PAUL ROBINSON, UP COMET 2 165, TORREY PINES, CALIFORNIA

HANG GLIDING IN NORWAY
STUFENSCHLEPP (STEP TOWING)
DANGEROUS LANDING APPROACHES

WHOLE AIR

The Magazine of Hang Gliding and Ultralight Soaring

OCTOBER 1984 — $2.50 (Can. $3.25)

BRITISH TEST RIG
PIREP ON THE MOYES MARS

WHOLE AIR

ISSUE NO. 38, VOLUME NO. 7, NO. 5, 1984

PILOT'S PERSPECTIVE

COMING NEXT ISSUE

La Mouette Factory Tour
Mitchell Wing Legacy
New French Connections
Views of Europe

FEATURES

AERO TOPICS

WHOLE AIR Magazine is published bi-monthly by Idea-Graphics, whose mailing address is P.O. Box 144, Lookout Mtn, TN 37350-0144, and whose executive, editorial, and advertising offices are located at 3308 Rondaboo, Chattanooga, TN 37409; telephone 615/825-5274.

Change of Adress & Subscription Inquiries — Send to *WHOLE AIR*, P.O. Box 144, Lookout Mtn, TN 37350-0144. Expiration date marked on mailing label in a four digit sequence, followed by two letters. The first two numbers are the year; the second two are the month of subscription expiration. Please give six to eight weeks advance notice of address change. Send both old and new address plus mailing label from recent issue, if available. Subscription rate: U.S. and Possessions, one year $12.00; Mexico and Canada, one year $16.00; All other countries, one year $20.00; Air Mail available, write for rates. Single copy price $2.50. **Back Issues:** Many past issues are still in stock. To order, send $3.50 plus 95¢ postage to Back Issue Dept., P. O. Box 144, Lookout Mtn., TN 37350-0144. No orders processed without the proper funds. **All Payments:** U. S. Funds only, please. Application To Mail At Second-Class Postage Rates is Pending At Chattanooga, Tennessee. **POSTMASTER:** SEND CHANGE OF ADDRESS TO: *WHOLE AIR*, P. O. BOX 144, LOOKOUT MTN., TN 37350-0144. Printed in the USA.

Volume 7, No. 5, 1984
ISSUE NO. 38

On The Cover:
At the 1984 Masters of Hang Gliding, several times past Champion, Steve Moyes, helps portray the fascinating shear clouds which form above the 6,000-foot peak. Launch ramps and gift shop are visible in the foreground.

Publisher's Column

A PRESSING NEED is upon us!

So, what's new . . . ? USHGA is calling for donations from each and every member so the Association can make it through the winter. The World Team fund drive is also coupled with this general need for money. Insurance rates are on the rise, and interest seems to continue its slow but inexorable decline (or at least apathy has not been stemmed). So what new need is so darn pressing?

I'll tell ya what. Our friend, the Fed', is most seriously contemplating an *increase* in the amount of regulation of our sport.

Oh sure, the attention is primarily focused on (powered) ultralights. Many of we "purists" have ascribed to those "two cycle drivers" a great many of our problems. Sometimes accurately so; sometimes not. But, you know (don't you?), the Fed, or more correctly in our case, the F.A.A., considers our holy hang gliders to be legally the same aerial contraption as our noisier counterparts.

By now, most are aware of the muck raking done by Kansas Congressional Representative, Dan Glickman. The results of his hearing were not conclusive, but one reaction is certain. The F.A.A. will hold its own internal hearings on ultralight safety about as this magazine arrives in mailboxes around the USA. One possible, no, make that *likely* outcome of their hearings will be a new NPRM (Notice of Proposed Rule Making) which could call for much more thorough regulation. This could include mandatory registration of all pilots and craft, and possibly imposed forms of pilot licensing and vehicle certification. The usual occurrance following such law enactment is a dramatic increase in the costs . . . of training/licensing, of craft themselves, and generally in the cost of pursuing the sport.

And again, you may say, "But this need is in *powered* flying, certainly not in hang gliding!" Well, regardless of the need, real or perceived, any changes in the present program will *certainly* include hang gliding. And why not?

After all, the current (almost-not-a-regulation-) regulation calls for each self-regulatory body — for us, the USHGA — to register craft, for example. The Association has obtained official approval for the simplest of vehicle registration programs. Do you know how many of our craft have been registered with USHGA since it was approved? Have you registered yours? Do you know anyone, even one other pilot, who has registered his or hers?

In the August issue of *Hang Gliding*, U.S.H.G.A. V.P., Dick Heckman, called for at least partial registration — quickly — so, come the September hearings, USHGA could report *some* percentage of registrations were underway. Since the approval of USHGA's program was very recent, full registration is not expected by the F.A.A. But again I ask, "Have *you* registered your diver?' For that matter, did you read Heckman's plea? Its position in the magazine was not very obvious, but its message was important. Did you just flip by it flippantly?

Now, in addition to our registration of our craft "For The Record," we can begin today with a letter-writing campaign.

"Oh, not again," you may wail! "Must we go through all that again," you ask? The answer is, "Yes and no."

Yes, if we wish to retain control of our own sport — which, as it has often been stated, *we* understand better than the Fed.

No, if you just don't give a darn. Which will it be?

We have a chance, once again, at trying to un-involve ourselves from ultralight airplanes. This time the incentive may be even greater. Here's my idea.

In addition to Heckman's suggestion that we and ultralights are like sailplanes and airplanes (thus differentiation in category is needed, as is already the case in conventional aircraft regulations) . . . we can cite what I will call "The Canadian System."

You see, in Canada, the regulations for ultralights are *much* more thorough and involved. Their program is already in place, and is the LAW. *But in that law, hang gliders are specifically exempted!* It gives us something to tell the F.A.A. about in defense of our request for de-involvement which the F.A.A. can immediately recognize and utilize.

Giving the F.A.A. that arguement, coupled with our admirable safety record, joined with our remote flying site situation, added to our long-existing program of *effective* self-regulation, plus our general habit of not using crowded airspace *just might* start the bureaucratic mind to again be considering the exemption of hang gliding from laws aimed at ultralights.

Then we could turn our attention back to the pressing needs mentioned at the start of this column.

If we just can't be bothered with yet another letter-writing campaign, then maybe our other problems don't need much attention either.

Is *that* how *you* think?!?

Thanks,
Dan Johnson

FORUM

Nice To Be Appreciated

Dear Editor;

Just a note to let the *Whole Air* staff know how much I appreciate the *professional* work you are doing in your publication.

Thanks for your lift. Keep turnin' circles!

JOE SZTUKOWSKI,
Phoenix, AZ

More Towing and Minimum Ultralights

Dear Editor;

Keep up the articles and photos for flatlanders (towing and super-light minimum ultralights).

STEPHEN ROACH,
Hilliard, FL

More Detailed Explanation Needed

Dear Editor;

In response to the article printed about my crash in your last issue, I feel things need to be explained in more detail (see pg. 8, AUG '84 *Whole Air).*

The wind had been straight-in soarable, but then switched to 90° cross, to straight in. The cycle I picked to launch in was blowing straight in a 10-15 mph. Everything was perfect on launch, until the instant my feete ground. The second my glider was airborne, it started plunging into a dive. It felt like I was being sucked right into the ground, which in fact, I was. My flight path was about ten feet forward and fifteen feet down. In that time my glider had rotated very rapidly nose-down. My head hit the ground before the glider, with the base tube and nose plate impacting at the same time. I believe the only thing that save me was my harness going tight as the glider impacted.

"What happened," I asked?

My launch crew said, "We thought you could tell us that."

Later on, my nose man told me, "Everything at launch was great. Just as you said, 'Clear,' I wanted to tell you not to go. I could feel the wind at my back to to zero, and could more or less feel a pressure change. At the same time I felt your front wires go slack, but it was too late to warn you, as the side wire people had already released. As I ducked, I watched behind me because I knew you were going to crash."

The only explanation I can come up with is that I launched into a large rotor, coming from either behind me or from the cliff edge below. This explains why my sail is being blown down, as the photographs show. [In my opinion] this same situation has never happened at this flying site before, and hopefully, no one will ever repeat it.

Anyway, I should be in the air again in a couple of days.

Happy flying.

CHRIS SMITH,
Chattanooga TN

Aero Testing Ideas Offered

Dear Editor;

Congratulations on your efforts to more objectively evaluate and test glider performance ("Aero Test I," pg. 17, August '84 *Whole Air).* The development and use of advanced instrumentation will be a big step in achieving accurate tests.

A recording device to store airspeed and sink rate data at a particular point in time would allow checking the glide ratio at different airspeeds in the same flight. Of course, the stability of the air mass (lift or sink) would affect the glide ratio calculations, but the sink per airspeed figures could be more effectively averaged if they were recorded for the entire flight(s).

The system would consist of recorded airspeed and recorded sink rates with respect to time. Much more data would then be available to analyze and average for each flight. Also, fluctuations in airspeed would not affect the results.

The most accurate airspeed measurement would be achieved by suspending the airspeed indicator below the glider approximately fifteen feet out of the pressurized area below the wing.

On a less enthusiastic note: The Wills Wing Skyhawk "Pilot Report" should have had the word "Advertisement" in brackets behind the title.

SCOTT WHITTET,
Dallas, TX

Why Promote Single Surface for Beginners?

Dear Editor;

Why is it the general overall consensus that the entry-level to novice pilot waste his time on single-surface nonsense? Double surface has been mastered by many from the start!

BARTON T. MOWDRAGON

The Nature of the Hang Gliding Business

Dear Editor;

Reading the letter "Quint—essential Parachute" (June & JULY '84 *Whole Air)* prompts me to express my thoughts on two things. One— a parachute is to me an essential piece of equipment that keeps me from assuming anything when I'm flying . . . to assume makes an *ass* out of *u* and *me*.

Two— the pilot wrote that he was flying two days later, having repaired a ripped sail, broken keel, five battens, and had his chute repacked. *Amazing service!* I ask why that kind of service does not exist where I fly?

I bent a lot of tubing on my Flight Designs trike and Demon glider about a year ago. I was told parts would arrive in two weeks. After many phone calls (my dealer's and mine), I received the parts four months later. The holes didn't quite line up, and some parts looked used—what a nightmare! I was told by Flight Designs that this was just the nature of the hang gliding business.

I am please, amazed that somewhere repair service and parts availability is as it should be. I hope "the nature of the business" becomes that heathly everyplace.

Oh, and another little thing about "the nature of the business." Thanks Flight Designs/Pioneer Int'l for flushing the value of my equipment down the toilet — that's the nature of my gratitude.

JAMES WISE,
Dover Plains, NY

1984 Nationals Over

It's history for another year and Rich Pfeiffer has won his third national title in the recently certified Sensor 510-VG.

Second was Rob Kells (Duck HP), followed by Steve Moyes (Missile GTS).

A last, rather maverick round apparently altered the top order, knocking leader, Steve Pearson, (Duck HP) out of the top notch.

The December 1984 *Whole Air* will carry a further story on the '84 Nationals by Rookie-of-the-Year, Tom Phillips.

ADVERTISER'S INDEX

INDUSTRY NEWS

Kevin Batman Injured

INDIANAPOLIS, IN — Twenty-one year old Kevin Batman, son of USHGA Region 7 Director, Dean Batman, was seriously injured in an accident while demonstrating the Pioneer FlightStar.

The August 22nd incident occurred after an engine failure on the downwind leg after take off from the demonstration site. At about 100 feet, and with a high angle of attack, the aircraft stalled, and dove to impact.

"There were no [expert] witnesses, but he [Kevin] said he attempted to pull it out," reports his father, Dean.

Besides his father's long involvement in hang gliding, Alpha Aircraft also deals in ultralights including the FlightStar.

Kevin is currently in intensive care with multiple injuries, and is expected to have to spend six weeks in the hospital. We wish him a full and speedy recovery.

LaMouette Profil Excels at European Championships

Only seven Profils entered the European championship, yet four of them finished in the top seven. Although the "aquarium" tasks of the championship were not the optimum choice for showing pilot capability, these results can only be achieved with a very competitive glider.

While the European countries were meeting for maximum duration in Norway, the Spanish held their National Championship near Madrid. Flights of 195 km [121 miles] have been accomplished. The results were:

1st S. F. Bosch (Profil)
2nd J. J. G. Martiarena (Azur)
3rd J. P. Lopez (Missile)

In France two national contests are held. One is for the top forty pilots, another for the next forty, called "National B." The fifteen first of National B will move up to National A next year. The top results of this year's National B are:

1st Patrick (Profil)
2nd Belin (Profil)
3rd Sakellarides (Profil)
4th Pouget (Magic)
5th Ducos (Profil)
tie Camensueli (Quartz)
7th Roussot (Profil)
8th Darlet (Profil)
9th Miramont (Profil)
10th Poulain (Profil)

High-Technology Harnesses from High Energy

High Energy Sports now offers Thermal/R as an insulation option in harnesses. Borrowed from the mountaineering and skiing industries, Thermal/R allows the convenience of light weight warmth and comfort without the bulk of foam.

