THE PERILS OF SKYTING

SAILCLOTH EXPLAINED BY THE EXPERTS

WHOLE AIR

The Magazine of Hang Gliding and Ultralight Soaring

July/AUGUST 1983 — $2.50

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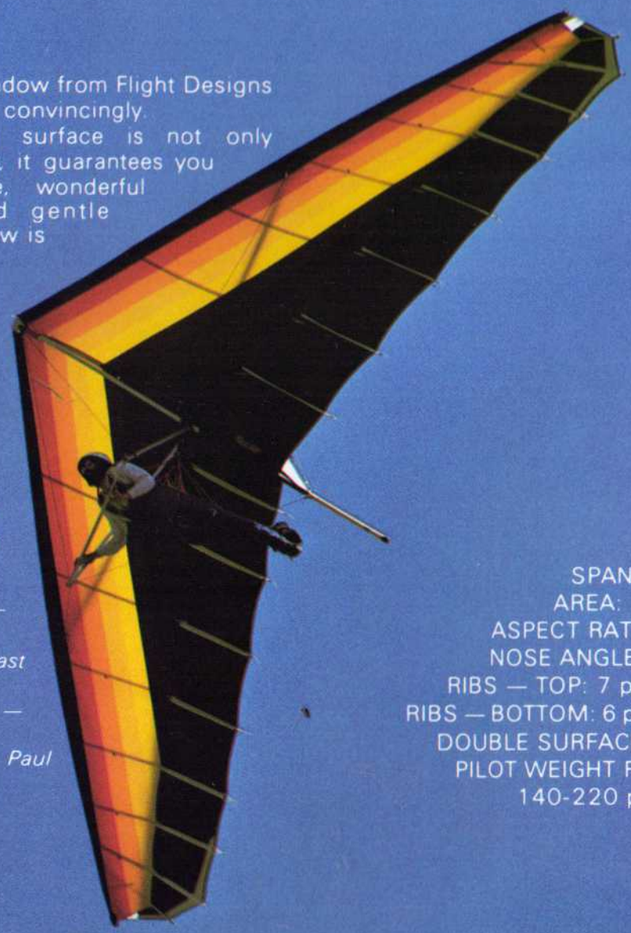
THE SHADOW

HGMA CERTIFIED, 1983



NEW for 1983½, the Shadow from Flight Designs outflies *all* prior models . . . convincingly.

Its detached lower surface is not only State-of-the-Art technology, it guarantees you an unbeatable sink rate, wonderful handling qualities, and gentle landings (which as you know is *not* "standard equipment" on all high performance gliders).

The Shadow's super-clean sail helps gain an excellent roll rate and an impressive top end speed.

The surprise? The Shadow's reasonable price tag . . . see your Flight Designs dealer soon!

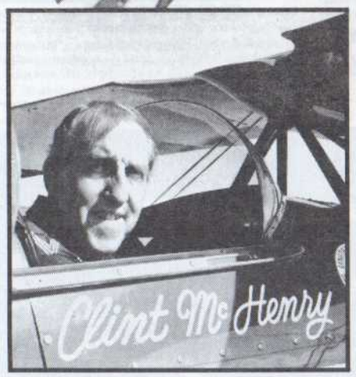
- *First Place — Region 6 — Derrick Turner*
- *88 Miles — Unofficial East Coast Record*
- *Fifth Place — Region 1 — Scott Rutledge*
- *5,000 foot Aero Tow — Paul Whitehill*

SPAN: 33 ft.
AREA: 173 ft²
ASPECT RATIO: 6.3
NOSE ANGLE: 128°
RIBS — TOP: 7 per side
RIBS — BOTTOM: 6 per side
DOUBLE SURFACE: 70%
PILOT WEIGHT RANGE:
140-220 pounds

GET BEHIND A SHADOW AND GET ON TOP!!

P. O. Box 1503 ● Salinas, CA 93902 ● 408/758-6896

WE'RE GOING FOR THE GOLD!



In the summer of 1984, the XII World Aerobatic Championships will be staged in Bekescaba, Hungary. It's an event that has often been called the Olympics of the Air. The United States team has always been there. With your help, and only with your help, our team will again bring us the honor of victory. We've done well over the years as a result of your contributions. Without your generous support, we have no way of getting there, no way of winning.

Help us continue our tradition of excellence in the world arena of competition aerobatics by being a Friend of the Team. Your contribution is tax deductible and your spirit will fly with us in Hungary.

Write us today for your symbol of support.

Clint McHenry, President
United States Aerobatic Foundation

AEROBATICS 500 CLUB Members receive the 1984 team jacket, an autographed color photo, team patch, decals with Friend of the Team Certificate.

AEROBATICS 100 CLUB Members will get a team shirt, color photograph of the team, a team patch, decals and Friend of the Team Certificate.

AEROBATICS 25 CLUB Members receive the team patch, decals and the Friend of the Team Certificate which is suitable for framing.

1984 Team Sponsor: Hilton Hotels Corp.; Associate Sponsor: Eipper Aircraft, Inc.

USA AEROBATIC TEAM ™

Mail To: U.S. Aerobatic Foundation, Box 229, Hales Corners, WI 53130

☐ Yes, I would like to support the U.S. Aerobatic Team in 1984.

Enroll me in the AEROBATICS___ CLUB; Jacket or Shirt size _____.

☐ check enclosed; ☐ bill me; ☐ charge my Visa or Master Card Acc.

Acc.#_____ Exp_____ Sign._____

Name:_____

Address:_____

_____ Zip _____

WHOLE AIR ISSUE NO. 31, VOLUME NO. 6, NO. 4, 1983

PILOT'S PERSPECTIVE

WHOLE AIR Magazine is published bi-monthly by Idea-Graphics, P.O. Box 144, Lookout Mtn, TN 37350-0144.

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FEATURES

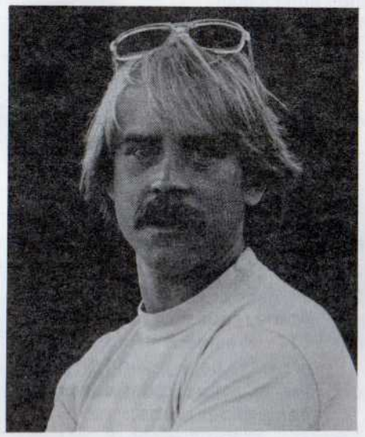
AERO TOPICS

Volume 6, No. 4, 1983
ISSUE NO. 31

On The Cover:

Harrier pilot, Chris Sali photographs a batch of ready pilots preparing for some good soaring at Cochrane Hill, the site operated by Muller Kites of Canada.

Publisher's Column



OOPS!

Does my chagrin show? It was our Fifth Anniversary Issue, a proud time in *Whole Air* history. A new look graced the cover, and our longest ever feature ("Accessory Buyer's Guide") filled eighteen pages inside.

But the date on the cover claimed it was our *second* March/April 1983 issue! It was *not*.

The cover is normally one of the last pages for which typesetting is prepared. For the past ten issues, only the date has changed. With our May/June 1983 issue, however, postal regulations dictated a revision. And to celebrate our Fifth Anniversary, we opted for a whole new format.

We are very pleased with its appearance, which gives us the chance to tell you what is in the issue, yet not clutter our cover photograph with writing, as do most publications. We even have a "safe" space for mailing labels, though most of you will have noticed that our mailing service covered up Gary Engelhardt's Duck anyway.

The point here is that due to this format change, we prepared the cover typesetting *first*. We had just completed the March/April issue, and the only explanation that makes sense is that yours truly (who does all the typesetting personally) thought we were still working on the March/April. Amazingly, the several proof readers who viewed the cover somehow *overlooked* the incorrect date, as we carefully examined the rest of the new changes.

Blush! It will *never* happen again. Not *that same* mistake anyway.

GLENN BRINKS

From humor to tragedy, it is my unhappy duty to inform you that Glenn Brinks was killed while evaluating an ultralight for one of his many articles.

An engineer, highly knowledgeable about much of what is happening in powered ultralights, Glenn was *not* a test pilot, yet *apparently* made a fatal discovery on a relatively new model. As with too many of these incidents, the facts are not clear, at least yet. The ultralight press will likely pursue the matter as they should, but for us, the loss is just one to lament.

A hang glider pilot as well, one-time Managing Editor of *Hang Gliding magazine*, Brinks was to fill many future *Whole Air* pages with the anxiously awaited results of our well accepted "Glider Owner Survey." We will all feel the loss, as Glenn's simple yet calculating style will not now tell us the good and bad of the machines we fly. May the spirit of his concern for quality aircraft soar ever upward.

Of course, we have enlisted other writers to release survey results. More delay is inevitable, however, as these persons begin again.

AERO TOWING

While we continue to speak of concern for the economics of modern hang gliding, the hopeful glimmer of aero towing has taken another significant step forward. An article is in the making, but our Centerspread this issue gives proof of the reality of successful flex wing (weight shift only) aero towing.

We too, read the *Hang Gliding* article of aero tow, and we are glad it ran. But aerodynamic control craft are more or less *expected* to tow satisfactorily. Now, Paul Whitehill and Flight Designs' colleagues, Ron Hess and Dan Murphy (photographer) demonstrate flex wing towing flex wing — Shadow behind Javelin.

With no prior tow experience at all, Whitehill took to the air with the greatest of ease, behind Ron Hess' piloting of the Jetwing trike. Using a Skyting bridle set-up and a fly-away-from-it wheeled carriage, Paul departed smoothly off the Castroville runway right up to 4,000 feet and enroute to Marina Beach, a few miles west.

The slower flying, single surface Javelin (28 mph indicated, under tow) on a trike provided not only the right speeds, but tug pilot Hess reported trim flying positions were experienced for both craft. It occurred to us that trike platform towing is like employing Skyting (center of mass) towing on that end of the towline as well.

While there certainly are pitfalls, known (see page 29) and awaiting, aero towing of flex wings is *here today!*

Congratulations are in order to the Whitehill and Hess team. Obviously . . . we *will* hear more on this, and you *Whole Air* readers will be the first to know.

Thanks,
Dan Johnson

FORUM

Dear Editor;

Here's some comments and observations and suggestions by a sled ride advocate.

Foot launch gliding has developed from ground skimming to high rise soaring; and the problem today in foot launch gliding is that high rise soaring has been developed to the neglect of the original ground skimming sled rides.

As the old timer responded when asked if he'd like a drink of Old Crow, "No! I don't want to fly. I just want to hop around a little bit."

So back to sled ride basics and broaden the base of foot launch gliding. How? Here's some suggestions.

Crystal Flight Resort should have franchise dealerships for use of their Simulator at other schools. Develop safety pods for ski lift type sled rides, gliding resorts. Pilot protective safety pod fairings would also improve pilot comfort, and would be useful for high rise soaring as well as sled rides.

Steve Hill and Jim Lee's Zia Dynamics ZD-1 rigid couch harness pod is a step in the right direction of making foot launch gliding a safer and more popular sport at least in a sled ride sense.

Can high rise soaring be imagined as a crowded sport?! Best of lift!

Edwin G. Sward

Dear Editor;

Thanks for printing my letter. It's nice to know you're listening.

Please keep the tow articles coming. Also, articles on European developments are fascinating.

Is anyone testing ballistic parachutes, reasonably prices for hang gliders? This could have saved a life at the Reg. 2 contest just completed (see "Product Lines," this issue).

Dennis Owen

More towing in this issue, and more on the way, Dennis. Also, we've a new plan for a regular column on European soaring news -- watch for it! —Ed.

Dear Editor;

Enjoyed the last issue. The equipment directory was a tour de force.

Noel Whittall

Dear Editor;

I am enclosing my completed survey even though I am just a beginner. But at least it's a response.

Incidentally, your March/April "Publisher's Column" has troubled me. I like *Whole Air* and I think hang gliding will be great if and when I learn to do it. But I'm worried about its future.

Want an opinion from a fresh (that is, ignorant) viewpoint? I think hang gliding has tried to go too far too fast. Too much emphasis on competition, performance, sophisticated (and expensive) equipment. We're forgetting the kid who can't squeeze the price of a Comet out of his paper route and who is the future of aviation, nonetheless.

I'm old, retired military pilot and all that; I don't count. But the young fellow does; let's pay more attention to him.

Ray Ward Taylor

Ray; we rather agree with your diagnosis of part of hang gliding's trouble. The way we view it — with over ten year's first hand experience — is that we needed new technology... badly, for most of our history as a sport. Each gain was a real help in the development process.

But a plateau we seemed to have reached, and higher, faster, further may no longer need to be our emphasis. Cross country flying, competition, aerobatics, and $2,300 gliders may not be the right direction . . . for continued growth.

We're worried about your "paper route kid," too. Has the industry forgotten that we offer "entry level aviation?"
(P.S. You do too count.) —Ed.

Dear Editor;

I'm writing this in an effort to help bring down the casualty rate of pilots who stall on take-off or near landing. This seems to be one of the greatest problems when looking at statistics.

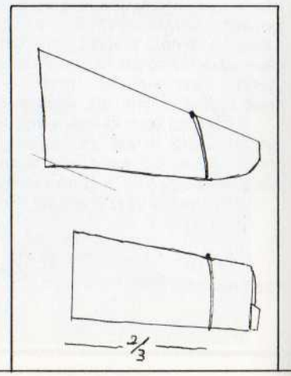
For several years now I have been testing and using Ram-Air-Tubes or R.A.T.S. on my glider. The R.A.T.S. act as stall fences to control the span-wise flow of the stall. A complete set (2) of R.A.T.S. weigh 3 to 5 ounces and can be put on *any* glider or ultralight. The R.A.T.S. are attached 2/3 (of) the way out from the keel or center section of the wing by using double stick tape. Each R.A.T. is custom made to fit each particular glider/ultralight. They are constructed of 1 ounce, zero porosity ripstop nylon. The R.A.T. is simply a 4" diameter nylon tube, sewn closed at the end, and attached to the top surface by double stick tape.

I've had many people test the R.A.T.S. over a period of time. We first tested them by attaching a R.A.T. to one side of the wing, then stalling the glider at altitude. Results? The R.A.T. side kept flying while the other side stalled and dropped. We also tested this on a Fledge II with the same result.

Please give them a try — *very little* weight — yet it will help control the stall.

For more information, write me at 4560 North Creek Rd., Girard, PA 16417; call 814/774-2924.

While any new idea should not be ignored, we question the true effectiveness of a tube rising only 1-1½" off the upper surface. But we are not engineers here at Whole Air, *and we'd recommend you seek advice from your glider manufacturer before any modification. Because of our interest in all new ideas, we present the R.A.T. idea, and will publish most others, with disclaimers such as this. —Ed.*



INDUSTRY NEWS

SERVICE BULLETIN DELTA WING TRIKE

Owners of Delta Wing Trikes are requested during *all* pre-flight inspections to carefully inspect the angle uprights at the engine strut junction.

Excessive working of this junction while the unit is folded down during transportation, may induce a fracture of the upright at the bolt hole.

Our field representative has found that during several thousand miles of travelling with the trike in the folded mode, the constant bouncing of the engine has produced fractures at the bolt hole.

Owners finding such a fracture should contact Delta Wing immediately at 213/787-6600.

Professional Hang Glider Pilot's Assication Formed

The PHGPA (Professional Hang Glider Pilot's Association) is off to a semi-late start, but is alive and well, and happy to provide some structure for those pilots wishing to compete in aerobatic competition. The PHGPA will also be trying to promote hang gliding as a sport through the vehicle of attracting spectator interest in aerobatic hang glider flying. This has much more appeal than the cross country type of competition which has become the standard.

