by their Harrier II (see report, pg. 30) which is being received very well. More news from Wills is that development and testing are complete on the 160 Duck, with certification awarded in late May. Same is true for the 200 Duck, for pilots hooking in over 200 pounds. They think it'd be a handful for a lighter pilot in strong conditions. Great demand for Wills' Bulletpan harness is putting their accessory department in a several week backlog. But the long Duck flights are mounting as Pfeiffer got 101 miles for the first 1982 100+ voyage in So Cal. It puts Rich in the lead for the S.C. X-C meet. Then as we told you last issue, Bruce Case got 134 great circle miles in Minnesota to Iowa. And finally, Chris Sali flew a 177 Harrier I for 115 miles from 330 foot Cochrane Hill in Canada. Up the freeway to Pro Air, we could barely pull Dick Boone away from his order desk, as the relatively new company comes bursting alive. They've got something like a 60 glider backlog, mostly beautiful ProStars. Our conversation was over the upcoming Pro Breez pilot report, but the talk was put off till Pro Air can think about building an extra Breez for the purpose. Good for Boone and the boys (and girls). Uncle Bill has similar good vibes as his X-series really grabs a position in the new glider marketplace. Delta Wing is hearing from pilots all over America, raving over the fine light handling on the Xs. That newer activity (it's been awhile since Bill had a really hot glider — the Lazor was last) plus his efforts at developing some powered business with his trike is pulling Delta Wing back up the charts. See the DW Trike up-date on page 37. But in his usual cover-it-all fashion, Bennett has kept his accessory line active, too, with helmets, wheels, various, instrument deck blanks, and his new FM helmet radio gear. Further up the coast now gets us in the beautiful Bay area, where Tod Bomont's Stratus Unlimited company has released their newest, the Alto Stratus. See his new ad on page 9. "Alto," by the way, means "high" in cloud nomenclature, so high Stratus it is. Great handling with contemporary performance in an advanced double surface machine is the sales pitch for the Alto, and judging from our "priorities" survey (see *Statistics*, pg. 20), this combination should have Tod taking a few orders. While we're near the Bay, Flight Designs continues a lengthy, thorough reorganization following Marty Alameda's death. The helm is manned by ex-Wills man, Tim Morely, in conjunction with company prez, sky diver, Alan Levinson. They've a new Aero Deck in final stages, which sounds excellent for their Jet Wing and ultralight program. Tach, CHT, airspeed, altimeter, and rpm — all digital, and all for a remarkable \$225 retail. If this price holds, it'll really challenge the other couple deck entries, which have forecast \$500 retail prices, when ready. The Jet Wing is due to be quieted considerably by gear reduction drive, expected by the end of June. And their two-seater Jet Wing is also nearing completion. Not only motor schools, but hang glider schools as well, see a value in dual training. Imagine flying up to 5000 feet under power, throttling off, and gliding quietly down to 1000 or so (10 minutes minimum). With three repetitions before landing, a student could really be taught some basic controls and perception skills, eh? On the negative side at FD, the Titan will not be produced, problems ensuing with turn efficiency. And, somewhat connected with this is the resignation of Jean Michel Bernasconi, who leaves to pursue other ventures, undetermined as of this writing. No replacement is expected for his V.P. position at this time. While we're on personnel moves, two more top hang glider names have jumped the fence to motorized, as Tom Peghiny joins Flight Designs Manchester (Conn.) facility to finish their ultralight project (see news release, pg. 15). The other Tom departed Wills Wing, as Tom Price joins Eipper. He'll be assisting another hang glider name, famed designer Dave Cronk. Let's get out of the country to conclude *Product Lines* this issue. In New Zealand, Marty Waller and Tom Namias, directors of Pacific Kites say things are good and growing for the manufacturer of the Vampyr and Lancer. They've recently begun production of the 140 Vampyr, using an 80% double surface, floating bottom surface, and spanwise sail layout. All Vamps (140, 164, 185) are available factory direct from Pacific Kites; PO Box 45087; Teatato North; Auckland 8 New Zealand. But after giving their news, Waller informed us that Warren Bird's Flight Sails went out-of-business at the start of June. FS marketed the Shark, Sabre, and Santana, but we'll not be hearing from them anymore evidently. So long! Got news or opinions? Send 'em to Product Lines, Box 144, Lookout Mountain, TN 37350-0144.

BREAKING THE HANDLING BARRIER

X-SERIES

140 160 180 200

HGMA CERTIFIED
TO 1982 STANDARDS

A REVOLUTIONARY NEW BALL SWIVEL TIP (PAT. PEND.) ALLOWS THE SAIL TO ROTATE AROUND THE LEADING EDGES. THE RESULT IS A LIGHT, RESPONSIVE TIP ACTION THAT REDUCES PILOT INPUT. THIS BREAKTHROUGH IN GLIDER DESIGN HAS MADE DELTA WINGS X-SERIES THE LIGHTEST HANDLING, MOST RESPONSIVE, DOUBLE SURFACE COMPETITION CLASS GLIDER AVAILABLE.

ASK ANY PILOT WHO OWNS ONE, ABOUT THE WAY IT TURNS, ITS HIGH SPEED L/D AND THE WAY IT INCREASES YOUR AIRTIME! CHECK OUT ITS QUICK SET UP, QUALITY FITTINGS AND BEAUTIFUL SAIL WORK. GIVE "UNCLE BILL" A CALL. HE'LL BE PROUD TO SEND YOU A COMPLETE FACT SHEET AND TELL YOU ABOUT DELTA WINGS NEW ADVANCEMENT IN HANG GLIDER HANDLING.

DELTA WING KITES & GLIDERS (213) 787-6600 TELEX 65-1425 P. O. BOX 483, VAN NUYS, CA 91408