"We had numerous requests from pilots particularly in the East," states Betty Moyer, President of High Energy Sports, "for a lightweight, low bulk harness that is comfortable and warm. They wanted something that they could fold into a self-contained gear bag and still have room for helmets, instruments, and extra clothes." The High Energy Sports Thermal/R harnesses do just that.

According to several government and private testing laboratories, 1/25 inch of Thermal/R has the same warmth value as ½" of Thinsulite. And how have pilots responded to Thermal/R? Larry Tudor claims his Thermal/R harnes is warmer than any of his other foam harnesses at altitudes, yet still light weight and comfortable while scratching low. Paul Robinson traded in his bulky pod for a Thermal/R harness, then flew the Owens Valley World X-C Championships in shorts! After winning the Southern California Regionals, Kevin Kernohan claimed his Thermal/R harness was not only the most comfortable harness he has ever had, but that it also gave him ". . . an easy 20 to 1 L/D." (High Energy only claims to believe the part about comfort since Kevin has lower back problems.)

With over 50 harnesses tested all reports have been favorable. For more information, contact High Energy Sports at 2236 W. 2nd St., Santa Ana, CA 92703, or phone 714/972-8186.

HGMA Clears Light Dream 185 and Pro Dawn 155

At the July 25th meeting of the Hang Glider Manufacturers Ass'n, a package was presented and a certification of compliance was issued for the Delta Wing Light Dream 185. That company's Light Dream 165 had been passed at an earlier meeting.

A package was submitted and reviewed at the HGMA's August 16th meeting, and a certificate of compliance was issued for the Progressive Aircraft Pro Dawn 155 model.

Pro Dawn Certification Claims To Be Major Step

The Pro Dawn 155 received certification on August 16, 1984. The company feels that this represents a major step in the hang gliding industry, being that it is the first glider in modern history to be certified without top wires (or king post therefore), or bridle reflex lines. This also represents a major structural change over existing gliders. (May 1984 *Whole Air*)

The Dawn incorporates a zero deflection leading edge with side struts attached to the cross-spar. The upper surface camber is supported by six cambered ribs per side. The lower surface flight loads are supported by three ribs per side, two of which are fiberglass and one metal.

"The new structure makes for a glider that is 10-20% lighter than other gliders on the market today," says Progressive Aircraft designer, Richard Boone. "This light weight makes for ease of ground handling, ease of launch, as well as the simplest landing of any high performance glider," Boone continued.

The spar located flight loads eliminates mid-span billow without high trailing edge tensions. This makes for one of the highest performance packages offered to date, without loss of ease in handling, the company reports.

For further information on the newly certified Pro Dawn, contact Pro Air at 4544 Industrial St., Simi Valley, CA 93063, or phone 805/583-1014.

High Energy Sports Hosts Advanced Programs

This winter High Energy Sports is offering advanced programs for hang glider pilots. Speakers will include Bob Trampenau speaking on "Hang Glider Design," Chuck Jones and Gene DePlume on "Radio Considerations . . . FM vs. CM; cost, care, and licensing." Chuck Rhodes and Gytis Tamulitus will discuss "Mitchell Wings and Rigid Wings . . . An Old, New Future," and Jack Lambie will talk on "Aerodynamics of Slow Flight."

For a complete schedule, contact High Energy Sports.

Rich Pfieffer will be teaching X-C flying theories, techniques, and practical experiences this winter at High Energy Sports. A series of ground schools will culminate in an actual team flying X-C experience with Pfeiffer.

The text book for the school sessions is (of course) "Hang Gliding According to Pfeiffer." High Energy expects that some terrific X-C pilots will emerge from these unique classes.

For registration and information on both series, contact Betty Moyer at High Energy Sports, 2236 W. 2nd St., Santa Ana, CA 92703, or phone 714/972-8186.

Update on Region 6 X-C Challenge

Charlie Gillespie of Ft. Smith now leads the Fort Smith Hang Gliding Ass'n 6th Annual Region VI Cross Country Challenge, with a flight made July 8th from Heavener, OK to Alma, AR, a distance of 46 miles.

Gillespie made his flight in his Fledge E.T. late in the afternoon, and took numerous photographs along the way. The contest runs through all of calendar 1984, and the winner will receive 85% of the total purse, plus the "Perpetual Order of the Eagle" award, a beautiful plaque with each year's winner and distance engraved. U.P. is offering $1.00 per mile (or $2.00 if over 100 miles) to the winner if flying an UP glider.

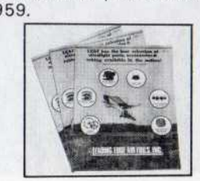
Another exceptional flight has been made by Bruce Mahoney (not as part of the Challenge, however). Mahoney launched his Wills Wing Duck from a 1200 foot tow near Inola, OK, and ended up five and a half hours later near Agra, OK, for a total great circle distance of 81.6 miles. His flight took an unusual direction of east to west, in a slight dogleg passing south of Tulsa. Mahoney's flight breaks the old Region VI record of 57 miles, made in 1982 by his brother, Roy Mahoney.

LEAF Releases New 1984 Parts Catalog

LEAF of Colorado Springs and one of the countries larger suppliers of powered and unpowered hardware and accessories, is pleased to announce the release of their all-new 1984 parts and accessories catalog.

LEAF's giant new catalog is the only such available specializing in powered and unpowered ultralight aircraft and gliders. It features a complete listing of over 1,200 individual parts, hardware, and accessories, measures 8½" x 11", and is printed in two colors. The catalog includes over 700 photographs, illustrations, diagrams, and over 300 detailed descriptions of most parts, hardware, and accessories all serious pilots will need.

The cost is only $2.00 in the USA ($3.00 foreign). When ordering, allow two weeks for delivery. Contact LEAF, Inc., 331 S. 14th St. WA, Colorado Springs, CO 80904, or phone 303/632-4959.



INDUSTRY NEWS

New X-C Records Logged by LaMouette

ISRAEL

Mr. Sagi Aharon flew exactly 100 km [62 miles] across Israel in August. It is the longest distance ever flown with a hang glider in Israel, and will be difficult to improve upon, as the flight was done in the widest part of the country.

Aharon took off near Gaza, along the Mediterranean Sea, and landed at the Jordanian border along the Dead Sea. As the wind is always west to east (the route of Aharon's flight), it makes it very difficult to fly a long north to south distance.

SPAIN

Santi Font Bosch has just broken the Spanish distance record with his Profil 17 Sandwich glider. Bosch flew 185 kilometers [115 miles] in the Madrid region of Spain.

FRANCE

(by aero tow)

A new record has been broken by Jean Francois Fauchier while testing his new Profil for the European Championships (see this issue, pg. 31. Fauchier flew 155 km [96.3 miles] taking off from the flat lands with the help of a Cosmos trike tug. It is the longest distance flown in open distance after being aero towed.

Fauchier took off from the La Mouette factory in Dijon, France, and landed near Lyon. The entire 5½ hour flight was done over flat lands, in a 10 km/h [6 mph] north wind, with cloud base at 1,700 meters [5577 ft]. Although Fauchier lives near the mountain sites in France, he thinks the best distances will be flown in the plains.

"A 30 km/h [18 mph] wind would have pushed me to 250 km [155 miles]," he speculated.

Masters Ends with Same Results as at "The Cut"

GRANDFATHER MTN, N.C. — Plagued by uncooperative weather, hang gliding's richest meet (total purse: $12,000) ended with no rounds completed after the "money cut" was made by Meet Director, Jeff Burnett.

Eight pilots, all ending up in paying positions, were announced after five rounds, and this order became the final results. None of the first three finalists were able to fly each other in the 1984 edition of the prestigious Masters of Hang Gliding.

At the called end of the meet, this is how they stacked up:

1st Chris Bulger (Magic)
2nd Bruce Case (Duck)
3rd Steve Moyes (Missile)
4th Stew Smith (Sensor)
5th Mark Bennett (Duck)
6th Randy Haney (Magic)
7th David Thor (Comet)
8th Kevin Kernohan (Duck)

Congratulations to winner, Chris Bulger, on his second consecutive win.

Region 5 Contest Results

Following the "St. Joe Baldy" regional meet at St. Maries, ID on July 19-22, the results were as follows:

1st M. Daily (Magic)
2nd R. Kidder (Comet 2)
3rd J. DeCleur (Comet)
4th M. King (Comet 2)
5th R. Altig (Magic)
6th K. Christopherson (Streak)
7th L. Heinonen (Comet 2)
8th C. Agte (Duck)
9th J. Brakefield (Duck)
10th R. Henson (Comet 2)
tie F. Gillette (Duck)

Eighteen pilots flew four rounds, averaing two hours in this competition.

After the "Sun Valley Sprints" at Sun Valley, ID on August 9-12, the results were:

1st H. Osterlund (Esprit)
2nd J. Brakefield (Duck)
3rd K. Christopherson (Comet 2)
4th A. Bitker (Comet 2)
5th R. Kidder (Comet 2)
6th C. Bright (Sensor VG)
7th R. Henson (Comet 2)
8th J. Gildehaus (Comet 2)
tie F. Gillette (Duck)
10th R. Altig (Magic)
11th M. McIntyre (Comet 2)
12th L. Heinonen (Comet)
13th W. McKellar (Sensor VG)

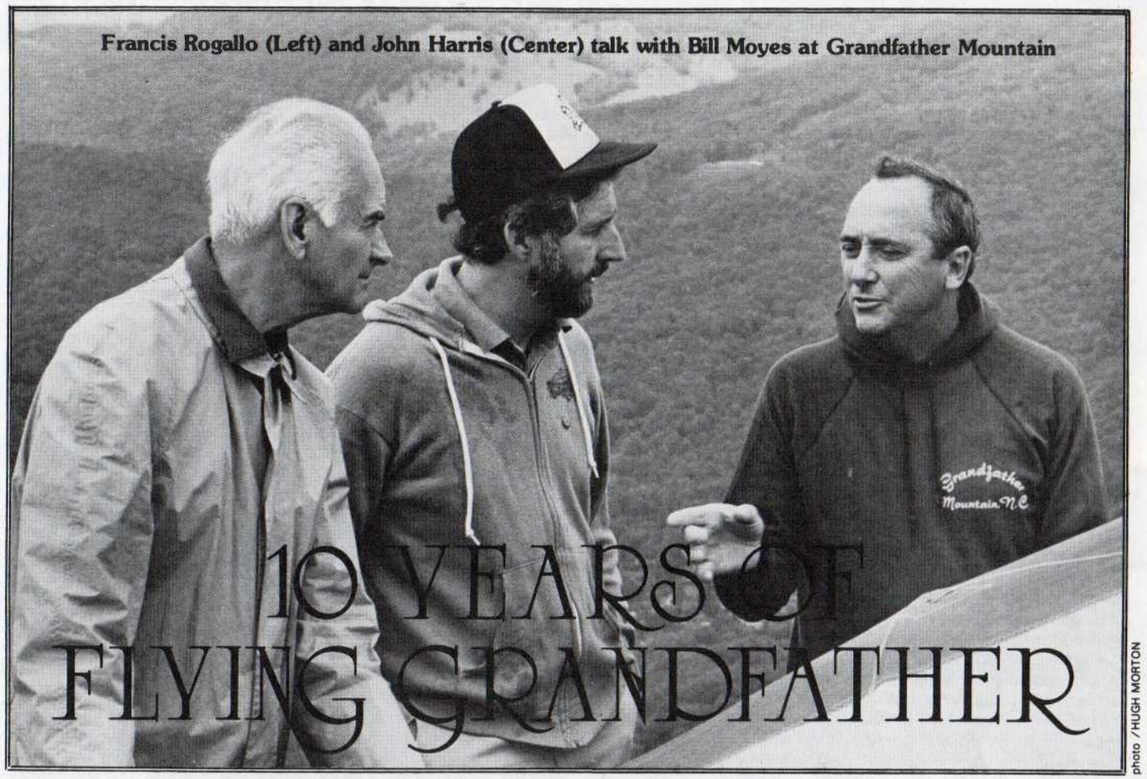
Twenty pilots flew eight rounds with an average flight time of 90 minutes at the Sun Valley Sprints.

Pork Piqued

By *not* giving photo credit, we've peeved an old friend, who snapped the shots in Paul Burns' Skyhawk article (August '84 *WA*).

"Pork, we're *really* sorry," groveled the editors. "It'll *never* happen again (heard that before?)!

THE EDITORS



Francis Rogallo (Left) and John Harris (Center) talk with Bill Moyes at Grandfather Mountain

photo / HUGH MORTON

10 YEARS OF FLYING GRANDFATHER

GRANDFATHER MOUNTAIN, THE RUGGED North Carolina mountain peak that is home of the Masters of Hang Gliding Championship, and site of the USHGA's Third National Championship in 1975, celebrated its tenth anniversary of hang gliding flights on July 20-22, 1984, when John Harris repeated his first flight off the cliffs of the 6,000-foot mountain.

On hand to be a part of the celebration honoring Harris were some of the popular new sport's biggest names.