Tentative dates and plans are laid for several meets this season:

JUNE 22-26 — World Aerobatic Hang Gliding Tour Qualifier, Salt Lake City, Utah

JULY 28-31 — Qualifying Meet for Telluride World Championship (top ten qualify) at Crested Butte, Colorado.

AUGUST 25-28 — Qualifying Meet for Telluride World Championships (top ten qualify) at Silverton, Colorado.

SEPTEMBER 7-11 — World Aerobatic Championships at Telluride, Colorado.

Also tentatively scheduled on the calendar for October are aeroabtic meets in Hawaii and Japan. These meets will be invitational only, based on the pilot seeding which comes out of the results of the meets scheduled above.

The plans lead to some fine aerobatic flying in excellent locations for aerobatics. But, as with all endeavors, it takes funds to produce a first class event. The PHGPA is seeking sponsorship, with a prime-the-pump-plan that should benefit all members of the PHGPA and hang gliding in general.

The plan calls for member pilots to join the PHGPA at a $100 cost. Anyone, pilot or not, is invited to join. The monies raised in this manner will be used to produce the qualifying meet in Salt Lake City, and will be used to promote the Association as well as the World Aerobatic Hang Gliding Tour for the purpose of signing sponsors and media interest.

Sponsors are directly sought for a $10,000 investment per meet. Member pilots of the PHGPA who can aid in this securing of sponsors can earn a 10% finder's fee, a relatively new wrinkle in sponsor development policies.

Each meet will charge a pilot entry fee which will be used to create prize money for that meet. All PHGPA sanctioned meets will require competing pilots to be PHGPA members. An organizational meeting will be held at each such meet, with minutes of these meetings mailed to all members.

The job of promoting professional aerobatic hang gliding as a sport worthy of sponsorship and media attention has already begun, and the interest level among potential sponsors and the media is already quite high. The PHGPA is an opportunity for all aerobatic interested pilots to get in on the ground floor, and to help shape its future.

All interested persons are invited to join immediately. Member dues sent to The PHGPA, 1208 H. East Walnut Street, Santa Ana, CA 92701. More information can be obtained through this address from principal organizers Chuck Dugan (see Nov/Dec 82 *Whole Air*, page 28) and Wills Wing President, Rob Kells.

Greater Redding Area Now Has Flight School

The Greater Redding area now has an established hang gliding school, The Hang Gliding Connection. The Hang Gliding Connection is owned and operated by two nine-year veterans of the sport, with certification in progress.

In a recent national publication, Redding was rated the second best place in the nation to live. Natives of the area have seen the growth, and Hang Gliding Connection owners, Phil Sergent and Robert Norris believe the have the availability of operating one of Northern California's larger schools. Redding is located in Shasta County, giving the company a population base of 100,000.

Ken Brown Wins Two California Coastal Races

Twenty one year old, Ken Brown proved himself the master of dune racing by streaking to consecutive wins in the Marina Steeple Chase and the Fort Funston Invitational Air Races.

Brown, entering his fourth year of hang gliding, flew a Streak 160 in good strong coastal conditions over the twelve mile course turning in a winning time of 19 minutes and 30 seconds, for an average speed of 36.92 MPH. Chris Bulger, also flying a Streak 160, sailed across the finish line in 22 minutes and 26 seconds to grab second place. Ben Reece's time of 25 minutes and 3 seconds earned him Third Place as he flew the Flight Designs' Titan. He finished in front of Mark Gibson on another Streak 160 with a Fourth Place time of 26 minutes and 46 seconds.

Ken then went on to set a new course record at the Fort Funston Air Races with an elapsed time of 9 minutes and 44 seconds over the five mile course. Seventeen seconds behind Ken's Streak, Mark Bennett dashed by on a 165 Comet 2. Third Place was a scant one second behind Mark's time of 10 minutes and 1 second, and Dan Racannelli whizzed across the finish line while flying a Streak 160. Rob Kells finished fourth at a 10 minute 27 second clip on a Duck.

Last year Ken Brown finished second in both of these sea side air races. This year he returned, set a record, and is the "master of the dunes."

George Hammond Perpetual Contest Reaches Third Year

The George Hammond Perpetual hang gliding contest in Santa Barbara enters its third year bigger and better than ever. This year, in addition to what many say is the most magnificent trophy for *anything, anywhere*, contestants will be vying for $1500 in cash prizes. Twenty five of the Santa Barbara area's finest pilots will compete for three weekends at three different flying sites. The final day occurs at the posh Santa Barbara Polo and Racquet Club before packed grandstands, local TV and possibly CNN news cameras.

George Fiske Hammond, for whom the perpetual trophy is named, began his flying career in 1926 and later worked and flew with Charles Lindberg. Claude Ryan, Wrong-Way Corrigan, Jessie Owen, Howard Hughes, Wiley Post, Amelia Earhart, Jack Northrop, and the Lockheed brothers (Lockheed Aircraft began in Santa Barbara) were but some of aviation's notables with whom Mr. Hammond flew and shared the wonders of aviation.

George Hammond lived to see the perpetual trophy and contest established and was present to congratulate the winners in the first year. Mr. Hammond died the day after last year's contest.

The pioneering spirit of George Fiske Hammond will be present during this year's contest as last year's winner, Robert Millington, defends his title against an even tougher group of flyers. Contest dates are June 25th, 26th, July 16th & 17th, and July 23rd & 24th.

For more information contact Ken deRussy's Hang Glider Emporium at (805) 965-3733.

George Fiske Hammond celebrates with winners and contestants of the 1st Annual Hammond Perpetual. Ridge in background is location of launch area/Mark Campbell

NEWS

CBS, ABC, and NBC Cover Girl's Physics Class

CHATTANOOGA, TN — For the third year in a row, Jan Cochran's senior girls' high school physics class has come to fly Crystal Air Sports' Hang Glider Simulator.

The Girls Preparatory School (GPS) of Chattanooga believes real experience aids the learning process. And all major television affiliates — CBS, ABC, and NBC realized this was newsworthy.

Each of the network franchises devoted major news stories after the 38 seniors discovered the effect of Bernoulli's Theorum, fluid dynamics, airfoil shapes, gravitational attraction and more.

"These classroom studies stay with a student much longer when you reinforce it with actual experience," reasons Instructor Cochran, who herself has flown the Simulator to the cheers of her enthused pupils. She continues, "With the safety built into Crystal's Simulator and its overhead cable, I can take my classes to go hang gliding, and be sure their parents are not concerned for their welfare."

Four news crews filmed the action on a beautiful spring day. Two of the television newscasters also took the mini lessons offered at Crystal Air Sports. All three affiliates presented significant length features, and all reported excellent viewer response. One appropriately named anchor person, Vicki Wing, used her flight and story as a day-long promotion for that evening's news.

The broadcast personalities and the students were all coached by a top instructor who helps the launch and follows the flight with safety brake handle in hand. Should the student enter a stall with inappropriate recovery, this instructor can remotely aid the effort via the brake and the tow rope attached to the rear of the custom made Simulator glider.

On the bottom at the sawdust landing zone, a second certified flight instructor offers control tips via radio. Upon landing, each student is helped out of the harness attachments. Post flight advisories are presented so that the student can increase learing insight on successive flights.

Instructor and Simulator Builder, Tom Phillips claims, "We've never had an unhappy face at the end of a Simulator flight. But very important to Crystal's training effort is the real environment flight knowledge that can be gained on our world's only Simulator . . . in complete safety. This aspect is vital for schools like GPS."

Several of the students were interviewed by the television reporters. Enthusiasm was obvious as they considered what they had learned on their field trip. One girl summed up the outing by saying, "I know the Junior girls can't wait till their day comes when they too (next year) will come out here to fly the Simulator. I think I'll save my money for more lessons this summer."

For more news information on the unique Hang Glider Simulator, write for a brochure at Rt. 4, Cummings Hwy., Chattanooga, TN 37409, or phone 615/825-1995 seven days a week.

Jim Johns Promoted to President

John Harris and Ralph Buxton, co-owners of Kitty Hawk Kites, Inc., announced the promotion of Jim Johns to President of Kitty Hawk Kites West, a hang gliding school and retail operation in Marina, California.

Johns, a five year veteran with the company, was hired as an instructor at the company's Nags Head shop in 1978, and subsequently advanced to Hang Gliding Manager. When the decision was made to expand to Marina, Johns was chosen to pioneer the operation.

His credentials are outstanding. He holds a USHGA Advanced Instructor rating and a Master Rating, the highest in hang gliding. While living in Nags Head, Johns held the soaring record as well as the distinction of being the first pilot to thermal out of Jockey's Ridge State Park. His accomplishments also include participation in the Cypress Gardens World Tow Kiting Championship.

In the past three years under Johns' professional leadership, Kitty Hawk Kites West has grown to become a highly respected center for hang gliding. According to John Harris, President of Kitty Hawk Kites, Inc., "Jim has done an excellent job with the Marina operation. He is largely responsible for preserving hang gliding in Marina State Park because of his work with the Park Service. He is well respected by the community because of his professional representation of hang gliding. We are glad to announce his promotion."

AERO MARKET PLACES

NEWS

Accessories Offered By High Energy Sports

Betty Moyer, Rich Pfeiffer, and Liz Graner have joined forces to form High Energy Sports. This company specializes in hang gliding and wind surfing accessories. Current products include: Travelite cocoon harnesses, Travelite stirrup harnesses, insulated cocoon harnesses, and insulated stirrup harnesses.

Pfeiffer, well known for his hang gliding accomplishments, is also a USA two-time sky diving champion and a master parachute rigger. Among his successful hang gliding designs are ballast attached to the harness, the "Flylite Harness," the "Bulletman" body fairing, both marketed by Wills Wing, and the parachute safety lock system.

Production manager and quality control supervisor, Liz Graner, has twelve years experience building parachutes and hot air balloons. In the industry, she is well known for her excellence.

With three years experience managing the successful Southern California hang gliding shop, Hang Flight Systems, Betty Moyer has a unique understanding of the problems and needs of retail dealers and customers.

To find out more about their current product line, write or call High Energy Sports, 2312 W. Second Street, Santa Ana, CA 92703, or call 714/972-8186.

Dealer inquiries are welcomed.

Owen's Valley Soaring Seminars

The Owens Valley Hang Gliding Center will present soaring seminars for pilots seeking to expand their knowledge and experience with mountain and cross country flying. Learn from the Owens Valley experts. An instructional session will be held each morning. Among the topics discussed will be: health and safety, high altitude considerations and oxygen equipment, advanced thermalling, distance flying techniques. After the morning session, the instructors will guide you to one of the fantastic Sierra, Inyo, or White Mountain flying sites. Daily lunches, and all transportation by four wheel drive is provided. The August 8-12 seminar is recommended for pilots wishing to fly at the height of the season, while the September 12-16 seminar is recommended for pilots seeking mellower conditions. Cost of the five day seminar is $275.00, and reservations are necessary.

Winners of the 1983 Hang Gliding Spectacular at Jockey's Ridge State Park: Kneeling: (center) Lawrence Battaile, 1st, Class I; (left) Terry Kennard, 1st, Class II. Above (left) Jerry Brown, 2nd - II; (center) Paul Gibney, 2nd — I; (right) Lester Billings, 3rd - I. Also pictured kneeling is Francis M. Rogallo, to many, the father of hang gliding.

NEWS

Pemberton, Walsh, & Gruener Enter Ultralights

A crew of Florida Flyers — part of the esteemed Florida expert tow pilot group — have organized a new ultralight company, High Craft Corporation.

The company is led by Bruce Pemberton, who brings with him a decade of ingenuity for mastery of metal fabrication and for pioneering tow hang glider flight in Florida. He had built several other prototypes before beginning production on the Buccaneer.

Jim Walsh and John Gruener are other principals in the company entry to the ultralight marketplace. They handle a variety of the many chores associated with bringing a new company into the fierce competition.

The Buccaneer is a conventional three-axis controlled aircraft sporting a high wing, providing excellent pilot visibility. The top of the line model is an amphibian, featuring retractable main gear and tail wheel, along with a fiberglass reinforced hull. This truly unique ultralight aircraft achieves its floatation stability on water by two sponsons mounted near each wing's outboard compression strut. This versatility allows the amphibious Buccaneer to taxi to or from land or sea for any type of launch or landing. The Buccaneer uses the increasingly popular Rotax, single cylinder model, and exhibits a favorable power loading even with this smaller engine.

For more information, contact High Craft at P. O. Box 899, Longwod, FL 32750, or phone 305/831-6688.

Pacific Kites Announces The Lowest Prices In The United States

An unusual announcement for any company today is a reduction in prices for desirable merchandise. Actually the cost of new wings from Pacific Kites of New Zealand is not a change in their pricing, but the result of a devaluation in New Zealand currency (also called a "dollar") relative to currencies elsewhere around the world.

The outcome is a retail price quote in US dollars of only $1295 for Pacific Kites' Vampyre Mk3, all sizes. The Vampyre is an 80% double surface, floating lower surface (sometimes referred to as a "split" or "unattached" sail) high performance glider. It has an excellent world wide reputation, and comes in 185, 164, and 140 sizes.

Competition results include a First in the Italian Nationals, First in the Owens Valley X-C Qualifier, and top places in the New Zealand Nationals.

The company also produces the original Lancer, now the IV model, and the new US price is mere $795.00. At this writing, costs of shipping and duty had not arrived from Pacific Kites.

Contact Tommy Namias for more information at P. O. Box 45087, Te Atatu, Auckland, New Zealand, or phone HSN 66-377. Dealers are invited to inquire.

NEWS

Big and Little Streak Certified by HGMA

In the May meeting of the HGMA Review Board — Mike Meier, Roy Haggard, Bob England, Bill Bennett, Mark West, and Dick Boone; attending — the Streak 130 and 180 received Certificates of Compliance. Packages submitted by Delta Wing were reviewed by the Board, earning approval for HGMA Certification.

Documentation of 50 MPH pitch test (but not drop tests) was also reviewed for both gliders. Subsequent presentation of documentation of the optional drop tests will qualify each glider for a "DHV" (German certification) endorsement.

The next meeting is scheduled for 10:00 AM on May 18th.

Mike Meier,
President, HGMA

Flight Designs Is Behind New Shadow

Flight Designs recently announced the release of their production Shadow high performance glider. The company has been developing the Shadow since early 1982, and only weeks ago finalized it with a detached lower surface.

The Shadow incorporates a new sail cut to optimize climbing performance, and with state-of-the-art pitch and roll pressure, the Shadow is, ". . . an excellent glider to fly in all conditions.

Combining a 70% double surface wing and an adjustable trailing edge tension, the Shadow has an excellent speed range while exhibiting superb landing characteristics.

Quick assembly and a reasonable retail price of $2,050.00, will make the Shadow ". . . a *must fly* before you buy."

The Shadow is available in three sizes: 153, 173, and 193 square feet. HGMA certification is pending, but all tests have been easily met in progress to date.

Contact a nearby Flight Designs dealer or contact the factory direct for a free brochure. Write them at Flight Designs, P.O. Box 1503W, Salinas, CA 93902, or call 415/758-6896.

Jetwing Passes "Test" as Aero Tug

Flight Designs is happy to announce the successful testing of the Jetwing Trike as an air to air tow plane suitable for towing high performance hang gliders.

Tows to over 4,000 feet above ground have been achieved with the Jetwing towing Flight Designs' newly released Shadow.

Contact your nearest Flight Designs dealer for more information on this latest development to the sport of hang gliding.