The father of the sport and its first participant were two of the special guests taking part in the event. Few, if any, other sports can boast such a combination still actively invoved in them. Francis Rogallo, a retired NASA engineer and inventor of the Rogallo of the Rogallo flexible wing, came from his home in Kitty Hawk, NC, while Bill Moyes, who eighteen years ago in Australia became the first person to successfully foot-launch with the Rogallo Wing, flew in from Tahiti.

John McNeely, a naturalist currently working with the Smithsonian Institution on a new wide-screen movie on the flying relationship between man and birds, came to the Tenth Anniversay Celebration from Sharon, Connecticut. McNeely is the first person to fly with a bird on a repeated basis. He and his Red-tailed Hawk flew together at Grandfather Mountain in 1980, and his historic achievements were recorded on film in an award-winning movie.

Vic Powell, past President of the USHGA and a leader in making the sport safe and respected, came from the nation's capital to pay tribute to John Harris and his notable companions.

Stewart Smith, second in last year's World Championship and Masters Championship, and the 1983 Southern California League Champion, represented Grandfather Mountain at the event as a member of its Exhibition Flying Team. Hugh Morton, owner of the Mountain scenic attraction and a pioneer supporter of the sport, was Master of Ceremonies.

Rogallo, Harris, and Moyes were each honored for their accomplishments by having one of the days of the three-day celebration as his own day.

A news conference was covered by a number of newspapers, four television stations, and *PM magazine*. *PM* did a special feature on John Harris and his contributions to the sport. The news conference was also filmed and recorded for future use in Hugh Morton's hang gliding movies.

The sport's major personalities used the occasion to tell the media and the large audience about some of their experiences and to share their observations about hang gliding.

John Harris, who made the flight that changed Grandfather Mountain forever, recalled, "It was a beautiful flight. That's been the most fun flight of my life. It was one of those opportunities where you had a chance to do something first."

He made a perfect landing on the golf course below and, feeling full of self-confidence, went back to the Cliffside Overlook to try again. This time he was a little cocky, waving to the astonished people below and enjoying their reactions. However, Harris sheepishly commented, "I landed in the trees that second flight and that took care of my ego for the day."

Moyes laughs when his own "first flight" is mentioned. He had no idea what he was getting into when he foot-launched a wood-framed plastic Rogallo Wing from Australia's Botany Bay in 1966, the very first successful foot launch of a flexible wing. After a number of crashes by both he and his daredevil friends, they were able to modify the wing to make it safer.

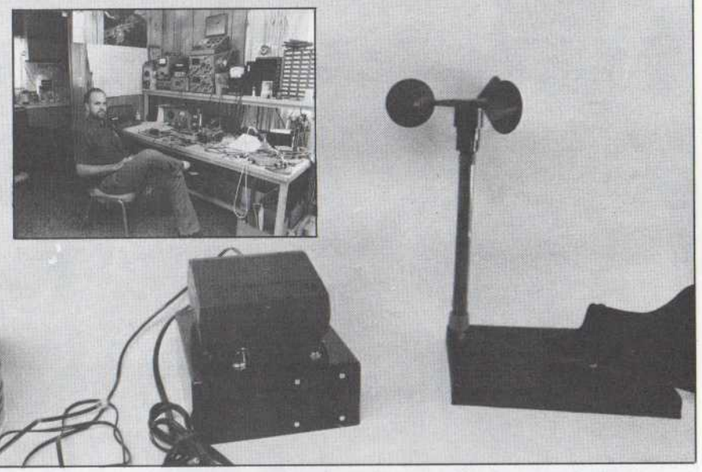
Sixty-five years ago, a seven year-old boy named Francis Rogallo saw his first airplane and like John Harris, his life would never be the same. It was his childhood dream to fly like a bird and he took matters into his own hands by inventing a means to do so, the flexible wing.

Rogallo tried to interest the government in his recreational wing which he and his wife perfected in 1948, but they got nowhere. Then the space age dawned and NASA looked at the wing for bringing space capsules back to earth. NASA settled on parachuting the capsules into the ocean rather than hang gliding them onto land and the Rogallo Wing became a vehicle for sport rather than for space.

Vic Powell paid tribute to his sport's pioneers and to the accomplishments of the USHGA in making hang gliding the safe, first-class sport it is today. He also paid tribute to the ten years of flying at this eastern United States hang gliding center and to its proprietor, Hugh Morton, for his devotion to the sport and its people. §

‹ LITEK ›

. . . Of Variometers and Talking Weather Stations . . .



PERHAPS THE BEST KNOWN of variometer manufacturers for hang gliding usage is Litek of Grants Pass, Oregon. The firm is a little company whose impact on the sport is evident at almost any flying site on the planet. Its history is so common to our sport . . . where determined individuals have worked against amazing financial and other odds to produce quality equipment which provide joy to pilots worldwide.

Litek got its start in January of 1978 when the year-long project of vario design was completed in the San Jose area where company leader, Chuck Kanavle had grown up and was still living. Acceptance of the original Hummingbird model A, then B, accelerated through the year and Kanavle had to quit his engineering job at Racal-Vadic on Thanksgiving Day 1978. After moving out of an apartment in Mountain View, and into a rented house in Campbell, production of the popular vario continued in large quantities throughout 1979 and 1980. The models C and D, and then the VE-10 evolved subsequently,

In 1980, Chuck's family dream of owning a farm in the country found new energy when it was realized that they could now make it happen. So Kanavle got in his van and headed north as far as Portland, turned around and headed back down south looking at properties that were advertised along the way. A 23 acre farm near Grants Pass stuck in his mind after returning to California. It had a nice, big hay field which he "tested" with his Pterodactyl ultralight, taking photographs from the air to review with his family. A call was made, and the property bought.

The fall of 1980 was filled with the activity of moving the shop 500 miles north. Once moved to the location eight miles outside of Grants Pass, near the town of Wilderville, production began in earnest, employing some local neighbors.

But after only four months, the family dream was shattered when Kanavle, flying home from the Medford Expo, a 30-mile evening flight in unfamiliar mountainous territory, found a stiff headwind with wave clouds above that turned the flight into a white knuckle, turbulent experience that broke the left spars at the outboard wires, sending pilot and craft spinning in from 1,000 feet, and no parachute.

Kanavle did not wake again until a month later in an intensive care unit. Still on a table, naked except for a towel, wires and tubes hanging towards him, all Chuck saw was a video screen displaying his heart beat, an even pattern traveling across its face. He shut his eyes to wake the next day. A ten inch opening had already healed on his abdomen and a nurse came in to remove the staples with a staple remover Kanavle was in traction with a broken neck. He also broke his pelvis, femur (now pinned), and according to a man with the progress clipboard, "a lot" of ribs.

During the two months in the hospital, and months and months of wheelchair and crutches ambulation, the Litek company managed to survive. The load had been carried by his wife, Donna, and two teenage daughters, Kathy and Sandra.

Chuck flies again, but it was two years before he became ready to take on a new product. The old line variometer took on some minor improvements, making it the model VE-7, but nothing new had come forth during this time. That is, not until Mission Soaring's Pat Denevan calling him looking for somebody reputable to manufacture a synthesized-voice, automated "weather station."

These last several months have seen much effort extended toward this exciting new project. The units sits at the launch site, monitoring the wind speed and direction and temperature, and is hooked to a phone line and source of power (10 watts). When you call its number from anywhere before you leave for the site, you hear a computer voice message that sounds like this:

"Hello. The current wind condition is (west) at (12) miles per hour and the temperature is (64) degrees. Over the last fifteen minutes the wind was between (north) and (south-south west) from (10) to (22) miles per hour, and the average wind condition was (west) at (15) miles per hour. Thanks for calling. Goodbye."

The device was first built by Wayne Ashby in San Jose, California for use in the Milpitas site and the Mt. Diablo site, and was written up in the February '84 *Hang Gliding*. He then sold the design to Litek who is now readying a commercial version, called the "WINDTALKER." This will be made available to the gliding, windsurfing, and small general aviation communities. The first two installations are going to be at Fort Funston in San Francisco, and at the Big Creek Lumber Company in Davenport, California.

The original units were built as engineering prototypes as practiced where Ashby works. The commercial version is being laid out on printed circuit boards, and several new mechanical design ideas are being incorporated. It is a two-piece affair, comprised of a base unit and remote unit. The base houses the power supply and telephone answering circuits, and is intended for installation indoors or in a protected enclosure. The remote unit is being made as a sealed unit to protect it from salt corrosion, built from a square, one-inch-thick plate, holding the sensing circuitry, and serving as a mount for the anemometer and wind vane on top.

These two units are joined by a two-wire cable (optionally included) that can be 1,000 feet long, or more. This cable powers the remote sensing unit and also carries the weather information back to the base, where it enters the phone lines.

Except for the wind direction sensing circuit, Ashby's original circuit design is not being changed, nor is its computer program. But several additional circuits are being added to facilitate its optional delivery of a 30-second, user pre-recorded tape announcement either ahead of the weather report or afterward. Input/output connections are provided for technicians who want to hook it up to other modes of power, such as solar cells, and/or to a radio transceiver in lieu of telephone. These two options have not been done by Litek, but the company will work with any technically-equipped customer that wishes to accomplish this alteration.

Kanavle now draws from his 25-plus years of experience in electronic design and manufacturing — dating to childhood days — to produce something already well-designed by a flying friend at Hewlett-Packard, by adding the finishing touches and applying his manufacturing skills. §

THE B.H.G.A TEST RIG

Certifying gliders in England takes on a new measure of accuracy/text and photos from Noel Whittall

Continued on next page,

AFTER SEVERAL YEARS in which success in testing hang glider wings was not an obvious element, we Brits have at last got a highly satisfactory rig working.

Unlike the USA, where the individual manufacturers carry out glider tests of pitch stability and structural integrity, in the United Kingdom, the national association (British Hang Gliding Ass'n, or BHGA) shoulders the responsibility.

Originally the work was done on a very sophisticated aerodynamic test rig mounted on a Citroen station wagon. This expensive unit was funded from state sources, but failed to fulfill its early promise. It really was over-complicated, and problems of calibration of the input and interpretation of the output have dogged it for some time. Countless hours of dedicated labor — most of it voluntary — have been spent on it, but with little sound results.

However, the picture changed with the development in 1983 of what was originally to be purely a structural test rig.

This device is both simple and effective, consisting of a superstructure mounted on a four-wheel trailer. The pyramid-shaped top of the structure incorporates a trio of load cells which are wired to a read-out carried in the towing vehicle. One measures *lift*, another *drag*, and the third, *negative pressure*.

The glider is mounted on a pivot at the apex of the pyramid which bolts to an adaptor fitted at the hang point. By clamping the control bar in varying positions, the angle of attack of the wing can easily be altered. Towing the outfit at different speeds and pitch angles rapidly provides the information required to plot L/D curves, while towing at high speed and high angle of attack overloads the wing to the required +6G test weight. No more piling bags of sand onto a glider suspended from the workshop roof!

Initial work with this towed rig was most satisfactory, but then the news got better and better: substituting the control-bar clamp with a simple bracket containing a spring balance, allowed pitch curves to be produced and the results have been enlightening, to say the least.

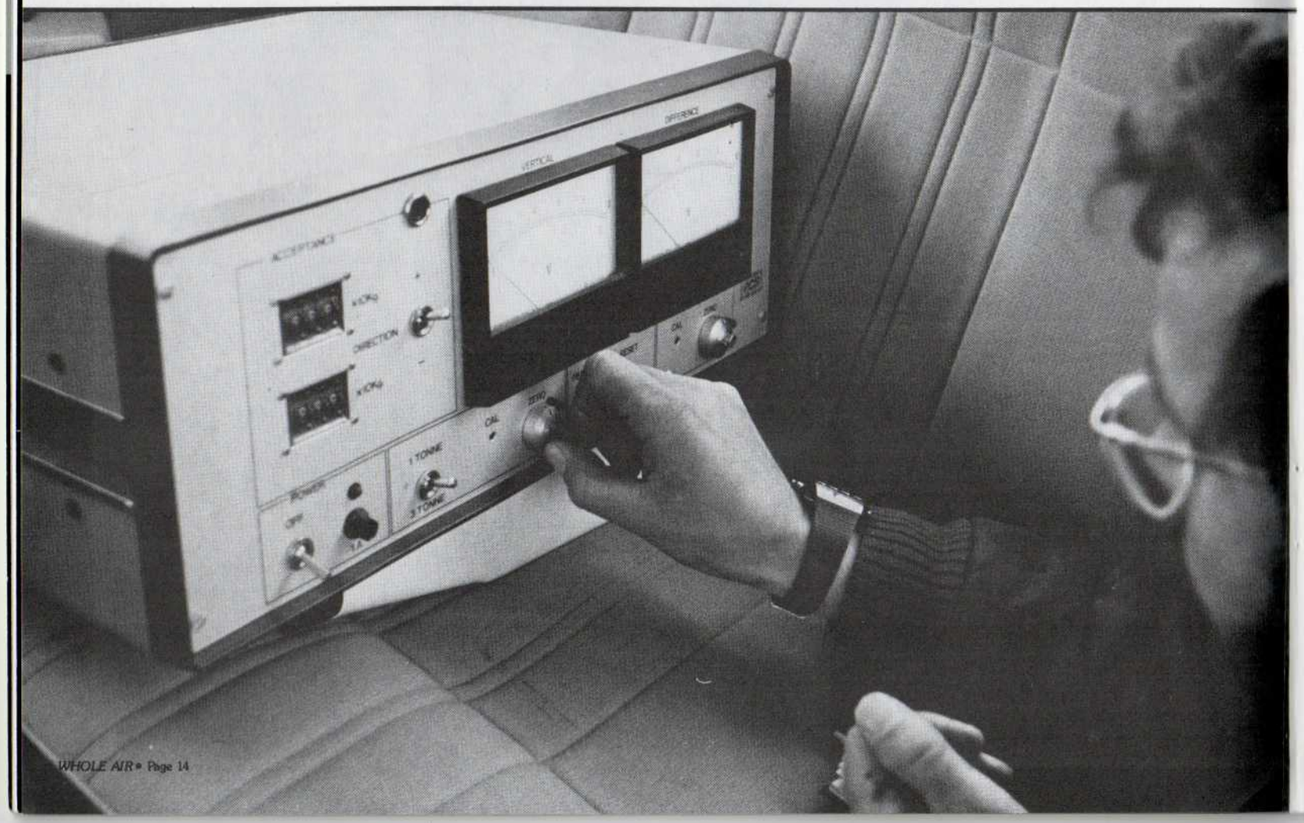
One particular glider which had a question mark over its pitch stability had defied all the Association's efforts to pinpoint the problem using the earlier complex rig. However, one afternoon's work with the towed rig not only confirmed that there was indeed a problem, but also defined it accurately and even provided pointers to a possible modification to make the glider safe. Full results will be published as soon as formalities permit, and the lessons learned will no doubt be of value to hang glider pilots everywhere.

A particular beauty of the system is that the results are immediately obvious. There is no need for elaborate computerized interpretations of a string of initially meaningless figures. This means that a few test runs can be made, the results assessed, the glider modified, then further runs made, all within the course of an afternoon.

The development of the towed rig is a great success story — the only real problem has been that of finding a suitable towing vehicle. Of course, the pitch tests don't require much power, and the average small European car can do the job without much trouble. The difficulty comes when attempting to apply a structural test load to a large wing — for example, one designed for a dual "trike" ultralight. It seems that we may need something like the raw torque of a big-block Chevrolet to produce the speed and power necessary to provide the 2,100 kilogram [4630 lb] loading which British regulations require. So far, the highest achieved has been about 1,600 kilograms [3527 lbs] behind a V-12 Jaguar.

BHGA Chairman, Percy Moss, should receive much credit for pushing ahead with development of the rig — a voluntary job which has involved enormous effort for him and his team. Credits must also go to the makers of Fosters Australian Lager Beer, who put up much of the essential financing through the Fosters Sports Air Foundation. §

The new BHGA rig prepares for action with Cliff Ingram, Mick Appleby, and Percy Moss aboard. (Below) Lift and drag figures are recorded from this unit in the tow vehicle.



What's Your Approach

The first of a series on improving your flying technique comes from Canadian Rodney Nicholson/ illustrations by Rick Lemche

AN ANALYSIS OF the hang gliding fatality data yield the information that a major proportion of serious accidents occur after pilots have run into difficulties near the landing area. Indeed, according to the latest (1983) fatality data, in fully 50% of the cases, the difficulties that were encountered occurred either *on the approach or on final.* Obviously, this is an unfortunate time to run into trouble. It can be asked whether many of these problems can be avoided, and whether there are basic rules which will help keep you out of trouble. The answer to both these questions appears to be, "Yes."

WHITWELL, TENNESSEE

Not only does the answer appear to be yes, but, based on one morning's flying at Whitwell in the fall, it seems clear that many pilots are badly in need of help in this area of flying technique. And I am among the "guilty" pilots. One Level II, one Level III, and two Level IV pilots all performed dangerous approaches to the challenging Whitwell landing area that morning, and did so without even realizing it. I am personally indebted to Chester Baker for having pointed out mine to me. In his inimitable, highly effective, and none-too-tactful manner, he impressed on me the potentially suicidal nature of my landing approach.

I now realize that, until Chester's criticisms had really sunk in and had produced what I hope is a permanent change in my approach technique, I was exposing myself to a high degree of risk almost every time I came in to land.

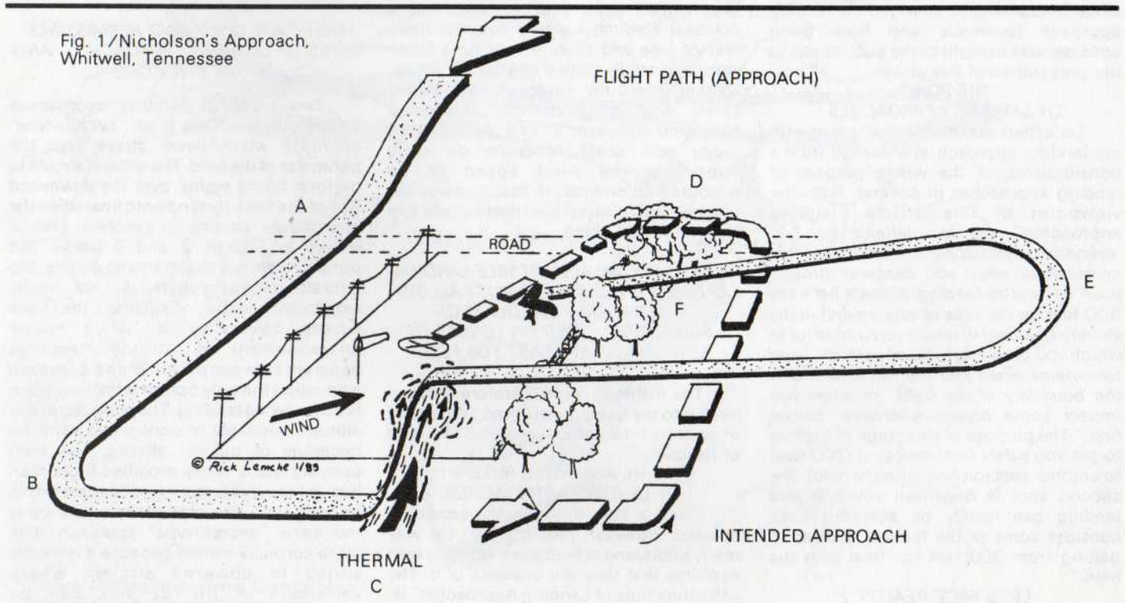
This information would not be particularly noteworthy were it not for the fact that I have seen innumerable pilots perform similar potentially lethal approaches at Whitwell and elsewhere. So, please read on and please take a very honest look at your own technique. Inadequate approaches will get us eventually if we don't correct them.

First, let's look at what I did at Whitwell. Now, Whitwell has a fairly tight landing area. It is surrounded by an assortment of wires, houses, and trees of various heights as indicated in the Figure 1 illustration. (*NOTE: Since this article was orginally put together, the landing area at Whitwell has been considerable enlarged by removing a line of trees. —R.N.)* So it goes without saying that it does not allow for major mistakes. Consequently, it has a minimum artime requirement of five hours, or a Level III pilot rating (established by the controlling Tennessee Tree Topper club).

Conditions were light — no one stayed up for long. I arrived at point 'A,' as indicated in Figure 1, with plenty of altitude to set up an unhurried approach. My plan, as indicated by the dotted line, was to bleed off altitude steadily from 'A' to 'B' to 'C' so that by the time I reached 'D,' I would be at the right altitude to turn onto final.

Everything went according to plan until I gained an unexpected 50-100 feet in lift between 'B' and 'C.' It was now clear me that if I continued on my original approach plan, I would be much too high at 'D' to turn onto final. So I considered other ways of arriving at 'D' with the desired altitude. What I decided to do was to extend my flight path from 'C' to 'E' and turn back towards 'D' when I had lost my excess altitude. This plan worked out well. I cleared the low trees at 'F' by about five feet and landed with three-quarters of the field to spare without even so much as touching the nose-plate of my new double surface

Fig. 1/Nicholson's Approach, Whitwell, Tennessee



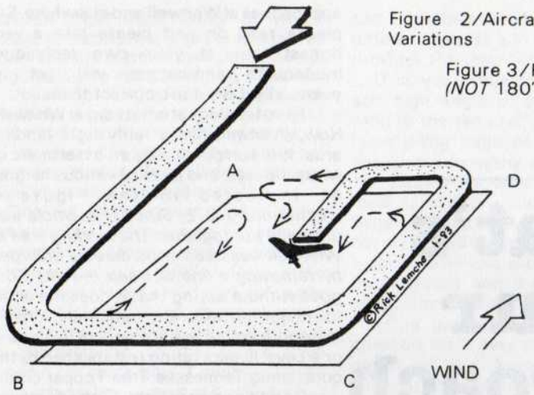


Figure 2/Aircraft-Type Approach and Variations

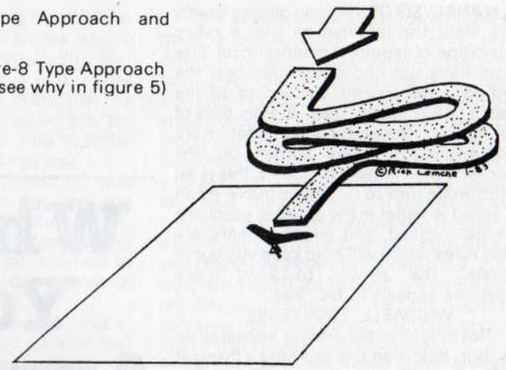


Figure 3/Figure-8 Type Approach *(NOT* 180's -- see why in figure 5)

glider.

I felt quite pleased with myself for having handled a tight landing area so well in less than straightforward conditions. Then Chester walked over. I don't think I have ever seen Chester so incensed. He obviously considered the approach (exactly with which I was quite pleased) to be one of the most incompetent and unsafe approaches he had ever witnessed. My immediate reaction was to defend myself. I pointed out that ten minutes later two Level IV pilots had approached exactly as I had, and I asked Chester why he wasn't at least equally critical of one pilot who had missed the landing area by three-quarters of a mile!

It is difficult to admit that one is wrong, instantly, right there on the spot. However, given twenty-four hours to think about it, I came to realize that Chester had been absolutely right. So much so that I have since fundamentally changed my landing approach technique and have given considerable thought to the subject and to the preparation of this article.

THE POINT OF LANDING APPROACHES

Let's think about what was wrong with my landing approach at Whitwell from a consideration of the whole purpose of landing approaches in general. From the viewpoint of this article "landing approaches" will be defined as: *". . . everything that happens in the period that commences when you descend through your 'commit-to-landing' altitude* (let's say 300 feet for the sake of arguement) *in the vicinity of a field in which you intend* (or in which you are going to have) *to land . . . and terminates when you are 'on final within the boundary of the field,' or when you impact some object, whichever comes first."* The purpose of this stage of flight is to get you safely from one spot *(300 feet)* to another spot *(on final over the field)*. The second spot is one from which a safe landing can readily be achieved. Let's consider some of the factors involved in getting from 300 feet to "final over the field."

LET'S FACE REALITY

We all know that it is a fact of flying that many strange, uncomfortable and unpredictable things can happen between 300 feet and the ground. Most landing approaches entail last minute modifications to the plan to take care of developments that were not completely foreseen at the time the plan was originally set. The most obvious of these events are related to lift, sink, and other kinds of turbulence. But they also include wind gradient, wind shadow, and others. Given that *problems* relating to turbulence of one kind or another will frequently be encountered on landing approaches, *IN ORDER TO BE SAFE, ONE'S APPROACH TECHNIQUE MUST BE ONE THAT WILL ALWAYS READILY COPE WITH ANY SUCH EVENTUALITY.*

Now, let's again consider my approach at Whitwell. Would it have coped safely with eight feet of sink between 'E' and 'F?' The answer is, "No." I had cleared the trees by only five feet. If I had suddenly experienced eight feet of sink (not a colossal amount) I would have hit three feet of tree and likely would have fallen vertically, totally stalled and out of control. Neither would my approach have coped safely with a greater-than-anticipated headwind between 'E' and 'F.' Who can judge with great reliability on every approach, the wind speed to be encountered on final? In fact, this was the reason why I cleared the trees by only five feet in the first place.

TO BE SAFE, AN ACCEPTABLE LANDING APPROACH TECHNIQUE MUST ALLOW FOR THE SAFE HANDLING OF UNEXPECTED GAINS OR LOSSES OF ALTITUDE OF AT LEAST 100 FEET.

The matter at issue therefore resolves itself into the basic question of, "What kind of approach technique provides this kind of flexibility?"