Cross Country Classic 1983 Update

Plans for the Sixth Annual Cross Country Classic are well under way reports the Owens Valley Hang Gliding Center. The tradition

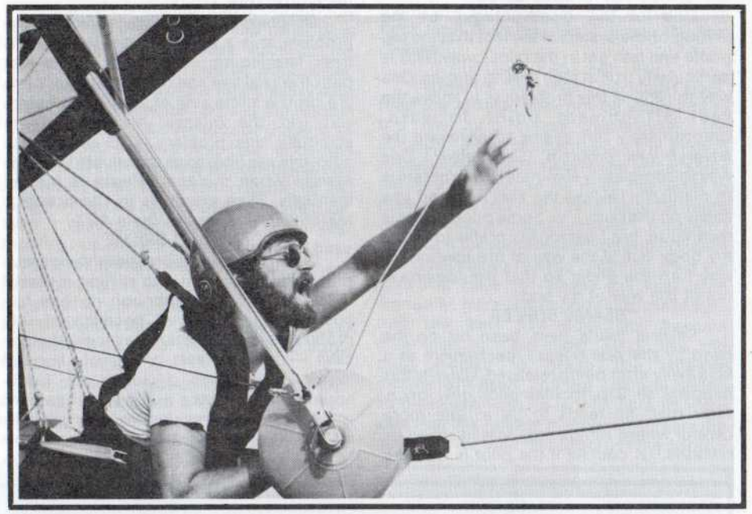
The tradition of presenting magnificent stained glass trophies for the top three pilots will continue. Janie's Ranch of Nevada will again offer a consolation prize. Pete Brock of Ultralite Products has offered too many contingency prizes to list, the organizer reports.

They have also received word that several pilots are working on one-of-a-kind secret ships for the unlimited class. Resumes still accepted for invitational positions. Entry fee is $395.00, with a $30.00 late fee for registrations after last June 1st.

Contest dates are June 30 through July 10, eleven days. For more information, contact Owens Valley Hang Gliding Center, 700 Airport Road, Bishop, CA 93514.

SKYTING

THE PITFALLS



In our continuing effort to promote towing, we cannot leave out the perils that are associated. In this installment, the inventor of skyting makes us aware of some of the pitfalls /by Donnell Hewett

Whole Air has published several articles about a new towing concept called Skyting. These articles have described how lockouts can be avoided, what characteristics an ideal towing system should have, and how the skyting technique is being adapted to many different forms of towing. In general, these articles have pointed out the advantages of skyting over other more conventional forms of towing. But skyting also has its disadvantages, and like any other aspect of aviation during its developmental stage, skyting has its own fair share of problems.

It is important for everyone who is considering skyting as an alternative, to be acquainted with these problems lest he inadvertently repeat the mistakes of the past. In this article we will discuss many of the problems associated with skyting, and explain how some of these problems have been solved and what is being done to solve the others.

LOCKOUTS

Whenever the words "towing" and "problems" are mentioned in the same breath, the first thing that comes to mind is the dreaded lockout. The lockout and its associated loss of control has long been recognized as the major weakness of conventional towing systems. (See Doug Hildreath's accident report in *Whole Air*, March/April 1983, and the corresponding reports for previous years.) But so far, no lockout has been reported on the skyting system, even though many potential lockout situations have occurred. (See *Whole Air*, March /April 1982 for an explanation of why lockouts do not occur while using a skyting bridle.)

BENT BASE BAR

In the early days of towing, when pilots towed from the center of the base tube of the control bar, the tow forces frequently bent the base tube. To eliminate this problem, pilots began using special heavy duty control bars. But more recently pilots have been using the three point bridle system, which attaches to the corners of the control bar instead of the center of the base tube. Skyting of course eliminates this problem by attaching the towline to the pilot, instead of the control bar.

BUCKLED GLIDER

Again, in the early days of towing, gliders were known to buckle under the excessive tow forces which were sometimes encountered. Conventional towing systems have eliminated this problem by using winches and reels which feed out the towline whenever the tension tries to exceed a certain preset limit. Some skyting systems also use winches and reels to maintain constant towline tension, while others use "dynamic control." But the only sure way to guarantee that excessive towing forces are never encountered is to utilize a weak link. This is one of the essential elements of any true skyting system.

RELEASE LOCATION

The original skyting release mechanism is activated by pulling on the sleeve of the latch attached to the pilot's center of mass. Several pilots have found this release location to be very inconvenient. They feel that it is unsafe to take their hands off of the control bar in order to activate the release. Therefore,

The "three ring" release system, considered by many to be the most fail-safe of systems available.

When the tow line passes on one side of the pilot's head, and the release line passes on the other, a dangerous situation can develop.

release systems have been devised which are either activated by a lever on the control bar or by pulling on a release line held in the pilot's hand. (See examples in the March/April 1983 *Whole Air*.) There is no hard evidence to indicate which of these release positions is actually the safest. Therefore, at this time, it appears that the preferred release location is simply a matter of personal choice.

RELEASE RELIABILITY

The original "horse bridle" release mechanism used in skyting has received a considerable amount of criticism because it is not of "aircraft quality." As the tow forces increase, this release becomes harder and harder to activate. Without a weak link, it is possible for the tow force to become so great that the release cannot be activated. Although no such failure has ever been reported, several pilots have begun experimenting with the "three-ring" release system which has proven to be so successful in skydiving. It is my opinion that eventually this three-ring release — or variation thereof — will become standard skyting equipment. At this time, however, skyting bridles with three-ring releases are not available commercially.

[Editor's Note: More than one company are currently working on exactly that — a commercially available three-ring release — and we will supply their address when the product is tested and ready.]

FINGER SANDWICH

Sometimes when the pilot releases under tension, the release mechanism is pulled through his fingers so fast, that it "eats a few of his fingers for lunch." Although no one has ever reported actually losing a finger, the experience can still be quite painful. The solution to this problem, of course, is to reduce the towline tension before releasing, or else utilize one of the release mechanisms described above.

TOP BRIDLE LINES

One of the disadvantages of the skyting bridle system is the fact that the top bridle line can get in the pilot's way. This is particularly true at high towing angles. One way to reduce this problem is to move the keel attachment point forward. Unfortunately this seems to agravate the adverse yaw problem. (See below.) One way to completely eliminate this problem is to manually release the keel line and tow solely on the body line. Some pilots like this technique, but I personally prefer to rotate my body out of the way of the towline, or else turn the glider so that the towline is out of the way of my body.

BEANIE BOPPER

Several pilots have been hit on the head by the keel release mechanism as it falls away after being released. Usually this happens to a particular pilot only once. After that, he tends to be a little more careful where things are located when he releases. Of course, if the pilot is wearing his helmet as he should be, there is no real damage done. Nevertheless, I hear that the experience is less than pleasant. The solution to this problem, of course, is to make sure that the keel line is no where near the pilot's head when he releases.

THE HANGMAN SYNDROME

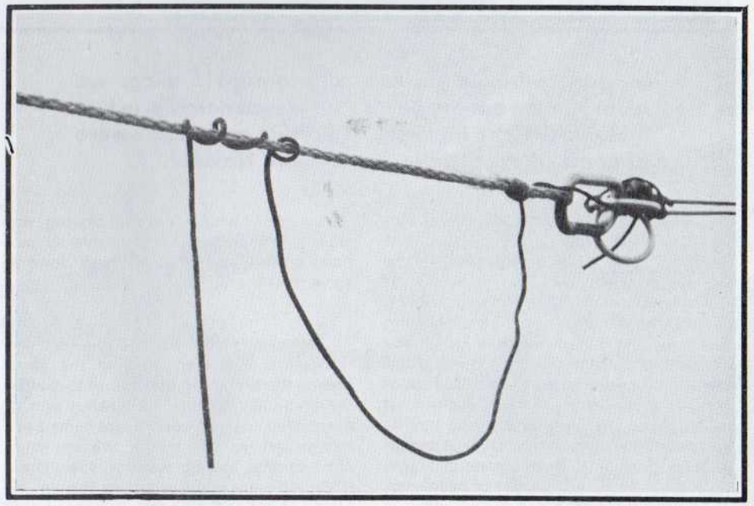
The original skyting system uses an auto-release line which runs from the bridle junction ring to the keel release mechanism. This line automatically activates the keel release when the pilot trips his body release.

Now try to imagine what happens when the pilot tries to release himself while the keel line passes to one side of his head and the auto-release line passes to the other. Yep, you guessed it! As the top release falls away, it catches on the pilots neck and tries to take his head with it. Needless to say, most pilots find the resulting flying position somewhat uncomfortable.

Of course, if you are aware of the problem, it is a simple matter to keep this from happening: simply make sure that both the keel line and the auto-release line are on the same side of your head before you trip the release. Another way to eliminate this problem is to reverse the auto-release line, so as to activate the body release when the keel release is tripped manually. (See examples in the previous March/April issue of *Whole Air*.)

TANGLED BRIDLE

One of the most potentially dangerous problems associated with skyting is that of the tangled bridle. Although no one has been seriously injured because of this problem, several pilots have received close calls — and at least one pilot received minor injuries as a result of bridle entanglement. Since bridle entanglement is most often the result of releasing with a slack towline, a pilot should take care when he is releasing to make sure the keel line



On release, the trigger line, or the tow line can entangle around the main tow line, the release(s) itself, or the glider's cables.

does not touch the glider anywhere.

One proposed solution to the tangled bridle problem is to use an extension line between the keel and the keel release mechanism. By placing the release mechanism below the flying wires of the glider, there is no danger of it ever becoming entangled upon release. Another suggestion is to use a lighter release mechanism (one, two, or three rings) so that there is less danger of the bridle ever becoming entangled with the glider.

BOTTOM BRIDLE LINE

One of the major disadvantages of the skyting bridle is the fact that at certain tow angles, the bottom bridle line must pass directly through the base tube of the control bar. This is, of course, impossible, so at the beginning of the flight, every pilot has to decide whether to pass the bottom bridle line over his base tube or under it. In either case, he may find that at certain portions of his flight, the bottom bridle line interferes with the pitch control of his glider. If the line passes over his base tube, then it may prevent the pilot from ever topping out. But if it passes under his base tube, then it may force him into a hard climb during the early part of his flight. So the general rule is, pass the bridle line over the control bar base tube if you want to stay low, but pass it under the control bar if you want to get high.

In order to reduce the pitch control problem associated with the bridle line rubbing against the base tube, it is important to keep the towline tension to a minimum. If the towline tension is excessive, then the pitch control problem can become quite severe. But if the tension is limited to that required for a reasonable climb rate, then the pilot can override the pitching tendency.

PREMATURE AUTO-RELEASE

If the auto-release line is improperly adjusted for the particular glider/pilot combination, then it is possible for it to release prematurely. When this happens, the keel line is eliminated and the full thrust of the towline is transferred to the pilot's body. This disrupts the glider's trim and causes the nose to pitch-up. If the pilot is caught by surprise — and this is usually the case — then it can be a very frightening experience.

The solution to this problem is to re-adjust the auto-release line until it functions as designed. The alternative is to watch the auto-release line during the flight and to notice when it is becoming tight (and therefore likely to trip the keel release).

AUTO-RELEASE FAILURE

Whenever the towline becomes slack, then the tension may not be adequate to trip the auto-release mechanism. The solution to this problem is for the pilot to release while the towline is still under some tension. (Of course he does not want to release with too much tension or he might wind up with a "finger sandwich" problem.)

But if for some reason the auto-release line does fail to release properly, then the pilot will have to release the keel latch manually. Here is is important to make sure that the keel line does not become entangled with the glider. To do this, the pilot needs to grasp the release mechanism itself, and not just pull on the auto-release line. He is then able to make sure that the release mechanism clears the glider rather than falling across the control bar or flying wires and becoming entangled.

TENSION GUAGE

One of the major problems in using dynamic control (instead of a winch) to regulate the towline tension is the absence of a reliable guage to indicate the tension in the towline. A spring guage is normally used for this purpose, but its accuracy and reliability leaves something to be desired. Eventually, someone is going to design a really good tension guage and this problem will be solved.

NO WEAK LINK

Since conventional towing is usually performed without a weak link, many pilots have begun skyting without using a weak link. One such pilot now has a broken leg, another almost crashed into the water while recovering from a whip stall, and another pilot who was opposed to using a weak link (but was pressured into using one by his friends) changed his mind when his feed-out winch jammed and his weak link broke, saving the situation.

Without a weak link it is possible for the tow forces to become so strong that some other component of the towing system (towline, release, bridle, glider, etc.) breaks. In conventional towing a lockout usually occurs long before a component breaks, but in skyting something usually breaks before flight control is completely lost.

The solution to this problem, like that of the buckled glider problem, is to use a properly designed weak link — one that permits a reasonable climb rate without breaking — but also permits the pilot to retain control of his glider in the event that it does break.

ADVERSE YAW

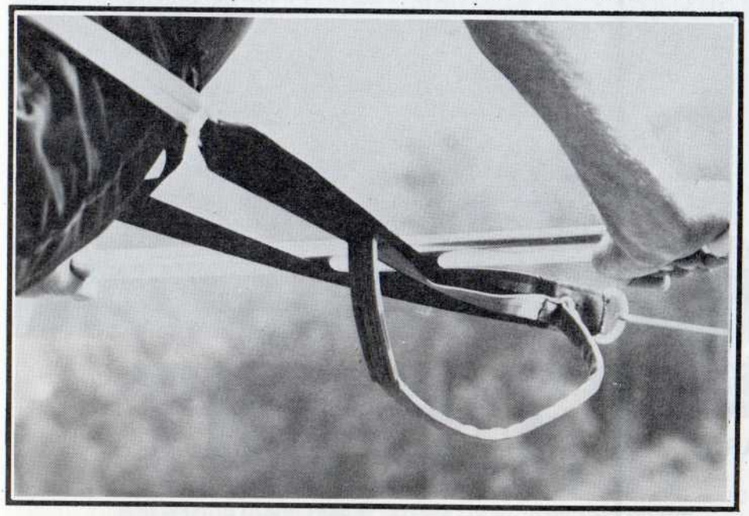
In my opinion, the greatest control problem in skyting is due to the adverse yaw phenomenon. The situation here is similar to that experienced in free flight except that it is more pronounced. When the pilot tries to turn the glider in one direction, the nose of the glider yaws in the other direction. Eventually, of course, the glider comes on around but sometimes not before the pilot becomes overly concerned.

Certain makes and models of gliders seem to be more susceptible to this adverse yaw phenomenon than others. Specifically the phenomenon is most noted among modern floating crossbar gliders, gliders being towed to fast, and gliders with the keel attachment located too far forward. As pilots become more experienced on the skyting system, their ability to handle this problem seems to improve. Nevertheless, glider control is not as easy on tow as in free flight.

A theoretical solution to the adverse yaw problem has been proposed, but the "jury" is still out. We will have to wait until experimental confirmation of the theory is obtained before we can be sure that the problem has been solved. Of course, if the theory is invalid, another solution will have to sought.

OVER CONTROL

A problem closely associated with the adverse yaw phenomenon is that of over-controlled oscillations. Whenever the



When the skyting bridle passes under the control bar — as it does when being ground towed — the glider's geometry is changed during initial climb, forcing the nose higher than the pilot may desire, one of the potentially dangerous situations.

adverse yaw tendency is strong, there is also a strong tendency for the pilot to over compensate. Therefore, when the glider finally does come around, it does so too fast and too far. As the pilot reverses his control input, the glider yaws in the opposite direction. The process repeats itself over and over as the pilot goes into an over controlled oscillation. Sometimes the amplitude of the oscillation increases to such an extent that the pilot has no other choice but to release from tow.