THE ABSOLUTE RULE OF LANDING APPROACHES

Given a little thought, the answer is obvious. However, judging from the way many pilots land at high sites, I can say with certainty that they are unaware of it. The "Absolute Rule of Landing Approaches" is:

BELOW 300 FEET, NEVER STRAY EVEN ONE YARD OUTSIDE THE PERIMETER OF THE LANDING FIELD, or, if altitude is still sufficient, never let the perimeter of the field be out-of-reach of your worst possible glide angle.

This provides the flexibility required. If unexpected lift is encountered, additional figure eights woll burn it off and put you back where you want to be, while in the case of unexpected sink, you can always turn onto final sooner than originally planned. Should any pilot respond at this juncture with, "Well, that's obvious; we all know that," I recommend that he or she check his log book and think back over his or her ten most recent cases of high flights to recall the approach he or she did in each case. From observation, I can say that many Level IV pilots violate this basic safety rule.

Let's take this a bit further.

THERE ARE ONLY TWO PERMISSIBLE TYPES OF LANDING APPROACH . . . AND MAYBE ONLY ONE.

Two types of landing approaches satisfy our rule. One is an "aircraft-type" approach which never strays from the perimeter of the field. The other is simple to perform figure eights over the downwind end of the field, turning onto final when the appropriate altitude is reached. This is shown in Figures 2 and 3 below. But purists might say that for hang gliding, the aircraft-type approach is not really satisfactory either. Consider the case where severe sink, or a major misjudgement of altitude, becomes apparent between points 'B' and 'c.' In such a situation the only option remaining open is a downwind landing. The pilot who at low altitude suddenly is confronted with the necessity of quickly altering and then carrying out a vastly modified flight plan has, at the very least, an anxious time on his or her hands. One now realizes how apt is the name "aircraft-type" approach. It is more correctly named because it is ideally suited to powered aircraft, where variations in lift or sink can be compensated for by changes in power setting.

APPROACHES TO VERY CONFINED LANDING AREAS

Now let's consider whether our rule concerning never straying outside the perimeter of the field should be relaxed in the case of an extremely tight landing field. If we are concerned with getting into a very short field, should we stray from our rule and set up final as a "long approach" to come in as low as possible over the tree tops in order to use up as little field as possible? In other words, does this exceptional situation merit a departure from our rule?

A few moments reflection provides a very clear answer. It is, "NO!" The best way to get the lowest into a short field is to do figure eights until one of the passes brings you below the tops of the trees (see Figures 3 & 4). When you now turn onto final you will be lower than you could ever have been no matter how well you had judged a long final designed to come in low over the trees. Thus . . . *NO EXCEPTIONS TO THIS RULE.*

This point is worth emphasizing. Gerd Neubeck died in an incident in McBride, British Columbia that was almost identical to the one described above. The only material difference was that he misjudged his altitude by eight feet more than I did. A careful analysis of Gerd Neubeck's accident indicates clearly that he set up his final approach in such a way that it put him in the position, on his final turn into the field, of flying low over the tops of high trees at the edge of the field. It is likely that he set up this particular approach because of the exceptionally small landing field. Such an approach entails enormous risk in the event of minor misjudgement (as occurred in his case), or minor unexpected sink. It is an approach, in short, that leaves no safe alternatives. But the most telling commentary on this entire issue is this:

THE IRONY OF IT ALL IS THAT THE TECHNIQUE THAT GETS YOU THE LOWEST INTO A FIELD SURROUNDED BY TREES DOES NOT ENTAIL THE RISK OF FLYING LOW OVER THE TREES.

Bear in mind also the invaluable piece of advice offered to me by a fellow hang glider pilot. He had the unfair advantage of also being a one-time flight instructor who had flown in aircraft since he was ten, and had 7,000 hours in multi-engined jet aircraft. That advice was: When performing figure eights in order to manipulate yourself into a field, the most important turn is not the last turn onto final, but the one from last turn.

A LANDING APPROACH CHECKLIST

Powered aircraft pilots use checklists extensively. Although hang glider pilots do not use them much I suggest a landing approach checklist, with the acronym "SWAT WOPA AA AA AA AA."

RODNEY'S LANDING CHECKLIST

Before flying a site for the first time:

1. STAND in the landing field and observe.
2. Check WIND direction.
3. ASK about the site and whether you should fly (in the existing conditions).
4. Plan to arrive with at least THREE HUNDRED FEET of atitude. .....

And when you arrive over the landing field itself:

5. Check WIND direction.
6. Remind yourself of OBSTACLES.
7. Never stray outside the PERIMETER of the field.
8. Increase AIRSPEED.

9. Adjust ALTITUDE.
10. Watch AIRSPEED.

9. Adjust ALTITUDE.
10. Watch AIRSPEED.

9. Adjust ALTITUDE.
10. Watch AIRSPEED.

ET CETERA until you land.

CHECKLIST NOTES

1. Before flying a site for the first time, stand in the landing field and check: (a) the slope of the ground, (b) wires, (c) trees, and (d) other obstacles. Consider the potential for: (e) wind shadow, and (f) wind gradient.
2. Check the wind direction.
3. Ask other pilots about the problems that others have had landing at the site,

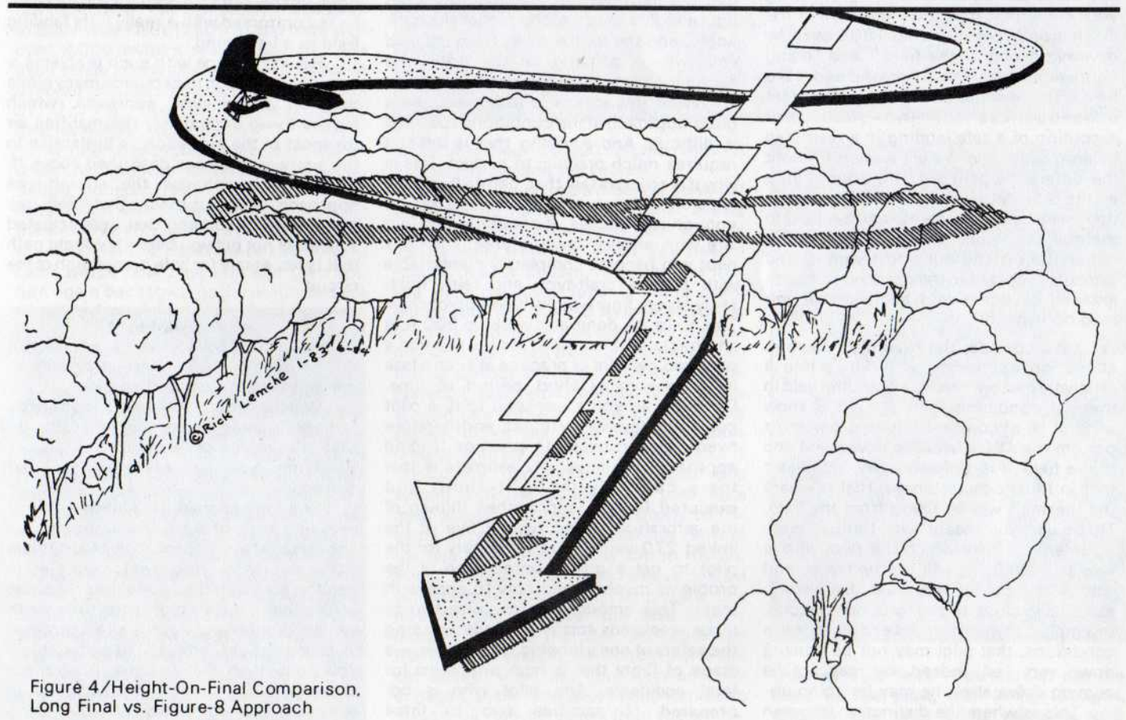


Figure 4/Height-On-Final Comparison, Long Final vs. Figure-8 Approach

and if, given the conditions and your flying ability, should you fly this site today?

4. It will vary with the site and the conditions, but plan to arrive over the field with at least 300 feet of altitude.

5. Check the wind direction again; it will likely be different.

6. Obstacles . . . don't hit them or fly into wind shadow caused by them. *(Remember the old premise; where you're looking is where you're headed -- so, don't stare at the obstacles "hoping" to avoid them.)*

7. Never stray outside the perimeter of the field.

8. Increase airspeed to provide good control response, to avoid stalls in general and wind gradient-precipitated stalls in particular.

9 & 10. Every time you make any maneuver, check your airspeed. Stalling below 300 feet makes no sense at all.

9 & 10. Yes, again, and again, and again, check your airspeed. Don't spoil it now. *(An old hang gliding flight instructor once remarked, "There are only three things that're important on landing approach — (1) airspeed, (2) airpseed, and (3) airspeed!")*

A NOTE ON
FIGURE EIGHT APPROACHES

If, as has been recommended in this article, doing figure eights over the downwind boundary is the closest thing in hang gliding to a fool-proof landing approach, why do pilots ever do anything else? This is an interesting question.

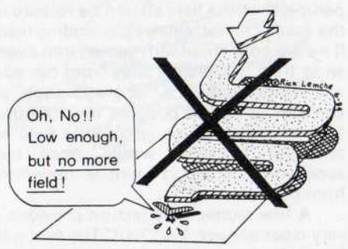
Pilots who have yet to set up a landing approach at a high site with a tight landing area are almost invariable unaware of the distinction between "doing 180's over the downwind end of the field," and "doing figure eights over the downwind end of the field." This distinction can have important consequences for the successful execution of a safe landing in a restricted landing field. The easiest way to find out the difference between 180'2 and figure eights is to try to land using 180's over the downwind end of a short, narrow field in thermal conditions with a light wind. But rather than going out and trying it, and exposing yourself to the risk to your health entailed by doing so, I suggest that you read on instead.

Let's consider the example I mention above: an approach using 180's into a relatively narrow, restricted landing field in thermal conditions with a 5 to 8 know wind. It is, of course, basic that one must peform the 180's over the downwind end of the field. It is, unfortunately, also basic that in most circumstances, that is where the thermals will be rising from the field. Thermals will mean two things. First, turbulence. . . for which the pilot who is new to high flying will not be ready, and who will find at the very least, disquieting, especially close to the ground. Second, thermals . . . which translate to lift. In these conditions, that pilot may not be coming down very fast. Indeed, he may not be coming down at all; he may be going up.

This is where the distinction between 180's and figure eights comes in clearly. In a light wind, if you do one 180 after another, you may well find that you are rapidly advancing down the landing field and rapidly running out of field while still 100 feet above the ground. This can be very disconcerting. Imagine the situation: already half way down a short field and still at 100 feet. What do you do? A 360 at 100 feet? Perhaps, if you are a 500 hour pilot, but not if you only have 100 hours. *(Probably if you were a 500 hour pilot, you wouldn't find yourself in this situation in the first place; and 500 hour pilots rarely attempt risky maneuvers like 100 foot high 360's.)* The difference between 180's and figure eights in these conditions is that doing figure eights enables you to remain over the downwind end of the field. Doing figure eights such that you remain in this quality position entails doing tight, quite steep turns in which, at certain times — in the "downwind" segment of the figure eight — you will be pointing perhaps 130 degrees away from the direction you intend to take on final. This means that figure eights are not merely 180's; they are multiple, linked 270's, alternating in directions. And on top of all this you have to do them at what is probably the most turbulent spot in the vicinity, where all the thermals will most likely be leaving the field, and close to the ground, trees, and wires as well. Executing a good approach in these circumstances is not easy for a 100 hours pilot. For someone new to soaring, it is enough to scare the pilot out of hang gliding altogether. It should also be noted that the narrower the field the tighter the figure eights must be, the higher the bank angle, and the further away from the field you will be pointing on the downwind segments of the figure eight.

What this means is that executing a good approach in the conditions specified is difficult. And anything that is difficult requires much practice to perfect. This is why it is so important that, before flying any high site, a new pilot must have set up enough approaches, at a walk-up 300 foot site with an easy landing area. Then this pilot can become completely comfortable with both aircraft-type and fairly tight, fairly steep, figure-eight-type approaches. This must be done at a walk-up 300 foot site because it is only at such a site that a pilot can get a lot of practice at such a task in a reasonably short period of time. Devoting an entire weekend to it, a pilot could get, say, twenty flights, and therefore twenty opportunities to practice landing approach technique. My estimate is that forty carefully-thought-about and executed landing approaches (fifteen of the aircraft-type and twenty five of the linked 270 variety) are necessary for the pilot to get a good appreciation of the problems involved and how to cope with them. This amounts to devoting two to three weekends totally towards ensuring the safety of one's landing approaches — a stage of flight that is high on the list for fatal accidents. Any pilot who is not prepared to sacrifice two to three weekends for this purpose demonstrates a sufficient lack of regard for his own safety that he would be well advised to get out of hang gliding altogether.

Figure 5/NEVER use this method!
The so-called "180 Approach;" actually a misnomer or possibly mistaken for proper Figure-8 Approach (See figure 3)



The new pilot should go about this task very carefully. He should not attempt it until he has perfected coordinated 30 degree bank 90's and is comfortable with 180's. And he should start out with very wide shallow bank angles and only gradually increase the bank angle and tightness of the turns, at all times ensuring that he has plenty of airspeed to avoid stalling. And the practice shoudl not end here. The only really safe place to practice steep, tight 270's is at altitude. So when the pilot begins to make altitude gains of 1000 feet or more, one thing he should have high on his list of things to practice — when well clear of all other pilots and other obstacles — should be to try some really tight, linked 270's, in preparation for when he is confronted with a really tight landing field in a light wind.

Having to cope with such problems is more than enough to persuade many pilots that an aircraft-type approach, which means flying in relatively thermal-free air for most of the approach, is preferable to the scary experiences described above. If, however, you choose the sircraft-type approach, you must realize that it requires greater skill in judging that unanticipated sink does not put you below the flight path that is necessary for safe completion of the circuit.

SO, IN SUMMARY

Remember SWAT, WOPA, AA, AA, AA.

Below 300 feet, never stray outside the perimeter of the landing field.

Watch your airspeed constantly (though, if using an airspeed indicator, do NOT stare at the device alone).

Time your one-from-last turn correctly.

And for a pilot who is shortly going to be flying high sites for the first time: get enough practice approaches at a suitable site, so that you feel completely comfortable with figure eight approaches before venturing to high sites. And when you are regularly flying high sites, continue to practice tight, linked 270's at altitude. You will then have done just about everything you could reasonably do to eliminate the possibility of your being involved in a landing approach incident. §

STUFENSCHLEPP/ STEP TOWING

From Germany comes another towing innovation/text and photos by Gib Eggen, D.O.

WITH FALL WELL ENTRENCHED by now, a discussion of towing seems appropriate. . . a good way to get up high and cruise, or to practice aerobatics. Here in Europe, we use a method called step towing (Stufenschlepp), by which we can easily tow up over 3,000 feet AGL.

Towing in general takes on new meaning when the tow is not "one way," but "stepped," as though climbing a reversing staircase. This system of towing, used in Europe, occurs when you are towed up in a step-wise fashion by *flying AWAY from the winch while still attached.* It is a great method, and a lot of fun in and of itself before you ever release. I purchased a German Koch brand winch with six other flying friends in the spring, after having taken a Geman certified towing course. We commonly make tows to 800 meters AGL [2600 ft] and tows well over 2,000 meters AGL [6500 ft] have been safely accomplished (see diagram of a record altitude step-tow to 2,370 meters or 7,775 feet,*compliments of Drachenflieger magazine*).

A brief description here will help in understanding what follows in more detail. Simply, in step towing, you are towed towards the winch, make a turn away from the winch as you near it, fly away from the winch *while still attached to the towing cable which now pays out,* and then you turn again back towards the winch and are towed higher aloft. Repeat the procedure, and the chorus, YAHOO!!

EQUIPMENT

As of about December 1983, Germany itself had more than 40 winches in use, but of course not all of these were capable of step towing. Step towing winch systems must be capable of paying the line back out as well as pulling it in, and the winch must have good line guiding systems that will not catch nico swedge repair area in the line as it returns. These winches also need additional oil pump cooling systems to cool the clutch between the motor and the winch, as step towing takes a longer time — sometimes as long as an hour — and can create a lot of heat.

Usually 1.8 mm [slightly larger than 5/64 inch]steel cable is used, which very seldom tears. Kinks in the line or multiple twists can weaken it. Some kite winches have launched 10,000 flights without needing to replace the cable.

You must also use a different center of mass towing harness system that allows the line to hang *behind* the base tube as you fly away from the winch. You need a double release system, releasing the first line *over* the base tube at some point during your initial climb. A large bungee is incorporated in the line system to pull this first line away from the pilot and the kite, so that it cannot entangle itself in the kite system. Likewise this bungee will pull the second line away from the pilot and kite system when the pilot finally releases himself entirely from the winch. Photo 1 shows the parachute and double line system with the bungee. The parachute itself allows the line to fall slowly to the earth, or to let the winch operator retrieve the line system while it is still in the air. Photo 2 shows the Fluch release system with the double levers. In this picture, one lever for the line *over* the base tube is already open, as the pilot has depressed the first lever system. The bottom line is still connected with the lever system still engaged. When the pilot finally wishes to disengage himself totally from the winch, he depresses his remaining lever; or as a

(Above) Tow lines — on the left are the lines to the pilot, with in-line bungee. (Below) The pilot bridle releases, with upper release open.

safety feature, if he hits this lever *at all*, both lines are disengaged simultaneously. Photo 3 shows Rolf Markmann hanging in a trapeze which demonstrates how this center of mass harness is connected to the pilot and the kite itself. Two lines run through the metal tubing itself, one line encircling the pilot's body as a safety line. The other system goes through the tubing and up through the normal carabiner connection point of the harness. This is the line that must be adjusted properly to give the pilot enough distance away from the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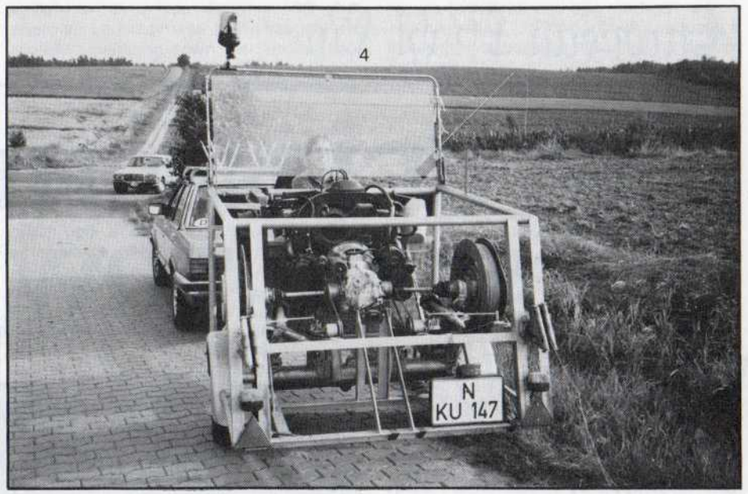

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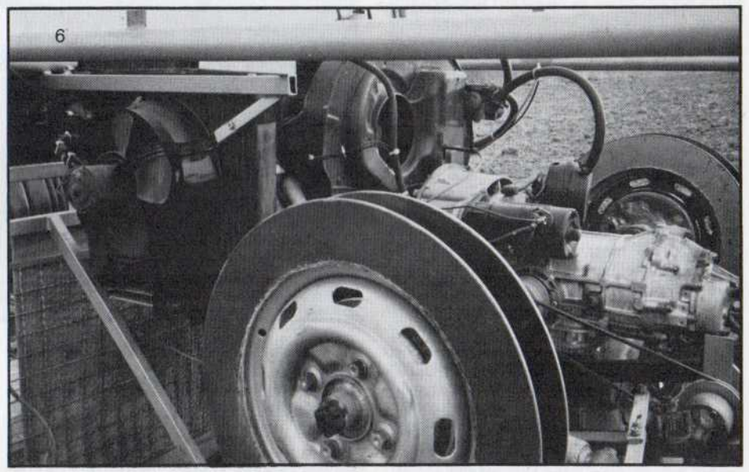
(Clockwise from top) The Koch winch; dual cooling fan system; Rolf Markmann models the center of mass attachment; winch control panel with protective shield and radio.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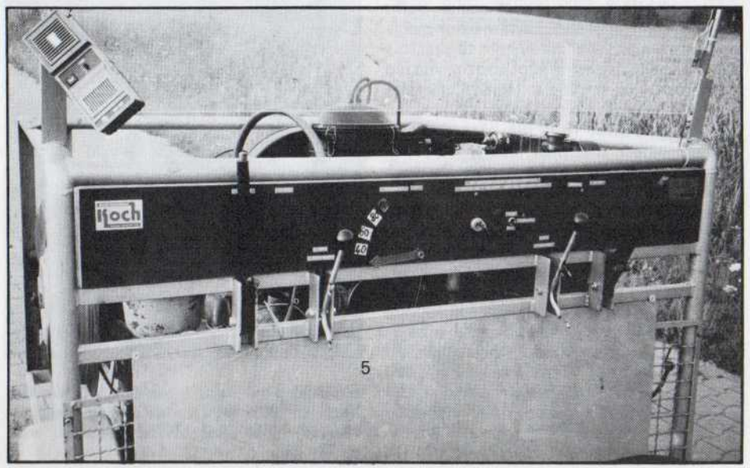

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base tube, to allow free control of the kite as he is being towed, and is the main suspension point of the system.

THE METHOD ITSELF

Looking at photos 4 and 5 you can see the Koch winch on its trailer, which actually has two drums, each capable of towing up a kite. You can see the four levers on the control board with the arrow indicating how many kilograms of tension are on the cable, ranging from 40 to a maximum of 100 [88 to 220 lbs]. The inside two levers are for regulating the gas and the towing power, and the outside levers are the brake systems.

Levers on the left and right sides are for the respective towing drums. If the throttle levers are pushed forward hard, the cables will be instantly cut for emergency situations.

In photo 6 you can see the dual fan system for cooling the oil around the

automatic VW engine, and for the clutch system. The fan in the middle is a normal fan for the engine, and the fan to the left is the extra fan used for cooling the winch during step tows.

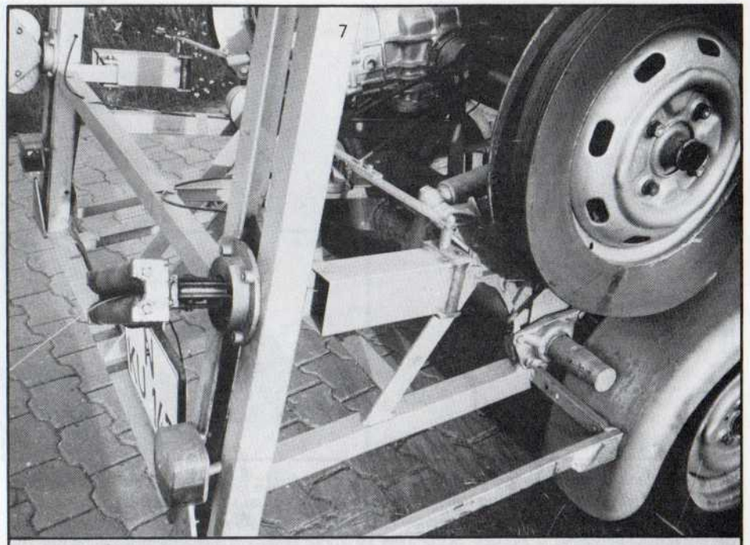
Photo 7 shows how the line is fed through a system of rollers to smoothly and uniformly distribute the line onto the drum. Also note in photo 4 the operating light that Sigfried Zecher installed on our winch that spins and shines just as a lighthouse beacon whenever the winch is in operation and drawing in the line. This helps on a step tow when you are as much as a kilometer away, by giving you advanced warning that the winch operator has re-engaged the clutch and is about to pull you in again. It also lets other aircraft, such as sailplanes know that you are there in the airspace.

For step towing you need a cable at least 500 meters long [1640 ft], and an obstacle-free area with ground terrain that has nothing that can catch the cable if it lies on the ground. You must have a good winch operator as well as a good pilot. Generally, both the pilot and the operator should have at least 100 normal tows before trying to step tow. Coordinating a winch correctly is much more difficult than actually flying the step towing procedure, and *responsibility for step towing operations always lies with the winch operator.*

You need a launch official at the pilot end, with a radio, as well as a radio for the winch operator, and preferably one also for the pilot. A series of commands are repeated between the launch operator and the winch operator prior to launch in a well-known sequence that is taught in the German towing schools. Launches can be aborted at any point with a HALT! STOP! command by the launch official.

Photo 8 shows Markmann in position, ready to launch, with cables connected over and under his base tube, and the tow cable taut. When starting you should fly up at a 30° or less to the horizon until you reach 50 meters [over 150 ft] above ground. If the cable breaks after that you have enough time to get the nose up before reaching the ground. Before that, you need a flatter flight angle so the kite's nose will not drop severly if the cable breaks. When starting, you should use only 40 to 50 kg [88 to 100 lbs] of cable tension which allows a gradual enough climb. After this, the maximum kilogram cable tension should be calculated by: [total flight weight (man + glider) - 10 kilogram].