Several pilots have reported some rather frightening first flights because of this over control problem. It is interesting to note that this tendency to over control is most prevalent among experienced conventional towing pilots. The reason for this is probably due to the fact that they are used to supplying the strong control inputs required by conventional towing systems. Pilots that have never towed before seem to have less difficulty in adapting to the light control input required by the skyting system.

The solution to the over control problem is probably the same as that of the adverse yaw phenomenon. As a pilot gains more skyting experience, he can learn how to handle the over-control problem. But it is going to take some design changes before the glider handles as well on tow as it does in free flight.

EQUIPMENT

One of the biggest problems with skyting today is the lack of commercial quality equipment. Almost everything being used is either homemade, prototype, or a modification of conventional towing equipment. But efforts are being made to solve this problem and hopefully it will not be too long before high quality skyting equipment is available.

INSTRUCTION

Another major problem with skyting today is the lack of professional quality instruction. In fact, I know of only one USHGA Certified instructor who is teaching students on the skyting system. (If there are others they have not been communicating with me -- see address at end of article.) This situation is obviously less than ideal and if it does not change soon, someone is bound to get badly hurt. Fortunately, as skyting gains acceptance, more and more certified instructors are learning to use the system. Again, we can hope that it will not be too long before qualified skyting instruction is available is most localities. In the meantime, I recommend that pilots exercise extreme caution when learning to use a skyting system. In fact, if you have waited this long to use the system, why not wait a few more months and learn from a qualified professional?

LACK OF INFORMATION

Of all the problems associated with skyting, the information problem is probably the greatest. Except for the *Skyting Newsletter* and *Whole Air*, almost all skyting information is being transmitted by word or mouth. As a result, there is a tremendous amount of misinformation floating around. I personally have been appalled at some of the rumors that I have heard. There are too many pilots who seem to believe that with "the new bridle system" anybody can tow safely. But I hope that this article has convinced you that even with "the new bridle system" there are a lot of mistakes you can make and a lot of problems you can rediscover if you use the skyting system without "doing your homework."

As a pilot you owe it to yourself to learn all you can about any "new towing system" before you decide to try it.

You are welcome to write Donnell Hewett directly or through Whole Air.

Whole Air Magazine
P. O. Box 144
Lookout Mtn. TN 37350
(Write -- Att'n: Towing)

Donnell Hewett
315 N. Wanda
Kingsville, TX 78363

THE T.T.T.

Answering many reader letters for information on the successful hang gliding club, the president of the Tennessee Tree Toppers gives an overview and an offer to respond to specific inquiries/by Rick Jacob

The Tennessee Tree Toppers is a socially oriented club, USHGA Chapter 60, located in the Chattanooga, Tennessee area. This club traces its origin to March 1974, when the Old Man of the Mountain, Dick Stern, purchased a glider "kit" from Flight Systems of Sylmar, California. This glider introduced hang gliding to East Tennessee. The club's name is directly related to the tree covered mountains that provide us with the fine flying sites we now maintain. Many a member is a full fledged "Tree Topper" after finding himself perched in the top of a tree, waiting assistance.

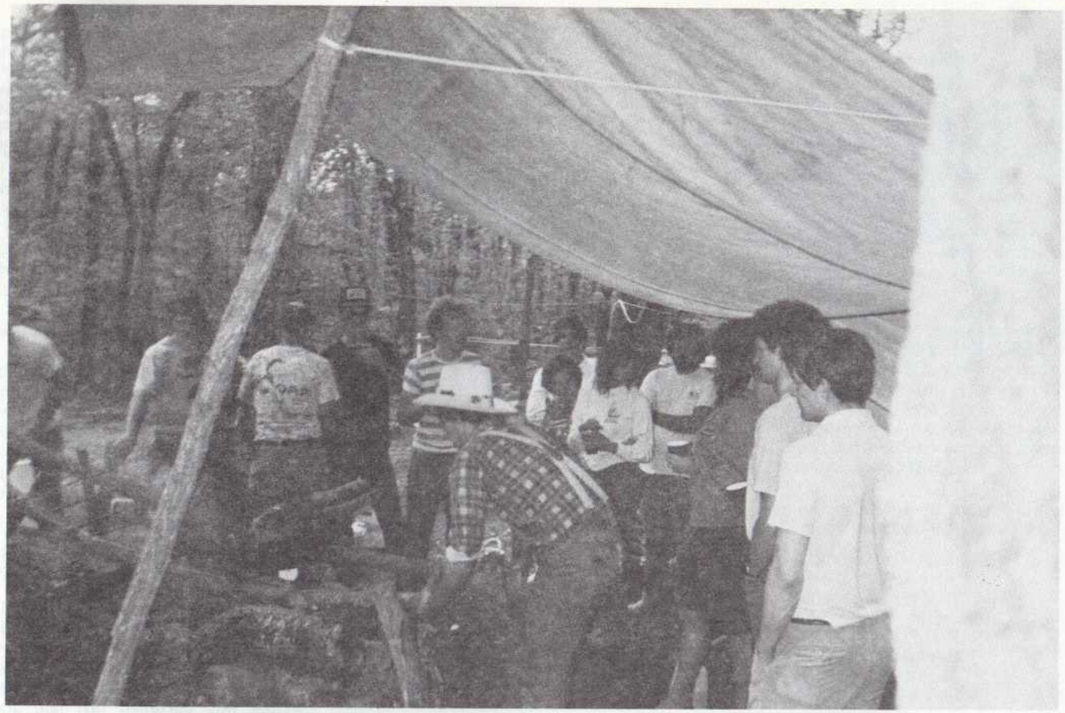
At the present time the TTT (Tennessee Tree Toppers) regulates a total of four flying sites, all within thirty miles of Chattanooga. A continuous search for sites continues, especially seeking a southwest facing launch. Our premier site is Hensen's Gap (Northwest), a four acre, club owned, 1450 foot launch complete with the world's only Radial Ramp (Nov/Dec 1982 *Whole Air*). The abundance of landing areas makes this northwest launch an excellent Hang II/Novice site. Camping is available free of charge to members at this site.

Raccoon Mountain, with its 900 foot cliff launch is the oldest TTT regulated site, located within the western city limits of Chattanooga. This launch is now reached by a four wheel drive shuttle. Tram car service was curtailed last fall, due to operating expenses and a high insurance premium. Recent developments point to a good possibility of renewed tram operation. The landing area is located adjacent to the Crystal Air Sports Pro Shop. Commercial camping is available at this Hang II/Novice site.

The Whitwell site, which faces southeast, is a club owned, one acre cliff launch. A new ramp is now in the design stage and should be completed before long. The club has a five year lease on the landing field. Limited camping is available on top at this Hang III/Intermediate rated site.

Signal Mountain is a relatively new southeast facing site that the TTT regulates. Both the launch and landing field owners are very enthused about the sport of hang gliding. The launch is located in an exclusive, brow side residential area, which present potential problems. The landing area has apartment complexes on the north and south sides, but the presence of a golf course to the east and the size of the field is reassuring on approaches. Due to the congestion of the area and the lack of alternate landing areas, this is a Hang IV/Advanced site. It is rather traditional for TTT sites to remain IV/Advanced rated till a mass of experience shows III or II rated pilots will have no difficulties.

In order to maintain our current sites and to purchase new sites whenever possible, the Tree Toppers requires a site fee. This fee comes in three forms. Annual



membership dues are $30.00 per year. Annual membership entitles one to a vote in the running of the club, and the opportunity to compete for club prizes (beginning in 1983, $1,000 cash). Annual members also receive the TTT Newsletter, which is sent out bi-monthly. Temporary passes of $5.00 for three days and $10.00 for ten days are available for visiting pilots. These are the only fees collected for full use of the TTT sites.

A regulatory program has been devised to rate a pilot's skills and to establish a managable structure in which to control the sites. Clearances are obtained from TTT Clearance Officials. Pilots are rated by a system comparable to the USHGA rating system. Proof of ability, a log book, or clearance official's observation, et cetera is necessary to insure a proper rating. Color coded helmet stickers are issued with each clearance.

Club by-laws have been established to provide guidelines under which the club operates. The President, Vice-President, and Secretary/Treasurer are elected in a general election conducted through mail-in ballots during the month of November each year. The new officers assume their responsibilities on February 1st, beginning with the club's fiscal and operating year. A Board of Directors is appointed by the president. These eight members provide services that are necessary for the club to operate. Board Members also chair various committees that are established as needed.

Tree Topper sites are maintained primarily through the efforts of the thirty-plus local members. Other than the reward of working *with* fellow pilots *for* fellow pilots, members are "paid" for their services through the "TTT Bucks Program." For each hour of volunteer labor, a member is given a "TTT Buck" (a facsimile of the American dollar). These Bucks are applied toward lifetime membership in the club. Various club offices are "paid" positions. Five hundred bucks (American or TTT) are required for lifetime membership.

One example of the tremendous volunteer effort put forth by the club, is the Radial Ramp, which graces the Hensen's Gap site. Over one hundred hours of design and pre-construction effort went into this ramp. Smoke tests were conducted and video taped, a scale model of the center section was built and tuft tests were run to determine the correct angle for a good laminar air flow. The construction project itself took approximately one thousand man hours, most of it under soarable conditions, and a financial expense of $2,500.00. The finished project has been featured on the front page of the *Chattanooga Times* Sunday Edition, appeared in *Whole Air*, and has an insured value of $10,000.00. All this was accomplished through the volunteer efforts of local club members.

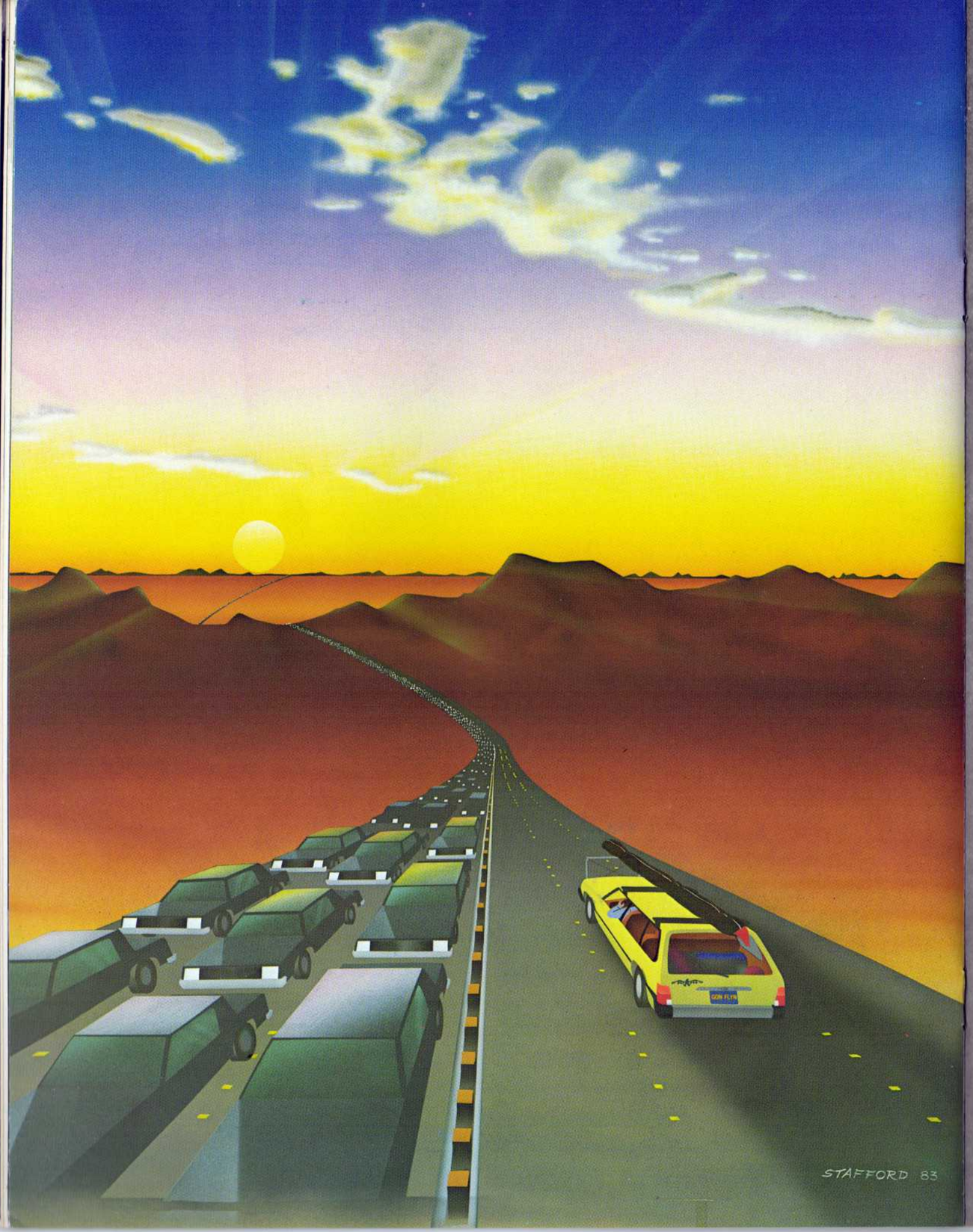
As originally stated, the TTT is a socially oriented assortment of pilots, many of whom live as far away as Florida, Michigan, and California. In order to bring pilots together, two competitive events are held each year. Both the MAYHEM and Oktoberfest Fly-ins are fun oriented experiences. Tasks to test all skill levels are used to provide a weekend of fun flying. Saturday night finds the members and guests well fed on barbeque and all the brew one wishes to consume. Oktoberfest '82 found the top nine finishes in each class awarded prizes valued in excess of $450.00, that had been donated by area merchants and restaurants. The entry fee, which includes the meal, has been raised from $5.00 to $10.00 for MAYHEM '83 in order to raise money for the USHGA's World Team Fund.

In addition to regularly scheduled club meetings, Friday night volleyball, and fly-ins, the TTT tries to have a social gathering each month. These gatherings allow the out-of-town members a sense of belonging that would otherwise be missed.

In 1982, the TTT's annual membership numbered 188. An additional 434 clearances were issued. Only two citation were issued for violations of TTT Regulations in 1982, a good record considering the number of pilots that utilized the sites.

This is just a brief summary of what the Tennessee Tree Toppers is and how the club operates. If you desire additional information, please contact me through the Tennessee Tree Toppers, P. O. Box 136, Lookout Mtn. TN 37350. §

The Flight Designs' team of Paul Whitehill (on Shadow) and Ron Hess (Jetwing tug) are photographed by Dan Murphy as they all fly toward Marina Beach, California. [Inset] A fly-away-from-it wheeled carriage facilitates a "loaded" take off.



ex•cep•tion•al

adj - **1:** forming an exception: RARE, UNUSUAL. **2:** better than average: SUPERIOR.

FOR TEN YEARS, WE'VE BEEN BUILDING QUALITY AIRCRAFT FOR EXCEPTIONAL PEOPLE TO REALIZE THEIR DREAMS OF FLIGHT.

SAILCLOTH

SAILCLOTH

SAILCLOTH

One of the industry's leading experts on sail cloth technology tells you . . . Everything You Always Wanted to Know About Hang Glider Sailcloth, and More/by Steve Pearson, Vice President of Wills Wing/illustrations compliments of Dimension Sailcloth

"Dacron" is Dupont's trade name for polyester yarn, which is used almost exclusively in the sailcloth industry. The specific structural characteristics of stabilized Dacron fabric are very unique and impressive. The performance, durability and safety of the gliders we fly probably depend more on this remarkable cloth than any other structural material used in the glider.