During your initial climb, release the upper cable which is the one over the base tube. You are now connected only by the cable under the base tube. Shortly before you reach the winch you separate your legs (or use another predetermined signal) and the winch operator puts the system in neutral, allowing the line to pay out. Photo 10 shows Rolf Markmann in his Moyes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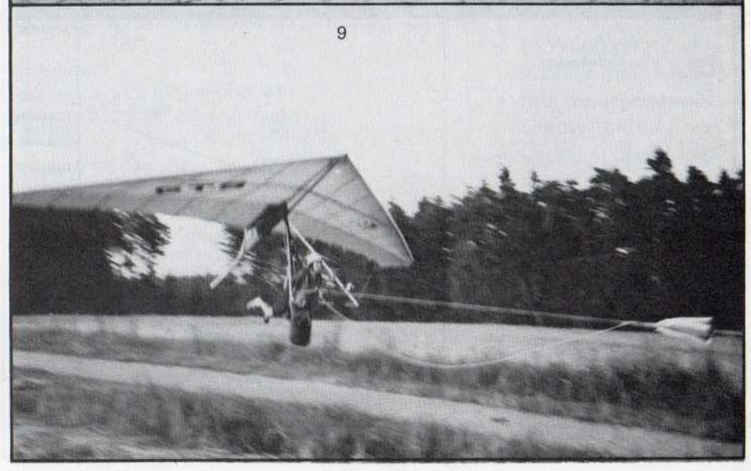
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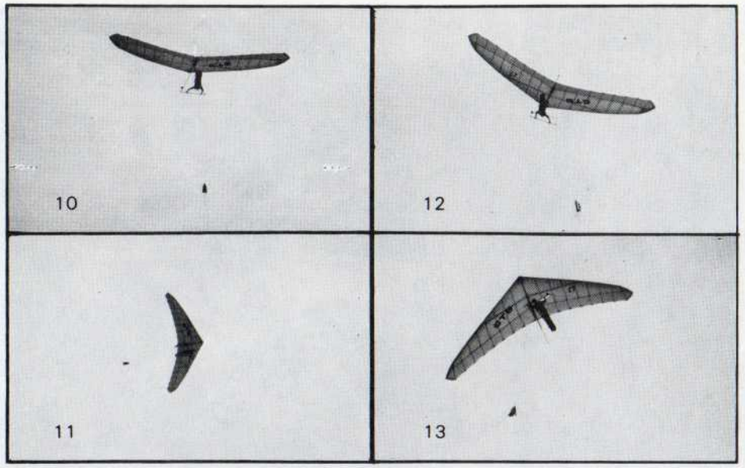
(Top) Line control devices; Rolf Markmann ready to launch; just after launch.



(Above -- Clockwise from top left) Tow pilot above winch; beginning 70 m [230 ft] radius turn away from winch; trailing line on downwind leg; pilot on base/return leg — cable drive clutch now re-engaged. (Below) From DRACHENFLIEGER magazine, the barographic proof of a record Step-Tow to 7,775 feet, with diagram illustrating the reversing tow methods. Comparing the two will further clarify the process.

GTS, almost directly above the winch just before the system has been put into neutral. The pilot then makes a 50 to 70 meter [150-250 ft] radius turn away from the winch (photo 11), flying away, with the wind, *pulling the cable along with him* (photo 12) from the uncoupled drum which has a small resistance of only 1 to 2 kilograms.

Generally, flying straight back to the starting place is best. With long cable lengths (high tows) you need to check where the cable is lying on the ground behind you. I have seen a cable lift a 55 pound, ¼ inch thick steel landing distance sign off the ground at a sailplane airport, slicing through it like butter in the process. *BE CERTAIN NO PEOPLE ARE EVER IN THE TOWING AREA!*

It is recommended that you be 150 meters [500 ft] above ground when you start your return; if not it may be better to release. When the pilot is cross to the winch in his turn, the winch operator engages the clutch, creating a 10 to 20 kg cable tension (see photo 13).

Because the cable is initially slack, this tension will not normally "jerk" the pilot. My experience shows that it is better to wait to engage the clutch until the pilot is *at least* cross to the winch. As the pilot it is easy to lose your cool and let out a string of expletives when the line goes taut before you are cross to the winch, pulling up against your rear flying wires and throwing you into a bank *away* from the winch. Your options, should this occur, are pretty limited, and leave you essentially at the mercy of the winch operator. If he is good, he'll drop the tension, allowing you to complete the turn and continue. If not, you will be forced to release. Situations like this demand radio communication, which I believe you *must* have for this and probably any type of towing.

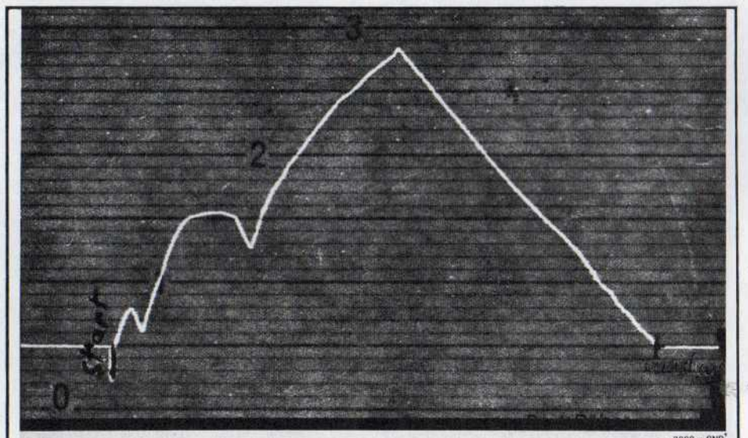
After turn completion, the winch operator applies full power and the whole process is repeated ad infinitum until you reach your desired altitude. Heights over 2,000 meters AGL are attainable; though be careful not to illegally intrude into controlled airspace or traffic patterns.

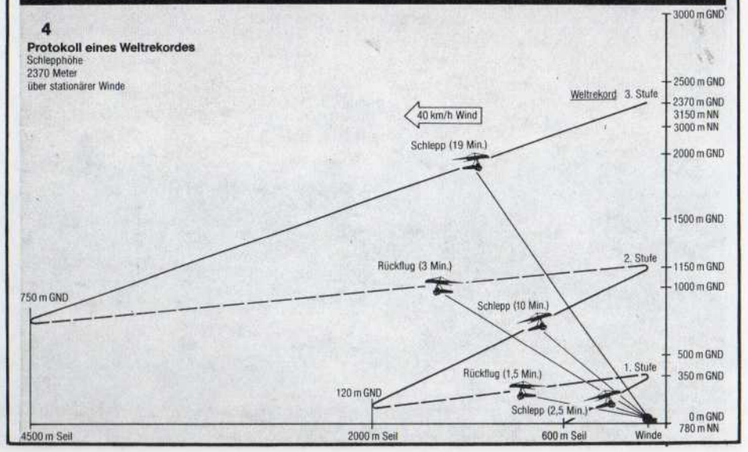
SOME TIPS FOR
A WINCH OPERATOR

1— Warn the pilot before he reaches the end of the cable or you'll have he and his glider strewn all over the landscape!

2— Just before engaging the clutch for the pilot about to make a return, *lightly* apply the brake a few times to slow down the spinning cable drum, in order to maintain some line tension in the transition phase where the pilot turns and flies towards you. Otherwise, the drum will pay out cable too quickly under minimum tension as the pilot returns. This backlashes the cable onto the drum, then off the drum, creating a real rat's nest. (Even if you've had one on a fishing reel, you will not believe the hassle of it occurring on a tow winch.

Step towing can be done safely and has obvious advantages over towing by autos or with single cable lengths. Hopefully, pilots will also begin using this method in the USA, which I believe also has a place along with that of the trike towing systems. §





PILOT DEMOGRAPHICS

In a change of pace, our steadfast Owner Survey analyzer, Bruce Wolfe identifies facts about many of the hundreds of responding owners. Next issue concludes with a "Grand Review."

THE GLIDER OWNERS SURVEY conducted by *Whole Air* should be familiar to most readers by now. However, allow me to make a brief review of the survey for the sake of newcomers to the pages of *Whole Air*. A questionnaire appeared in two issues of this magazine in 1983 which consisted of 149 questions relating to the pilot's glider, the manufacturer and dealers, and the pilots themselves. The response to this survey from the hang gliding populace was excellent. Reports on the UP Comet, the Wills Wing Harrier, the Seedwings Sensor 510 and 210, the UP Gemini, and the Progressive Aircraft ProStar, based entirely on the returned onwer survey questionnaires, have already been published in preceding issues of *Whole Air*.

As promised last issue, this space will be devoted to pilot demographics gleaned from the owners survey. This report is the result of nearly 10,000 (9,944 to be exact) individual bits of information from 226 questionnaires (out of 538 generated), covering 29 different glider models. Approximately half of this data is from earlier owners survey reports while the remainder is new information from surveys processed more recently.

When considering the distribution of pilots across the USA, one must realize that this is a compromise between *actual* pilot distribution and the distribution of the *Whole Air* questionnaires. Even so, few surprises show in the results.

Most readers probably expected to see California have the highest percentage of pilots, and it did with 18%, more than twice as many as any single state. *(Ed. Note: 24.5% of* Whole Airs are mailed to California alone.) Washington State was next with 8%, and — this seemed surprising — Texas was third with 6% of the survey population.

The eastern states with the highest pilot population were North Carolina with 5%, Tennessee with 4.5%, and New York with 4 percent. The pilot distribution for the rest of the USA can be seen in the map.

Eleven states were not mentioned in the returned surveys. Surely most, and probably all of these states, harbor a pilot population within their borders. *(Ed. Note: All 50 states have subscribers to* Whole Air.*)* The non-responding states were: Alaska, Connecticut, Delaware, Hawaii, Maine, Mississippi, Missouri, Nebraska, New Hampshire, North Dakota, and South Dakota.

Dividing the country into its four time zones showed the Pacific time zone had a total of 28.5% of the survey population. The Mountain and Central times zones were nearly identical at 14.3% and 14.8% respectively, and the Eastern time zone had 38.4% of the responding pilots.

The average physical statistics of this survey group derive an age of 31.6 years, with a range of 18 to 60 years old, and an average weight of 164 pounds.

Of special interest are the average pilot experience levels and sport participation figures. For this group of 226 pilots (statistically about 3½% of the USHGA membership), the average length of time flying hang gliders is 4.3 years during which time 79.3 hours of airtime has been accumulated. The upper limits for these figures were 11 years of flying involvement with over 1,000 hours of airtime.

These average figures indicate the average pilot has 17 hours of airtime per year of hang gliding activity. This time has been acquired by flying 4.6 times per month which produces an average flying time of 18 minutes per flight. Some pilots said the flights-per-month figure was during the flying season only, which would make the average time per flight longer than 18 minutes, although it cannot be determined just how much longer.

One quarter of these pilots also had flight time in aircraft other than hang gliders, although what type was not specified. Those who did have other flight time averaged 370 hours over 6.5 years, or 60 hours per year of flying.

Competition participation figures are as follows: 19% of the survey population participated in their Regionals; 5% reported flying in the Nationals, and 35% said they flew in some type of competition. It, of course, should be pointed out that this competition participation took place over their flying careers; it is not indicative of the percentage participating in any single year.

The questionnaire did not directly ask if pilots were members of USHGA, but they were questioned about their pilot ratings. The percentage for each rating is listed below:

V — 0.5% (one pilot)
IV — 32.0%
III — 35.0%
II — 18.0%
I — 4.5%
No rating — 10%

It is very likely that those with no rating are not USHGA members (this included some very experienced pilots). Since it is likely that some of those who gave ratings are not current members, it is safe to say that *at least* 10% of the survey population do not belong to the USHGA, and very possibly this number approaches one-quarter of all respondents.

What type of associated flying paraphernalia do these pilots take flying with them? Listed below are ten accessory equipment items presented in order of their popularity:

Helmet	100%
2nd Hang Strap	93%
Parachute	86%
Variometer	75%
Altimeter	68%
Two-way radio	34%
Air Speed Indicator	30%
Compass	23%
Ballast	4%
Strobe Light	0.9%

Note that the top ranked three items are safety-related and that absolutely everyone (all 226) used a helmet.

Finally, let's take a look at some the pilots' priorities revealed by the survey. The questionnaire listed sixteen qualities of a glider and asked pilots to rate each with a standard rating system.

Comparing the results from 226 re-surveyed pilots with those from individual reports on the Sensor, Harrier, and Gemini informs us of some of the diversity and similarities of these four groups. The over-riding concern for all the pilots is structural integrity. However, the next priorities vary considerably between performance and handling qualities. Sensor pilots consider performance vitally important, but Harrier pilots value handling slightly above performance. Gemini pilots, the least experienced group, combined handling and performance qualities closely together around a "significantly vital" rating.