Most of the differences between "Factory Gliders" and normal production gliders is attributable to fabric selection. You seldom see factory pilots competing on a normal 3.8 ounce sail. I said seldom, instead of never, because at Wills Wing, Mike Meier and Rob Kells often choose a stock 3.8 ounce sail. I usually prefer a Mylar sail. The point is, we choose a fabric for a specific set of flight and performance characteristics.

There are dozens of fabrics on the market that are suitable for hang glider applications and they vary quite a bit in strength, price, durability, and weight; four things which are important to you. To a certain extent you can participate in the fabric selection. The material presented in this article is intended to help you make an educated selection.

Before I get to the fabrics themselves, I am going to give you a little history of the products, suppliers, and the different procedures involved in manufacturing the fabrics.

MANUFACTURERS

There are two large manufacturers and suppliers to the Hang Gliding and sailing industries.

HOWE & BAINBRIDGE

Howe and Bainbridge has been supplying fabric for sails since 1917 and, until recently, has totally dominated the industry. They started out with cotton and canvas fabrics and pioneered a lot of the technology of the synthetic fabrics which were introduced in the 60's. Ten years ago when Wills Wing started in business, they were the only supplier for the fabric we use. They did not have any competition because the finishing processes are proprietary.

Which leads us to their current competition . . .

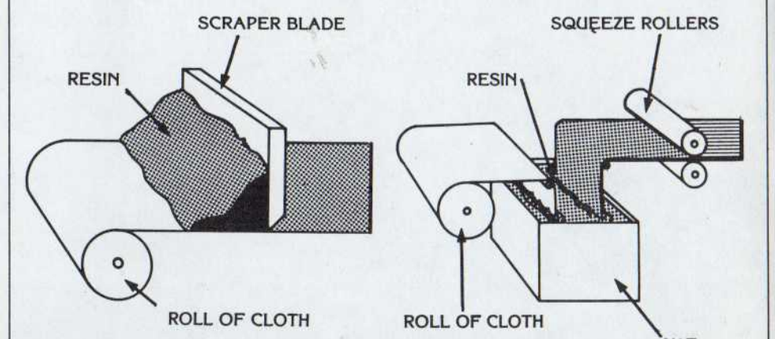
DIMENSION SAILCLOTH

Dimension was started in 1977 by a group of talented, aggressive people from North Sails (a *very* large sail loft) and . . . you guessed it — Howe & Bainbridge. They are a very progressive, service oriented company and they have worked very hard and have been very successful at providing a high quality, competitive fabric line.

SAILCLOTH

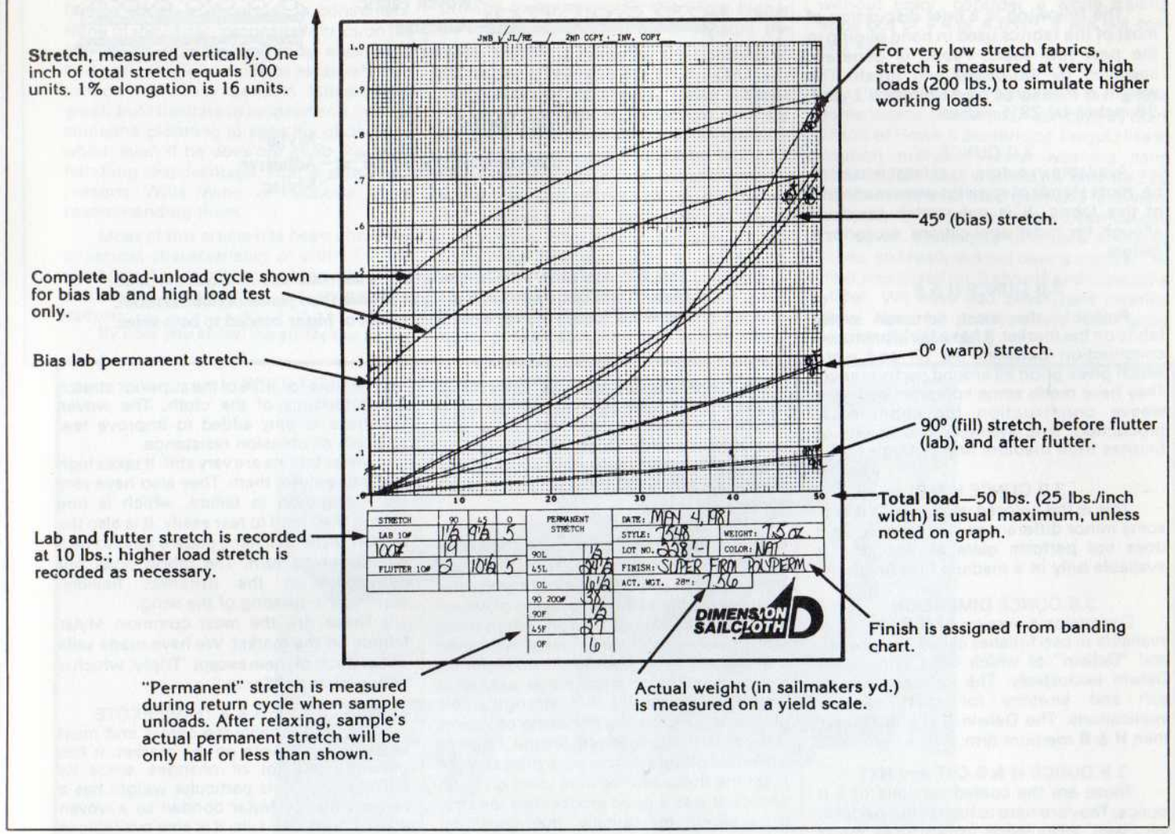
The individual characteristics of different styles of cloth which are significant, and which you should be familiar, can be classified as follows:

1) Stretch



Duroperm are coated with resin. Coating tends to make the resin form a film like sheet on top of the cloth making it more stable by bonding the weave. Duroperm fabrics tend to be very stiff but have minimum stretch.

Polyperm fabrics are impregnated with resin. Impregnation drives the resin into the weave structure bonding adjacent yarns together internally. Polyperm fabrics tend to be softer, more pliable and more adjustable than Duroperm fabrics.



2) Durability
3) Weight
4) Finish
5) Tear strength
6) Cost

All of these are related, but I shall try to keep the explanations simple. The following explanations apply to 100% woven fabrics.

The *Stretch* is primarily determined by:

1) The *Weave Density*. Measured in thread counts in two directions; the "fill" and the "warp." The fill is short axis of the cloth and the warp is the long axis.

2) The *Yarn Size*. The size of the individual threads in the fabric.

3) The *Finish*. How much and what type of resin is applied to stabilize the cloth.

Each company has testing procedures used to evaluate the performance of these fabrics. Every time H & B or Dimension runs a dye lot (typically 2000 yards or more) they test the fabric by cutting long rectangular strips from the fill, warp, and bias directions (typically +/- 1" by 20") and load testing them. The data is typically plotted on a graph of load vs. stretch. The stretch is measured in 1/100th of an inch increments. In addition they test samples which have been fluttered (whirled around for 30 minutes to simulate abuse and wear).

For a given weight of fabric, a denser weave with smaller yarn size will generally perform better for our applications. The stretch along the warp and fill axis may not be better, but the stretch on the bias (diagonal) will be less. The bias direction is always the weakest in woven fabrics. The performance of a fabric in this direction is very important to us.

A discussion of the factors affecting *Durability* would include the weight of the fabric, the type and amount of resin in the finish and the fabric style.

Generally, conventional woven fabric styles, in heavier weights, with medium firm to firm (normal to slightly stiffer) finish, live the best. Most of the more exotic fabrics are more fragile. They often have poor abrasion resistance, tear easier, and, in the case of Mylar composite fabrics, are sometimes subject to delamination and/or have poor ultraviolet resistance. However, depending on the care they receive, they can perform well for years.

Fabric Weight is a large percentage of the total weight of your glider. The difference in weight between a sail constructed out of 3.8 ounce and 5.3 ounce cloth would typically be four to seven pounds.

The types of *Finish* on sailcloth can be divided into two different categories:

1) Impregnated
2) Coated

Impregnated finished fabrics are permeable. The resin is applied to glue the thread together in the matrix in which they are woven to "stabilize" the fabric. All of the general purpose and colored fabrics on the market have this type of finish. Two examples of *Coated* fabrics are H&B "CYT" (conditioned yarn tempered) and Dimension "Duroperm." These fabrics are coated on one side with a layer of very tough, very low stretch resin. They have excellent structural performance, sometimes even better than the mylar fabrics, but are very stiff and hard to handle. They also have poor tear strength.

Tear Strength is usually a cut-and-dried straight tradeoff. Better performing, lower stretch fabrics usually have poor tear strength often requiring extra doublers (reinforcement "patches"). This is because the firmer finishes hold the threads in their woven matrix so they are torn one at a time. The softer finishes allow the cloth to deform a little to form a multi-thread ripstop effect.

Cost depends on many factors such as

availability, popularity, manufacturing techniques, and weight. Generally, heavier fabrics and tighter woven fabrics cost more.

The following is a brief discussion of most of the fabrics used in hang gliding in the past few years. Fabric is generally specified by its weight and finish. The weight is measured on a sailmaker's yard: 36 inches by 28½ inches.

3.0 OUNCE

Available in colors, or at least it used to be, most standard rogallos were made out of this fabric. It is not stretch resistant enough for most applications on today's gliders.

3.8 OUNCE H & B

Probably the most common white fabric on the market, it has a fairly balanced construction between the fill and warp which gives good all around performance. They have made some compromise in the weave construction for economical production. It is available in a variety of finishes from medium firm through CYT.

3.9 OUNCE H & B

This is the colored version of 3.8 with some minor differences in construction. It does not perform quite as well and is available only in a medium firm finish.

3.8 OUNCE DIMENSION

Dimension's version of 3.8/3.9, it is available in two finishes called "Polyperm" and "Delwin" of which Wills Wing uses Delwin exclusively. The Polyperm is too soft and stretchy for most of our applications. The Delwin is slightly firmer than H & B medium firm.

3.8 OUNCE H & B CYT and NYT

These are the coated versions of 3.8 ounce. They are hard to handle but perform very well. Wills Wing usually uses mylar fabrics when we want the structural characteristics these cloths have to offer.

3.8 OUNCE DIMENSION

This is Dimension's "CYT" or coated finish.

4.4 OUNCE H & B

This is H & B's premium woven fabric. It is simply the tightest, best performing fabric they can make. They describe it as, "Weight for weight the strongest filled non-Kevlar fabric in the world. Tight fabric. Strong bias." It is available only in white, but a variety of finishes.

4.5 OUNCE DIMENSION

This is Dimension's version of H & B's 4.4 ounce fabric. Both of these fabrics cost about one and a half times as much as the normal 3.8 ounce fabrics.

There are at least two dozen other fabrics which these two companies make in these weight ranges. For example Bainbridge makes their 3.8 fabric (which they call BSDS) in 2.2, 3.0, 3.3, 3.8, 4.5 4.75, 5.5, and 7.25 ounce weights. All these are called "Genoa" style. They also make "High Aspect Mainsail" and "High Aspect Genoa" and "All Purpose" styles, et cetera. Of course each fabric is also available in a wide variety of finishes. This does not even include any of the Mylar, Kevlar, experimental, or other exotic fabric styles available.

Top, the most often seen laminated fabric with one side cloth and the other Mylar. Top Right, a sandwich of Mylar between two panels of cloth. Bottom, a scrim of loosely woven cloth with panels of Mylar bonded to both sides.

The other popular fabrics you have seen are the Mylar composites. They are a combination of one or two layers of polyester film (Mylar is Dupont's polyester film) bonded to one or two layers of woven substrate of Nylon or Dacron. When these fabrics were introduced most of them were constructed of two layers of thin Mylar (½ mil or less) bonded on either side of a woven substrate for tear strength. This caused the severe delamination problems Bill Bennett experienced on the Phoenix Six series gliders, which were probably the first time these fabrics were used on hang gliders. It was a good progressive idea but it backfired. Incidentally, that particular fabric was manufactured by Noah Lamport, I think, and later came to be known as "Garbage Bag" in the sail industry. I was not implying that the other sailcloth manufacturers have not had problems. The next time these fabrics were *marketed* on a production glider they had other problems. All the Ultralite Products "OVR" 1's turned yellow and generally seemed to have problems with severe ultraviolet degradation. I emphasized *"marketed"* because Wills Wing made a Mylar fabric evaluation glider right after the Harrier was introduced, and did not have any problems with ultraviolet degradation . . . it just started delaminating at all the seams after six months. It *seems* that most of these problems have been taken care of, but one thing to remember is that most of these fabrics are designed for sailboat racing, and usually are not used for more than one season. No one has enough experience to guarantee their service life for our application.

Today's fabrics usually have one layer of Mylar to avoid the "I beam" effect of two layers, which was most responsible for the delamination problems. They also have a higher percentage of Mylar film, usually 1.5 top 3.0 mils thick. The Mylar film is responsible for 90% of the superior stretch characteristics of the cloth. The woven substrate is only added to improve tear strength or abrasion resistance.

Mylar fabrics are very stiff. It takes high loads to deform them. They also have very low elongation to failure, which is one reason they tend to tear easily. It is also the reason Mylar sail hang gliders tend to be a lot harder to turn. The fabric does not participate in the dynamic, flexible, asymmetric twisting of the wing.

These are the most common Mylar fabrics on the market. We have made sails out of each of them except "Triply" which is very similar to "Scrim."

3.7 OUNCE H & B TEMPERKOTE

This is probably the oldest and most versatile composite on the market. It has undergone a lot of changes since its introduction. This particular weight has a two mil film of Mylar bonded to a woven substrate on one side. It is also available in various other weights with one to three mil films of Mylar and different weights of substrate.

Dimension makes a similar fabric to Temperkote, but I am not sure what is currently available in this style.

H & B SANDWICH

Right now, this is the most popular composite fabric for hang gliders. It is available in two weights. One has two mils and the other three mils of Mylar, sandwiched between two lightweight woven layers. Sandwich owes much of its popularity to its conventional look and feel. The 2 mil weighs over five ounces, but does not have any better structural performance than 3.4 ounce Temperkote.

DIMENSION TRIPLY

This fabric has two layers of Mylar bonded on each side of a coarsely woven scrim cloth. They do not seem to have delamination problems because the Mylar is actually bonded to itself between the voids in the scrim. The result is a "ripstop" composite. It works well. It seems to perform well and probably would be more popular if it did not look so unconventional.

H & B SCRIM

Similar to Triply, Scrim has only one layer of Mylar bonded to a layer of scrim.

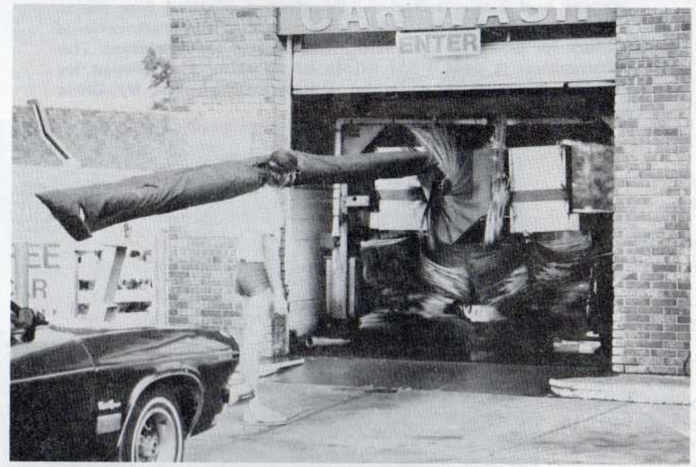
One final point on all these exotic fabrics which is important to consumers. None of the Mylar composite fabrics on the market have been used long enough in hang glider applications to establish their service life. They perform (structurally) great, but I hesitate to recommend them to someone planning to keep his glider for a while, even if he does not mind the flight handling disadvantage. That is one of the reasons Wills Wing is cautious about recommending them.

Most of this article has been about the structural characteristics of cloth. For the most part, I have left hang gliders out of the discussion. Now comes the recommendations.

By now you know; the stiffer the finish, the lower the stretch of the cloth (comparable raw greige goods to begin with). Resistance to stretch allows for higher sail tensions. Higher sail tensions provide lower twist and therefore higher performance. For the same reason; the stiffer the cloth, the stiffer the handling of the glider. If I were to design the optimum hang glider fabric, I would make it about the same stiffness as a medium firm 3.8 ounce, but 100% elastic up to an ultimate strength as good as a 2 mil Mylar fabric. In other words, a lower modulus of elasticity, but an ultimate strength as good or better than today's high performance Mylar composites. You might be able to do something like that with a Nylon film composite. The closest fabrics to that ideal are H & B 4.4 ounce or Dimension's 4.5 HP. They also turn out to be the most durable in terms of tear, abrasion, and overall abuse resistance. If you do not mind stiff gliders, and you normally get a new glider every year or so, you should consider Mylar. If you are on a tight budget, or cannot live without color, consider a white trailing edge out of 4.4 or 4.5 HP. It will not cost you extra.

SAIL CARE

I have enclosed as part of this article some words of advice on sail care by Mark Olson of Howe & Bainbridge. I would like to caution everyone about washing hang glider sails. I once washed my favorite 220 XC sail with mild detergent and lukewarm water, in my bathtub. It had been caught tail down, assembled in a gale at Torrey Pines, so I really did not have a choice. The mud was caked on. It *shrunk* and ruined the glider. We have had other sails cleaned since then by professionals with good results. *Be Careful!* §



SAIL CLEANING

by Mark Olson, of Howe & Bainbridge

For most problems such as common dirt, dried or caked salt, et cetera, try scrubbing the surface with a soft bristled brush and liquid detergent. Avoid harsh powder detergents and stiff brushes, as they may damage the finish or stitching. This approach should work nicely for most applications, more severe stains can be taken care of by the following:

BLOOD

Soak the stained portion for 10-20 minutes in a solution of bleach (Clorox) and warm water, generally 10 parts water to 1 part bleach. Scrub and repeat, if necessary. Rinse thoroughly, particularly nylon and dry completely.

OIL, GREASE, TAR, AND WAX

Warm water, soap and elbow grease seem to be effective. On hard stains, propriety stain remover and dry cleaning fluids should do the trick. Be careful to remove all fluids, as they can soften the various resinated coatings on sailcloth.

RUST AND METALLIC STAINS

These types of stains are very often the most frustrating and difficult to remove. First scrub with soap and water and apply acetone, M.E.K. or alcohol. As a last resort, you might try a diluted mixture (5%) of oxalic acid and soak 15-20 minutes. Hydrocloric acid 2 parts to 100 in warm water will also work.

MILDEW

Hot soapy water with a little bleach will generally prevail, After scrubbing, leave the solution on the fabric for a few minutes and rinse thoroughly. When using bleach a residual chlorine smell may be present after rinsing. A 1 percent solution of sodium thiosulphate (photographer's hypo) should remove all chlorine traces. Here again, rinse and dry well.

PAINT AND VARNISH

Acetone and M.E.K. should remove most common paint and stains; varnish can easily be removed by alcohol.

Temperkote or mylar sails are still new and experimental. At this point in time, avoid most solvents, as they can damage the fabric over a period of time. Soap and diluted bleaches should take care of most stains.

Use all solvents with care. Always rinse and dry thoroughly. It should be emphasized that nylon ripstop spinnaker fabrics are less durable and more sensitive than their polyester counterparts. Bleaches and solvents can ruin nylon if not used properly.

MICRO GLIDERS FOR MINI PILOTS

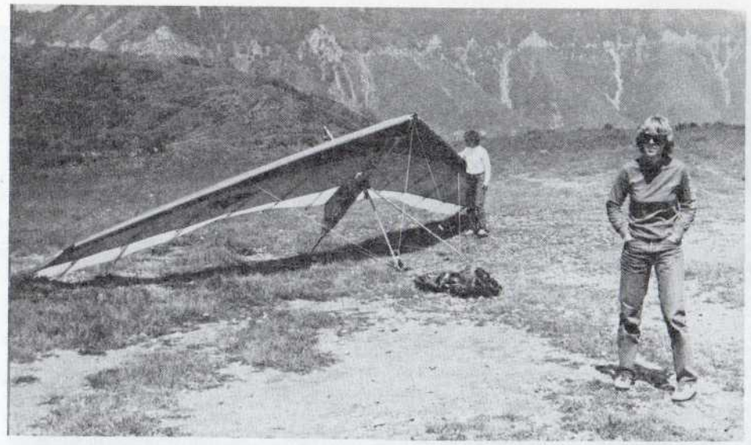
Marcey and Diane toured the Southwest, visiting four major builders in search of information on smaller high performance gliders for pilots of light wing loading and small stature. The information is useful for pilots of all sizes and shapes/by Marcey Gillespie and Diane Dandeneau/photos by Chris McClure

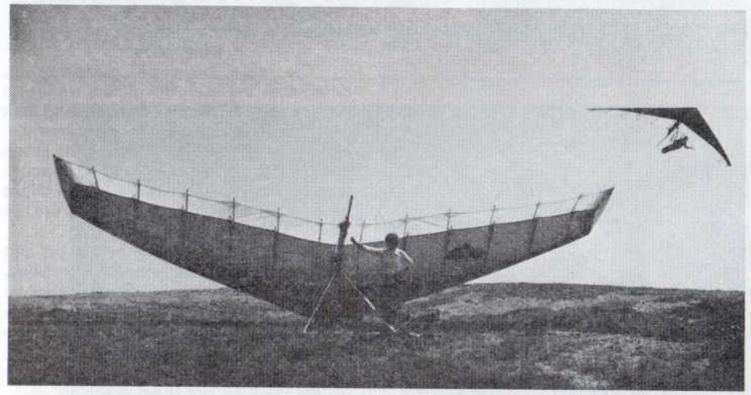
Small pilots have been the neglected minority in hang gliding for many years. Up until the appearance of the Ultralite Products 135 Comet, we had little choice in a high performance glider. Then came the Delta Wing 140 X wing and the Progressive Aircraft 130 ProStar.

Finally the manufacturers are responding. UP should have the 135 version of the Comet II sometime this summer. But now at this very moment, we have three new gliders on the market: the 130 Streak, the 130 Duck, and the 130 ProStar II. The intent of this article is to familiarize small pilots with these three new gliders and possibly help them in their choice of a new "hot" ship.

Pilots of small stature have some special problems with hang gliding. Just getting the thing off the top of a 4 X 4 can be a tiptoe affair. The weight of a glider is a definite consideration when the low end of the pilot weight range encompasses 100 pounds. Lifting, ground handling, and launching something that weighs almost as much as you do can wear you out before you even get into the air. Launching and landing can also be a problem with large control bars and slack wires. Small people usually have shorter arms and can have trouble running with the glider on rough launches, and that "punch it hard" landing flare. The more vocal complaints have gotten comments like, "Ballast up." or "Stay out of strong conditions, pipsqueak!" Advice well taken when your wing loading is only 1.1 (lbs. per square foot) or 1.2 on a stiff turning supership.

Diane Dandeneau and Marcey Gillespie have flown the new gliders and herewith offer their findings, facts, and opinions. Diane is an advanced rated competition pilot who has been flying a double surface glider over a year (135 Comet). Marcey is an intermediate rated pilot recreational pilot who has been flying primarily single surface gliders. They are both Texas pilots and have recently completed a two month southwestern United States hang gliding odyssey.

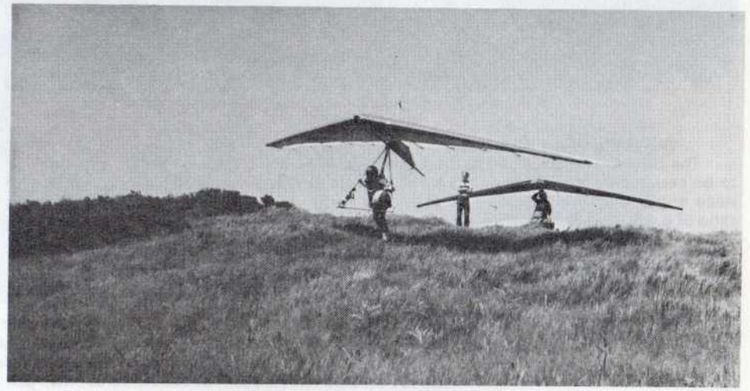


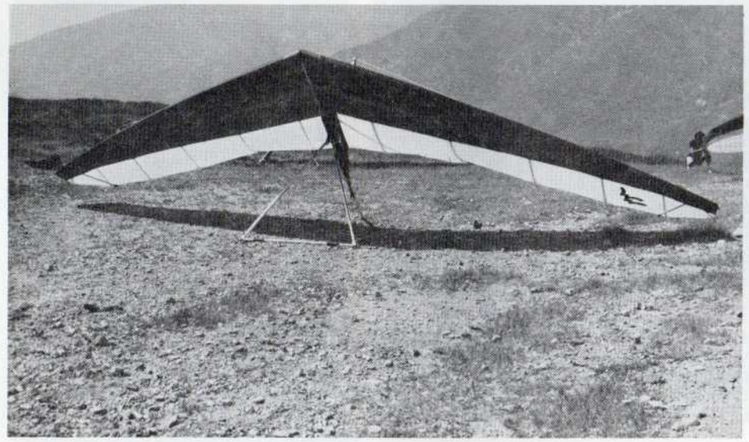


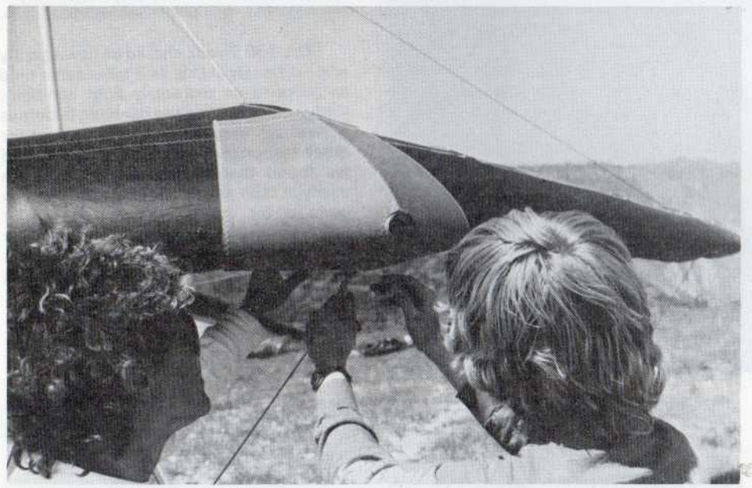
The 130 Streak should be flown gently and cautiously at first as it takes some time to adapt to its extremely light handling. With a little practice the handling becomes a pleasure. Very little input is needed for quick response. Speed builds *rapidly* and we found that the Streak will oscillate easily at high speeds. It also tends to yaw quite a bit a low speeds. The glider thermals easily using yaw and roll to produce a flat turn. Landing the Streak is no problem if you allow plenty of room the first few times.

The Delta Wing 130 Streak

This glider is one of the newest in design and the first of the three to be certified by the HGMA. The Streak has a 133° nose angle, a span of 29'6" and an aspect ratio of 6.6. It weighs 56 pounds with a pilot weight range of 90-190 pounds and retails for $2,250. The Streak takes a little longer to set up and tear down than most gliders. This reflects the fact that both upper and lower surfaces are fully battened. The double surface is separated which allows for easy inspection of the frame. The hardware is standard Bennett Delta Wing issue. Numerous wear spots are padded and reinforced. The foam leading edge makes the airfoil very clean. The Streak has a scaled down control bar that makes ground handling and launching controllable.







The Wills Wing 130 Duck

The Duck was the second of the three to be certified by the HGMA. It has a 130° nose angle, a span of 29' and an aspect ratio of 6.45. It weighs only 50 pounds and retails for $2,095 with custom colors and the new mylar nose cone. This glider has the simplest and easiest set up and break down using the clean Wills Wing hardware. There is a zippered opening for airframe inspection. The overall look is very clean with a tight, well-made sail. The Duck is also the lightest and easiest to ground handle. The small control bar allows positive control during launch. The Duck is a very solid feeling glider with light to moderate bar pressure and good response. Control is very predictable on this ship though it does have a slight tendency to yaw at low speeds. The glider is very stable at high speeds and seemed to have excellent speed retention. The Duck tracks well in thermals with no tendency to roll in.

We had, on the average, better landings on the Duck than with the others, but this was probably due to our experience on gliders with similar landing characteristics.

The Progressive Aircraft 130 ProStar II

The 130 ProStar II certification package had not been completed at this writing. It has a 124° nose angle, a span of 29', and weighs 57 pounds. The aspect ratio is 6.39. Pilot weight range is 100-165 pounds and it lists for $2,095 with custom colors. The airframe is interchangeable with the 130 ProStar and the 140 ProAir.

The Progressive Aircraft sails are turning out quite nicely with imaginative custom inlays. The split double surface allows close routine frame inspection. The small control bar and snug wires again allow for easy ground handling and launch.

Control pressures are light with quick response. The glider has no tendency to yaw at low speeds or oscillate at high speeds. Turns require little pushout for coordination. Landing was no problem on the ProStar II if you allow plenty of room for the double surface glide.

Summary

The side by side performance differences between the gliders we found were negligible. There was no glaring best or worst in any aspect of performance, including: sink rate, best glide, glide at top speed, or top end speed itself. With more time on the gliders in stable air, we might have found something more concrete, so this is opinion and not fact.

All the gliders could be set up and broken down by one small person. Many pilots at Crestline became hysterical when we were setting up. They would snatch them up and run around holding the gliders over their heads yelling, "It's a toy, it's a toy!" But all were inpressed by the gliders once we got them in the air.

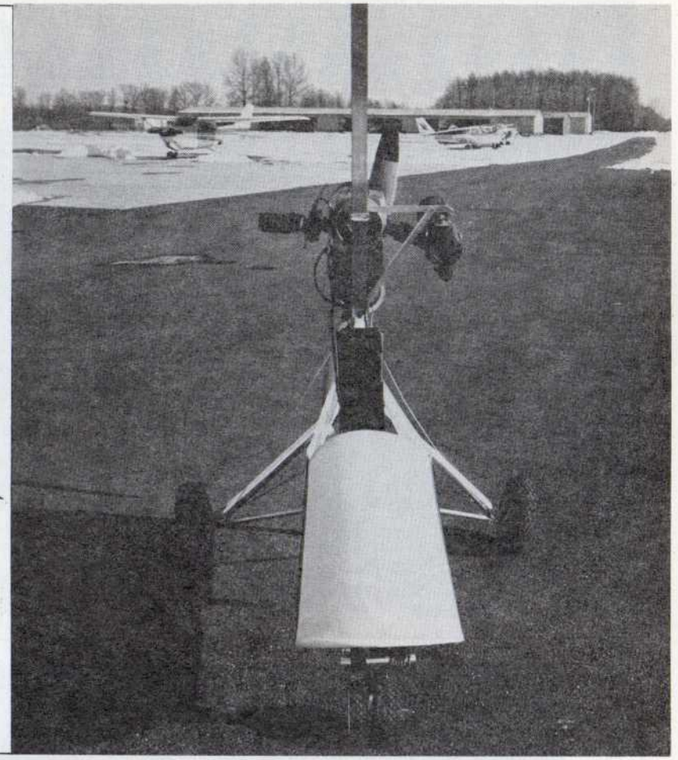
Depending on what you are flying now, one may be more comfortable to fly than another. Some may require more time to wire into than another. Personal preference will prevail. So, if possible, fly before you buy.

One thing that must be noted is that all the small gliders are different than their big brothers. Besides being smaller in span, weight, and square feet, the aspect ratios are also lower. The small gliders do not necessarily fly like their big brothers. Because they are smaller, the aerodynamic characteristics have changed somewhat. Keep that in mind when listening to large version pilots talk about their gliders.

Postscript

We would like to thank all the manufacturers for their cooperation in making the gliders available to us for our evaluation.

A micro glider and mini pilot . . . !? Well, just kidding, actually. Here, Randee Laskewitz of Chattanooga is seen holding an ultra-micro glider (while kneeling on her shoes). The Flight Designs built model was donated by Crystal Air Sports for use by the State of Tennessee in its World's Fair Pavilion last year.



CANAJAN, EH?

What do Molson's, air monkeys, holy smoke, ski poles, and Jamo have to do with a chilled start to cummie chasing? It's a Canadian Season Opener/by Douglas Madeley/illustrations by Albert Prisner

During a normal working week, I usually start the day around 6:45 AM. This particular morning, the phone rang at 8 AM, and woke me from a near coma. After the initial shock and trying to find the phone under piles of clothes, I picked up the reciever, putting the mouthpiece to my ear.

"Gidday!" a voice yelled into my mouth. "What do you think? From my window it looks like it's blowing straight west at 15-20 kph."

Grasping my reeling senses, I gurgled into the earpiece, "What's going on? Who is this and what do you want?" Then, without waiting for a reply, I hung up, rolled over, and went back to sleep.

Less than a minute had passed when the phone rang again. "Hey, listen, it's Ian. Wanna go flying?"

What a silly question. The night before I had checked the weather maps, figured it would be a dandy day for some flying, and phone my buddy, Ian Ewens, to tell him the good news. Neither of us had flown since the Great Race in Chattanooga, and the air monkey on our backs was getting mean and ugly as the weeks went by with no flying. Did I want to go flying? *Of course I did!*

There was but minor problem. My best friend, Jamo, had arrived in town the previous evening, and we had done a superb job of promoting Molson Breweries Ltd. until the wee hours of the morning. So, after a quick medical analysis, I decided that another two hours of sleep was what the doctor ordered, followed by 2,000 feet A.T.O. After telling Ian to pick me up at 11:00, I slipped blissfully back into unconsciousness, dreaming of thousand fpm thermals and big cummies.

When Ian arrived around 11:30, I was fresh as a daisy, and we loaded up the divers. Surprise, somehow the Harriers had gained about 50 pounds each since the last time we hefted them. Ian and I looked at each other and concluded that we would have to join a fitness club if we wanted to be in shape for the flying season.

The weather in Ottawa this winter has been quite unusual, with very warm tempertures. The poor snowfall has meant better than average early-season flying conditions. Normally the temperature in February hovers far below zero, and there is a lot of snow. It's not very appealing, even for air junkies. But on this day, February 24, 1983, the temperature was a balmy +3°C. And the wind was west at 18 kph.

I ran back into house and woke Jamo, our wuffo for the day. After dressing him, I threw him into the back of the van. "Let's go to Champlain Lookout, kids," Ian growled and we were off.

Champlain Lookout is a west facing launch in Quebec, 20 minutes from downtown Ottawa. It's situated 350 feet up an 800 foot hill, with thermal generating fields out in front. Although pilots curse the climb, most people agree that it is worthwhile, because of the site's cross country potential. Last year, a local pilot, Jim Lamont, flew 54 miles from it and gained about 9,000 feet above launch (two unofficial eastern Canadian records).

When we arrived at the bottom of Champlain Lookout, the trail was covered with about a foot of snow, turning the 20 minute walk up into a grueling 1½ hour ascent. Lying in the snow at camp 3, sweating and needing oxygen, I peered towards the summit and wondered whether it was all worthwhile.

At last we reached the top, and half hour later we were ready.

Ian launched first into the perfect conditions.

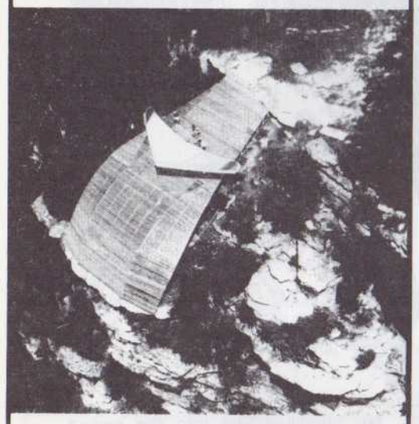
"Holy smokes, I don't believe it!" Jamo's eyes lit up like he was in love. He had never before seen a hang glider and had been amazed that any flying machine could unfold from the long, black bag. Now he started to go ape. "Holy smokes!" he yelled again. I knew I was in trouble when he started eyeing my harness and glider; he was thinking of trying to fly the thing. "Jamo," I yelled, "it takes a trained professional to fly one of those things. Put that glider down!" Slowly, as I explained a few fundamentals of hang gliding, the crazed look faded from his eyes. And deciding that his chances of even correctly getting into the cocoon harness were slim, he decided to help me launch instead.

The first launch of the season is always tough. My stomach started to fill up with butterflies, there being nothing else in it, since I had elected not to have any breakfast and lunch was long overdue. Maybe I should have had a bowl of Shreddies and a McMadeley muffin.

"CLEAR!" Jamo jumped to the side and I began to climb . . . fast. I could hear Jamo in the distance, "Holy smokes, I don't bel . . .

The sun was still shining through breaks in the thin overcast, so there were tiny thermals in front of launch, but nothing that would help me at this altitude. I headed back over to launch to work the ridge lift. At least one hundred feet are needed before heading along the ridge towards the 500 cliff beyond the bowl. That's where you really start to gain. In the

WIN ONE GRAND CASH



IN THE TENNESSEE TREE TOPPERS OLDEST X-C CONTEST

Question: Who holds the oldest cross-country contest in the world?

Answer: The Tennessee Tree Toppers Club, Inc., (TTT) has been running a continuous contest since 1978, even before similiar ones began in California and elsewhere.

Now for 1983, the TTT is putting up *One Thousand Dollars* in great American green to the pilot flying the farthest distance *beyond* 100 miles, after a launch from a TTT site (some of the very best in the world; see above!).

With contingency prizes (some are still pending), the winner *might* pick up a cool $5 GRAND... or even more.

You'll have to be a year member, tho. Cost: $30/year. And even if you don't win the big bucks, we'll *guarantee* you'll have some of the finest flying in the USA.

Contact the TTT for details **now**! Write to: P.O. Box 136; Lookout Mtn., TN 37350.

spring, the thermals funnel in there and give us our best lift.

The butterflies were gone within five minutes. After an hour, even the air monkey had left.

As I flew along the Gatineau Hills, I could see the cross country skiers below, waving and pointing with their poles. Ian decided to put on an aerial show of wingovers and 360's. I was quite content leaving such antics to him; it was, after-all, the first flight of the season.

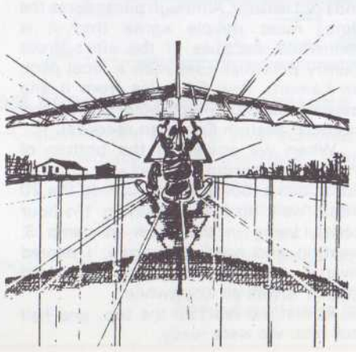
After 1½ hours, I decided to head out over the valley and land because I was getting cold and we had left poor Jamo below in the van. Moreover, the wind was starting to increase.

The lift band extended about one eighth of a mile from the ridge. When I was over the landing zone, I was still about 1,900 feet up and having some difficulty getting down — nothing a few wingovers and 360's can't handle, though, I thought.

Oh, nooooooo! Yes, I really should have had some breakfast. By the time my stomach had recovered from the first wingover, I was back up to 1,900 feet.

It took fifteen minutes of vigorous aerobatics before I finally landed on a frozen surface that resembled an ice rink more than a landing field. Sliding to a stop, I unhooked, and lay on the ground, hungry, tired, and thrilled by my first flight of the season.

An hour or so later, we were at our favorite French Canadian brassierie (i.e., bar cum restaurant) having breakfast/lunch/dinner, and again enjoying another Molson promotional evening. §



1983 X-C CLASSIC RESULTS

The 1983 Owens Valley X-C Classic is history. England's Tony Hughes and his Magic 3 took home the trophy.

Another fine showing for U.P. —who takes the Classic more seriously than any other manufacturer— as 3 of 5 placed in the top five and 4 of 5 placed Six thru Ten.

Only five pilots *completed* two tasks in the weather-plagued contest. Of the three tasks offered, any pilot could choose any task for any day. All three tasks were just under 100 miles cross country events.

Task I went north to Benton (about 50 miles) then south to Big Pine, and finally north to Chalfant, a goal task.

Task II was a straight flight to Gabbs, Nevada (97-98 miles), having no turnpoints. This became the most common run, and was available for pilots without cameras for turnpoint verification.

Task III was open, but was not ever run . . . *successfully*, though some tried. It went from Gunter launch to Mina, Nevada and then east to a rest area just outside Tonopah, Nevada. Frequent winds from the east — unusual this time of year in the Owens — and gusty 30-40 winds *in the valley*, put the damper on this task.

The winning pilot had the *least* accumulated minutes of flying to *complete* the tasks. Non-completion gave no points. One such flight was Steve Luna's blazing two hour and (estimated) forty minute flight to Gabbs, which fell *one mile short* of the goal. Zero points in spite of a 36.8 MPH *average* speed, some 26 minutes *quicker* than DeGlanville's mark.

Not one rigid wing entered, though the meet organizers said they had received several enthusiastic calls earlier in the season. And Rick Fritz's 123 mile flight was *the* longest. Just a poor weather year, it seems.

For those who read of Helmut Denz's alledged 187 *mile* or *kilometer* flight (see this issues's "Product Lines"), Classic personnel have confirmed that the entire story was pure *rumor*.

TABLE OF RESULTS, 1983 X-C CLASSIC

1st	Tony Hughes (GB)	470.9 *Magic 3*
2nd	Larry Tudor (USA)	476.3 *Comet 2*
3rd	Ed Goss (USA)	527.4 *Comet 2*
4th	John Pendry (GB)	634.9 *Magic 3*
5th	J. C. Brown (USA)	658.7 *Comet 2*
(Pilots below did *not* complete two tasks.)		
6th	Mike DeGlanville (FR)	186.2 *Comet 2*
7th	Helmut Denz (WG)	186.4 *Comet*
8th	Ted Zinke (USA)	193.0 *Comet 2*
9th	Carlos Clauson (CH)	195.8 *Comet 2*
10	Don Gordon (USA)	199.6 *Sensor*

BLUEBOOK

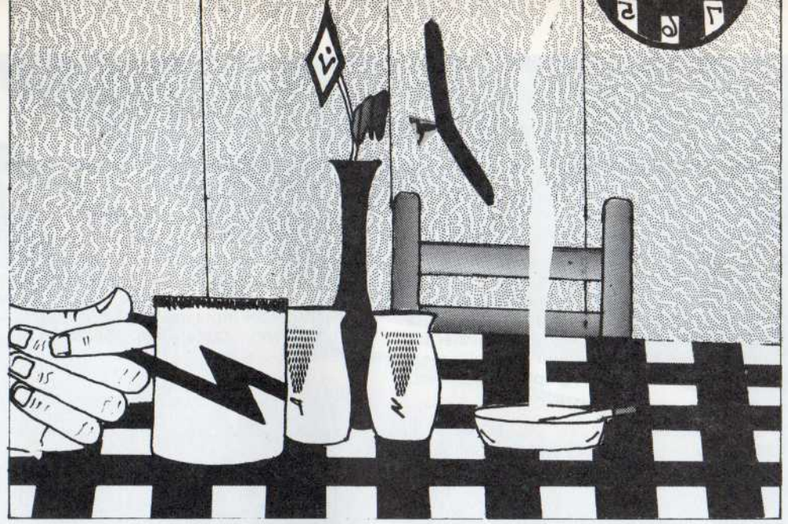
EDITION NO. 28

The BLUEBOOK is a service of *Whole Air* magazine. The prices which appear below are designed to be *guidelines* for evaluating the worth of your glider or one you many wish to buy. We *do not* intend for these figures to be considered the final authority. *Please* consult your local qualified dealer for information pertaining to these values in your particular area. The prices *do* vary widely in differing geographical locations.

Dealers: Please contact *Whole Air* Magazine about your input to the BLUEBOOK. The figures come from collected reports of *actual sales* of used gliders in all areas. They are then averaged for purposes of simple presentation. To keep from having disparity in these prices from area to area, we need input from more dealers. Your input is welcome and will be used and appreciated. Send to the attention of BLUEBOOK.

Year	Model	Size	Clean Price	Avg. Price
	BENNETT DELTA WING			
78	Phoenix 8 Super	Reg.	575	425
	Phoenix 12	Reg.	400	400
79	Phoenix 6D	185	675	575
	Lazor I	190	700	650
80	Phoenix 6D	215	725	725
	Lazor II	175	925	725
81	Phoenix 6D	185	900	775
	Viper	180	1000	750
82	X-180	180	1375	1075
	EIPPER FORMANCE			
78	Flexi III	Lg.	500	375
	Flexi III	Med.	600	525
	Cumulus 10	Med.	575	575
	Antares	Med.	800	725
79	Antares	Med.	850	650
	Antares	Lg.	725	725
	ELECTRA FLYER			
78	Cirrus 5	C	425	425
	Cirrus 5	B	600	525
	Cirrus 5	A	600	575
	Olympus	160	725	600
	Olympus	180	675	475
79	Dove	A	675	525
	Cirrus 5	A	775	600
	Olympus	160	825	575
	Floater	205	800	650
80	Spirit	200	900	725
	FLIGHT DESIGNS			
79	Lancer	190	775	650
	Lancer	170	850	725
80	Super Lancer	200	825	675
81	Super Lancer	175	950	700
	Demon	175	1050	925
82	Javelin	168	1250	1000
	Javelin	208	1175	1000
	Demon	175	1325	1075
	MANTA			
79	Fledge II	B	1075	875
80	Fledge II	B	1225	1100
82	Fledge III	B	1600	1450
	MOYES			
78	Maxi II	200	600	500
79	Maxi III	200	725	700
80	Stingray	200	675	650
	Maxi IV	200	825	650
	Mega II	172	1075	825
81	Mega II	172	1250	1000
	Meteor	180	1175	1050
82	Missile	200	1375	1175
	PROGRESSIVE AIRCRAFT			
81	Pro Air, Series I	160	1325	1200
82	ProBreez	180	1175	1100
	ProStar I	160	1400	1275
	SEAGULL			
78	Seahawk	170	550	400
	Seahawk	190	500	500
	10 Meter	---	775	750
	10.5 Meter	---	750	700
79	Seahawk	180	800	675
	10 Meter	---	900	675
	11 Meter	---	900	650
80	11 Meter	---	925	725
	SEEDWINGS			
81	Sensor 510	180	1200	1175
82	Sensor 510	180	1525	1375
	SKY SPORTS			
78	Osprey	175	675	500
	Sirocco II	164	700	575
79	Osprey 2	175	600	525
	Sirocco III	189	825	700
	UP (Ultralight Products)			
78	Spyder	176	800	575
	Condor	178	825	700
79	Mosquito	166	550	350
80	Firefly 2B	181	750	575
	Comet	165	1000	800
81	Gemini	164	1025	850
	Comet	165	1175	1000
	Comet	185	1225	975
82	Gemini	164	1175	1025
	Comet	165	1425	1175
	Comet	185	1400	1250
	WILLS WING			
78	Alpha	185	775	575
	Alpha	215	775	600
	X-C	215	750	500
79	Alpha	185	800	675
	Alpha	215	775	650
	Omega	220	825	700
	Raven	209	925	775
80	Raven	209	950	775
	Raven	229	925	800
	Harrier	177	1075	875
81	Raven	179	1125	950
	Raven	209	1150	925
	Harrier	177	1175	1050
82	Harrier II	177	1225	1100
	Duck	160	1475	1350
	Duck	180	1425	1225
	SPECTRA AIRCRAFT			
	SPORT AVIATION MFG			
	STRATUS UNLIMITED			
	PACIFIC WINDCRAFT			

No used market values established at this time.



Heavy snow and folded wings can do strange things to air junkies. Eric Robinson spins a yarn . . . "Thermals of Oz — Madness of Frizz"

Rumor had it that the sun never rose on the Avatar Plateau, it just appeared. Oz was a light sleeper and somewhat surprized to wake up under the hazy silence of mid-day. The Great Mesas were more incredible than he had imagined. Their polished brown walls and mile wide overhangs looked like the handiwork of some giant carpenter. It had been a long drive for one day of flying, but if half the stories were true it would be worth it.

A light wind blew towards the nearest Mesa and he wasted no time loading up. Heading out over the spongy green soil, he came under its massive shadow and pulled to a stop at the vertical wall beyond. As luck would have it, he spotted a single ragged slash of road winding up it. It was horrendously narrow, but took him finally to a ledge that was big enough to set his glider up. The view was intoxicating. The evenly spaced mesas were incredibly similar and it reminded him of something familiar, though he did not know what. The sun seemed to hang motionless and the wind was ominously light. It did not look as promising as he had expected, but he set up and clipped in as quickly as possible.

He launched and arced out across the sheer face of that strangely polished cliff. The air was mildly bouyant as he flew towards the lip of the mesa's overhang and into a burst of sunlight beyond. His vario celebrated with a steady chirp as a healthy core found him a moment later. Wide flat turns carried him up the broad lip to its summit where he was met with a view that was anything but believable.

Frizz was thinking about flying, as usual. He was thinking back on the years he had been addicted to it and all the things he had thrown away in the course of that bitter-sweet addiction. Now it was happening again and he was going to lose his job if he took another day off to go flying. The people he worked with just did not understand. They thought he was crazy; a hell-bent lunatic who did not fit. It was a bad scene and one that he was not likely to figure out over dinner and a cocktail. He always came to MadDog's Restaurant when his world was crumbling. It was good therapy for him to sit alone and stare at the edge of the table.

He was doing just that when the quarter inch shape of a hang glider came thermalling into view. His mind screamed, "Impossible" and his eyes widened into glassy half dollars, but he did not make a sound.

Amazed at how calm he was, Oz knew he had lost his mind. He never dreamed madness could be so vivid. In a photograph it would just be a typical restaurant dining room table, nicely set with industrial silverware and nylon flowers. But this was not a photograph. It was the real thing, the size of his home town. The smallest item on the table was a six hundred foot salt shaker looming over a creamer that was bigger than the Los Angeles Coliseum. It was a minute before he noticed that the grayish wall in the background was a twenty thousand foot person staring back at him in equal shock . . .

Frizz knew he had lost his mind. Every ounce of his attention was focused on the miniature glider as it continued to thermal over his dinner table. He never dreamed that madness could be so vivid, or realistic. The little glider was flying with admirable skill. When it had climbed to almost eye level, it turned out and began racing towards the far end of the table. His after dinner cigarette lay smoldering in an ashtray there and he suddenly realized what his tiny friend had in mind . . .

Oz may have been crazy, but he was not suicidal. The secret here was to back off as discreetly as possible, land, drive home, and then figure out what the hell had happened. He spotted his escape in the form of a narrow gray dust devil coming from an ashtray the size of a football field. His hands were trembling on the base tube as he pulled in to run for the twisting elevator of smoke. The gap took forever to close and it was worse than it looked when he got there. Turbulence like he had never encountered tossed him every which way until a fairly thick column of smoke caught him and he rocketed into space. He pulled out dizzy and bleary-eyed in a cloud that hid the world below. In a dive that seemed to last forever, Oz finally dropped under the polished lip of the mesa and onto the green valley floor beyond. They would never believe this one back at the Ridge . . .

The waiter asked him three times if he wished for coffee, but he never heard a word. He had watched the little glider fly across his table and into the smoke from his cigarette. It had centered the snaking vapors beautifully and climbed into the murky depths above the rafters. Suddenly, as if by magic, he did not have a care in the world. He may have been crazy, but he knew good flying when he saw it. When he paid the check and stood to leave, he looked around the room of happily preoccupied customers. Maybe he was *crazy, maybe he was not. Maybe* they *were, maybe not. It really did not matter. It was a nice feeling to know that* his sanity *was a small price to pay for flying. The rest of them would not agree, but they would see their own little gliders sooner or later.* §

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

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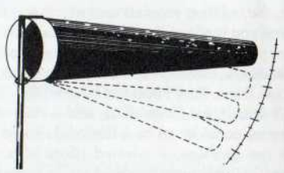

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PRODUCT LINES

CHATTANOOGA, TENN — We hope this trend quits; this business of having to deliver bad news. But a mid-air fatality is something none of us can ignore, nor should we if our safe pursuit of flight is important to us. On June 9th at 4:12PM, **Tom Kityama** lost his life following an in-air collision with **Ray Parsons**. The accident is made even more tragic as Tom was involved in his very first competition. Happening at the **Dunlap Region 2 Regionals**, site of the upcoming Nationals, Kityama and Parsons struck each other's wing tip about 300 feet above ground and some 100 yards out from launch. Parsons, an eight year veteran, the oldest regional competitor at 44, was uninjured, thankfully. Said to be a conservative pilot with prior experience in competition, Ray could have deployed successfully, but chose not to, as his damaged 185 Comet was still controllable. Parsons' leading edge failed in front of the crossbar junction only partially, when the tip to tip incident bent his aft leading edge section inward. He walked away from his glider after flat spinning into some bushes. According to **David Bowen**, Dunlap Flight Park operator, Kityama's Duck 180 had a failure of the leading edge at the crossbar junction, also failing the crossbar. The glider folded instantly, and though Tom threw his chute it did not inflate before pilot and glider struck the ground, it was reported. He died on impact, said the coroner, from massive head injuries. He was the most inexperienced pilot in the meet, being seeded last. Tom was 35 years old and had a light hook-in weight. A local television station video crew was at launch and filmed the occurrence. They also aired the tape, releasing Kityama's name, for which transgression of procedure and good taste they are being challenged by the coroner's office. According to *Whole Air* source, David Bowen, many knowledgeable witnesses saw the entire event, and unlike many fatalities, this one seems well enough explained. While Kityama may have been inexperienced, Bowen surmises it was the rigors of the close flying dictated by one-on-one competition that could be held most responsible for this incident. Well, no aircraft ever built was designed to withstand any appreciable impact, certainly not a collision in mid-air. We surely hope that in Sep/Oct's *Whole Air*, it will not be our obligation to report such tragedies (as appear here and in our "Publisher's Column"). But, as we have always maintained, we *do* feel the duty of reporting the accidents as well as the hopeful promises, so that perhaps someone else may avoid the same error. In reporting these things — especially here in "Product Lines," where we can use the latest information before going to press — we are bound to sometimes make mistakes, or fail to report all person's observations. Such is apparently the case with our **Jeff Burnett/Streak tumble** story in last issues's "P.L." We received a call from Delta Wing marketing man, **Luigi Chiarni**, who wished to clarify erroneous information from that incident. Our information (*very* last minute) was directly from **Grandfather Mtn** News Director, Harris Prevost. The official statement from Burnett's employer quoted Robert Crowell directly as saying, "I was watching closely as Jeff was doing spins . . ." Luigi told us this information was incorrect. He reported Jeff was ". . . *attempting* to induce spins . . ." but that a spin was not entered. It is not our policy to judge any glider, and we were not doing so with the Burnett/Streak story or with the above mid-air incident. But a *direct quote* received from a business as respectable and supportive of hang gliding as Grandfather Mtn, was taken as quite reliable. **Bill Bennett** points out that Jeff has also been involved in tumble incidents with other brands, such as the Comet, and we insist that the story was about a "name" pilot and not at all meant to be a smear on the Streak, the building reputation of which is quite good. Our apologies to Delta Wing and you readers, *if, in fact*, we passed on "bad" information. Chiarni gave us more poop, on SoCal contest results, specifically the **Region 3 Regionals**. Rick Rawlings (Streak) -- First; Steve Pearson (Duck) -- Second; Greg DeWolf (Duck) -- Third; Paul Robinson (Comet 2) -- Fourth; and Rob Kells (Duck) -- Fifth. A victory for Delta Wing, and a very strong showing by Wills Wing in what many consider to be a Regionals more demanding than the Nationals, due to the plethora of talented pilots who compete. **Rumors Dept.** The reported 187 *mile* flight "somewhere in Europe" was actually 187 *kilometers*, still an *excellent* flight, but no new distance mark. Luigi also told us that after, ". . . tumbling a customer's Comet 2, **Chris Price** is perfectly alright." The occurrance at Dunlap was witnessed by a large number of persons, but following the aerobatic maneuver, Price deployed successfully, Chiarni reported. At presstime, we were unable to reach U.P. for additional comments, however, the incident would seem to have generated no ill repercussions. **Wills' Duck 130** is certified and is now in what they imaginatively have called "Pro-Duck-shun." For pilots in the 110 to 150 pound range, it is reported to fly, ". . . a lot like the other Ducks in that it will do exactly what you tell it to do; no more no less." While the company still advises smaller intermediate pilots to use a Harrier 147, for more advanced flyers, they claim, ". . . on the basis of what we have seen, *nothing* will out-perform the 130 Duck in sink rate, in the hands of a reasonably skilled pilot. The Wills **Dealer Bulletin** of late May also had info on the **SoCal League** results. They congratulated Grandfather Mtn pilot and World Team member, **Stew Smith** (an Easterner!) with, ". . . showing the local California hot shots what hot competition flying is all about. Stew won the meet going away as he was undefeated in nine rounds of one-on-one competition." Local pilot **Rick Rawlings** (see above Regionals results) flying for Delta Wing snagged Second with 7 wins. In a six way tie for Third were Kevin Kernohan (UP); Bob Trampenau (Seedwings); Bob England (Delta Wing); Mike Meier, Rob Kells, and Steve Pearson (Wills Wing). Rich Pfeiffer (Delta Wing) finished in a nine way tie for Ninth Place at 5-4, along with Gene Blythe (UP); Chris Bulger (Delta Wing); Dave Beardsley (Seedwings); and five other pilots. In team standings, Seedwing took First with 25 team wins, Delta Wing, Wills Wing, and UP were Second, Third, and Fourth with 23, 22, and 21 wins. "Five of the six World Team members flew in the meet, and it served as a good tune-up of their flying skills prior to leaving for Germany. They finished 1st, 3rd, 9th, 12th, and 14th, which goes to show that on any given day, a lot of pilots — some of whom, like Don Gordon and Rick Rawlings, are relatively unknown — can compete successfully with the best." Wills supplied the entire World Team with their spiffy new **Flight Suits**. In Salinas, **Flight Designs** still has some specially priced Demons and Javelins, though this good cost opportunity has really thinned out that inventory. Same goes for their deluxe Jetwing. Get to a FD dealer soon if you've an interest in these products and want to save a bundle. Flight Designs is also very excited over the final version of the new **Shadow**, which judging from their ad copy on page 2 (IFC), is being marketed as a state-of-the-art SuperIntermediate. The glider has been in development for some time and now sports an unattached lower surface. They highlight its sink rate, landing characteristics, and overall handling qualities. It has been the towed ship on FD's aero tow effort, while being tugged by a Jetwing trike. See the centerfold for photographs, but we wonder if this may not begin to provide a means of further factory testing of new wings? More word from the **George Hammond Perpetual** contest in Santa Barbara shows Ted Zinke, Don Gordon, Robert Millington, Jim Graham, Ken deRussy, and Gilbert Roberts (all of S.B.) each remaining undefeated after two rounds in late June. The Hammond Perpetual finals are at the America Cup Polo Tournament finals at the posh Santa Barbara Polo Club on July 24th (about as this issue gets in the mail). Finally, the **HGMA has certified** the Duck 130 (May 18th), the Comet 2 — 165 and 185 (May 27th), and the Shadow 173 (June 7). An addendum was accepted for a change in crossbar length and rib shape on the Streak 160. To finish this edition of "P.L.," we've some news on **two-place flying**, both for powered and soaring pilots. The FAA has just recently (June 10th) approved exemptions for the commercial use of two-seat ultralights for instructional purposes. The craft cannot exceed 350 pounds and must have a maximum power off stall speed of not more than 29 knots (33+ MPH). You must have Air Safety Foundation (ASF) "Examiner" status (or better), among a few other *musts*. The USHGA's proposal for tandem (really dual) hang glider flying has also been approved, but *without* the instruction-only provision. So pilots filling the Association's requirements (III or better rating for pilot; I or better for passenger) may once again fly "tandem" legally. HOWEVER, *Whole Air* strongly advises you check with Yoo-sh-ga before proceeding. Check with AOPA or EAA for *full* details on powered training. Get *all* the facts and requirements *first!* Last, in a move we'd expect others may follow, Connecticut's **Sal Defranceso** has formed a consortium of ultralight dealers to "corporately" open an ultralight flight park at the Stormville, NY airport. Figuring to become *the* center of Northeastern ultralighting, they will jointly represent Pioneer, Mitchell, Pterodactyl, Manta, Rotec, Swallow, Cascade, Flight Designs, Sidewinder, Tomcat, Eipper, and Lazair. They have (open *now*) a full repair facility, 3300 foot paved strip and 1500 foot "ultralight strip." Call **Airwise** for more info at 203/267-8980. Got news or opinions? Send 'em to Product Lines, P.O. Box 144, Lookout Mtn. TN 37350. **STOP PRESS FLASH!!!** Australia's **Steve Moyes** has won the 1983 Tegelberg World Meet, another deserved feather in Stevie's competition hat. USA's rising star, **Stew Smith** placed second followed by England's great, Graham Hobson, third. These are three top pilots in the world, in our humble opinion, and all have worked long and hard to earn the title now bestowed on them. In team showings, the **Australians** were irrepressible in First, followed by the tough **Great Britian** gang, and in third was the USA. We'll have a story in the Sep/Oct *Whole Air* by our British correspondent, Noel Whittall. Congrat's from *Whole Air* on behalf of all our readers to Steve, Stew, and Graham.