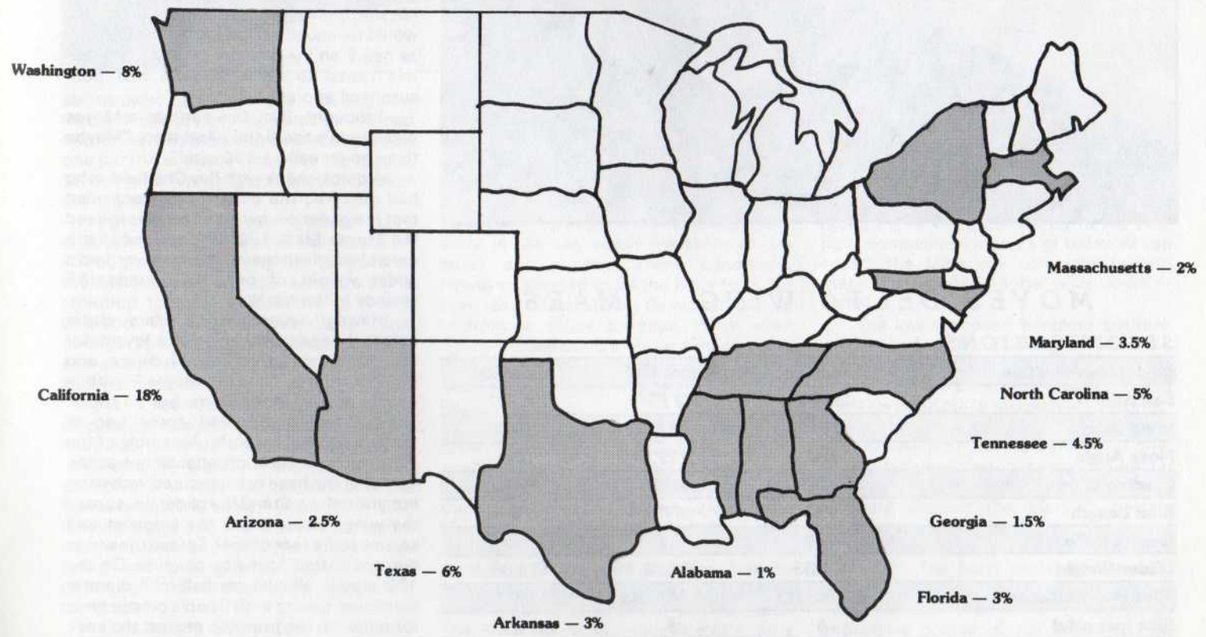
All four groups rated set-up ease, light weight, and price between "significant" and "average importance," and delivery time is rated at "average importance. Commonly shared priorities rated between "average" and "low importance" are brand names (except for Harrier pilots, where it is rated "above average importance"), popularity, and innovation (except Sensor pilots, who rate it "significant").

In my own case, much of this information on pilot priorities has reinforced my perceptions of the particular groups of pilots considered. But even though the information may not be a surprise, it is valuable because it has been quantified. A British physicist once said something to the effect that, "If you can put a number on a quality, then you begin to know something about it." And that, after all, is just what we want; to know something about the prime mover of the sport of hang gliding . . . *its pilots.* §

In the final report generated from Whole Air's *Glider Owners Surveys, Wolfe will compose a "GRAND REVIEW" of all gliders involved. This will include averaging those models already reported as well as several models which were not given a separate report due to the smaller volumn of responses.*

This will conclude a full year of Whole Air's *extremely popular Owner Survey series, by far the largest and most comprehensive survey of American pilots ever published. To all who participated, "Thanks!" We hope you enjoyed it and advise you to look for the "Grand Review" in our year-ending December 1984 issue.*
—Ed.

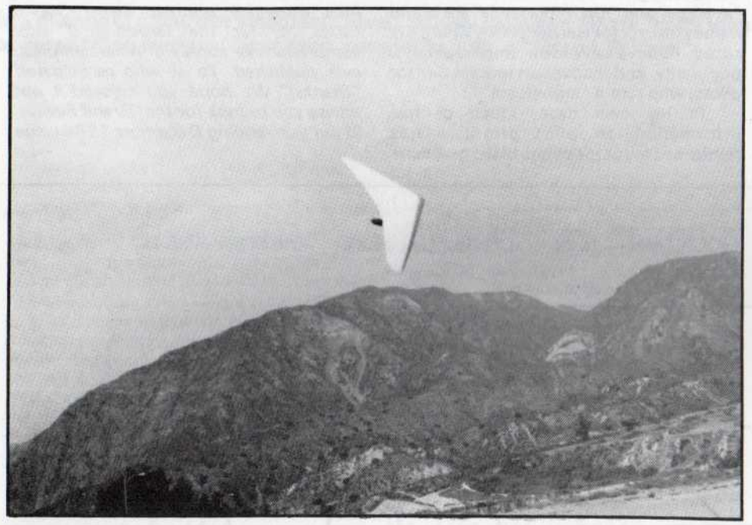
Totals by Time Zones:
PACIFIC — 28.5% **MOUNTAIN — 14.3%** **CENTRAL — 10.8%** **EASTERN — 38.4%**



NOTE: All figures above represent totals from WHOLE AIR's *survey. These do NOT represent the U. S. hang glider population nor USHGA membership distribution. All information above from 226 pilots surveyed, a fair sample size (3.5%) of known USHGA membership totals.*

MOYES MARS

In the down-to-earth Mars from Moyes, Paul Burns reports the pleasing qualities of the intermediate glider whose light weight surprised him.



I FELT LUCKY to catch Steve Moyes in the Los Angeles area between his trips to India, Italy, Vancouver, B.C. Steve agreed to furnish all three sizes of the Mars for evaluation. However, Steve's trip to the Grouse competition gobbled up nearly two weeks of valuable time, and a shipping delay caused another lost week, leaving me only twenty days to complete my evaluation.

Initially, my goal was to fly each size a minimum of five hours each. As Murphy's Law would have it, I ended up flying the 190 model for a total of ten hours over seven flights. Only two flights were accomplished on the 170 model in (non-soarable) conditions. I was prevented from flying the 150 Mars by a shipping delay. As a result, this article will primarily be concerned with the Mars 190.

Having flown many earlier Moyes gliders (Maxi II & III, Mega II, Meteor, Missile, and G.T.), I assumed the Mars 190 would be equally strong in the air and just as heavy on the ground. When I first lifted this model to my shoulder I was both surprised and confused.

I thought, "No, this can't be a Moyes glider — it's too light!" And then, "Maybe this one is really a 150 size!"

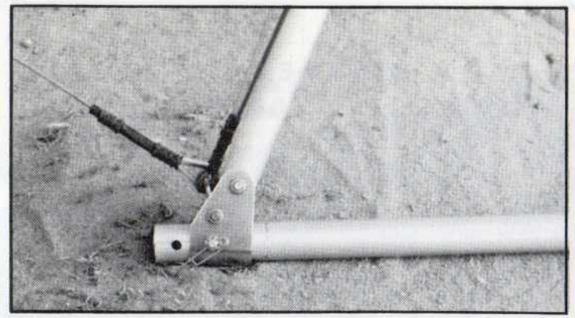
A quick check with Ray Chatfield, who had delivered the glider to me confirmed that the glider on my shoulder was indeed the Moyes Mars 190. Ray advised that a careful weigh-in the night before verified a glider weight of only 63 pounds (65 pounds in the bag)!

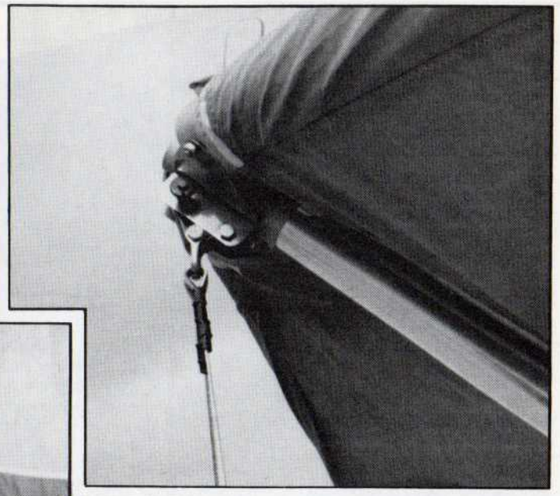
Having never seen a Mars glider before, I began setting up and found, for the most part, that the hardware and procedure was "classic Moyes," with a couple of new innovations, but no tricks. The full-length zippered cover bag is durable and light weight. Assembly of the control bar is through attachment at the corner of the base tube, secured with wing nut and safety. Stand the glider up, spread the wings some, erect the kingpost and secure at the rear of keel. Spread the wings out and install four ribs per side. On the 190 model, all ribs are half-inch diamter aluminum tubing with flexible plastic ends for reflex on the four ribs nearest the keel. The next step is to tension the crossbar and secure at rear keel mount with wing nut and safety. Now insert the number five and six ribs. Receptacles for these ribs are permanently mounted on the leading edges — the idea here being to tension the sail to avoid flutter at higher speeds. Now install the nose ribs and check the defined tips. Done! The Mars can easily be set up by one person in ten minutes. For the record, Steve claims he can accomplish this task in six minutes flat!

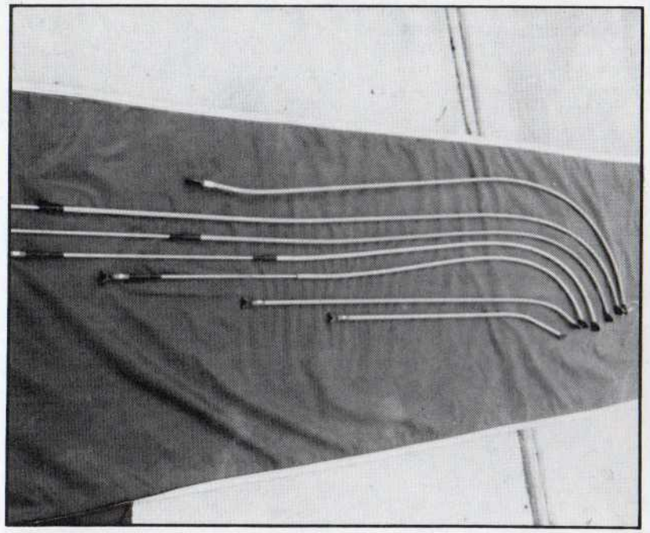
MOYES DELTA WING MARS

SPECIFICATIONS:

Model Identification	Mars 150	*Mars 170*	Mars 190
Sail Area	153 FT²	*172 FT²*	190 FT²
Wing Span	29'0"	*31'1"*	33'0"
Nose Angle	125°	*125°*	125°
Leading Edge	202"	*217"*	230"
Keel Length	7'6"	*8'7"*	9'8"
Aspect Ratio	5.17	*5.6*	5.75
Glider Weight	49 LBS	*59 LBS*	63 LBS
Pilot Weight Range	90-180 LBS	*125-240 LBS*	140-240 LBS
Ribs (per side)	6	*6*	6
Nose Ribs	2	*2*	2
Crossbar Connection	Floating	*Fixed*	Floating
Suggested Hang Rating	I	*I*	I
Price	$1,650	*$1,650*	$1,700







(Clockwise from top left) The Mars has an adjustment to accomodate the advancing owner; Nose attachment fitting; Steve Moyes flies the Mars at Kagel Mtn; The Mars ribs show the reflexed airfoil shape.

For years, Moyes gliders have displayed top quality sail construction. Although originally designed for training, the Mars is built with the same care and attention to detail that has long been a tradition for the "Moyes Boys." Sail configuration is in the chordwise layout and all sail colors are available, including spectrum cloth.

As I conducted my pre-flight inspection, I began to realize the strength built into the Mars. The crossbar is 2¼" x .049 offering plenty of strength with an economy of weight. The remainder of the frame is equally "beefy," with 1⅞" x .049 leading edges and 1¾" x .049 keel, eighth inch sidewires and 5/16 inch front to rear flying and landing wires, complete the structure. Yes, all the Mars models are towable.

Light weight, short span, and a small control bar combine with excellent static balance to provide easy ground handling. Low stall speed enables quick take offs even in the lightest of wind conditions. In fact, ground handing may be one of the Mars most valuable assets.

Once in flight, the Mars demonstrates an excellent sink rate and quick control response, with a level of stability long famous in Moyes gliders, yet surprisingly light bar pressures in both pitch and roll. Working in close to a mountain top can sometimes be overly traumatic, especially early in the day when the thermals are small and punchy. These conditions, however, seemed to be the Mars forte, for then the Mars really demonstrated its impressive ability to soar. When even lightly-loaded double-surface models with advanced pilots were making sled runs, the Mars was at times hundreds of feet above launch.

Slow flight speeds and short span provide a very small turning radius, enabling the Mars to circle in small, low-level thermals very efficiently. As the thermals ascend and spread out in size, the Mars can be held at a very low bank angle, while still maintaining a small turn radius, producing a sink rate that can only be termed outstanding. Coordination of these turns requires a minimum of pilot input. The Mars seems slightly roll stable, so a slight bump of roll control is required to maintain a constant angle of bank in a thermal; effort here is minimal.

Gliding between thermals, a Mars pilot can feel comfortable even in "lumpy" air, a product of the stable, reflexed airfoil chosen by designer, Bill Moyes. Comparatively low air speeds provide a smooth ride even in thermal conditions. Considering the machine was designed as a basic trainer for entry-level pilots, the glide performance is more than adequate, though it is weak compared to the fast, tight competition models of today. At top speed, the Mars will not compete with these bladewings in either glide angle or speed.

The low air speed handling qualities are very impressive. Pushing the Mars to a stall requires some effort to overcome increasing bar pressure. Straight ahead stalls revealed quick recovery with minimal loss of altitude. A stall in a turn at about 30° of bank resulted in an increase in sink rate, but the radius of the turn seemed to remain fairly constant. Relaxation of forward bar pressure allowed the Mars to quickly resume more normal flight speeds and required little pilot input to complete this maneuver. The Mars remains amazingly controllable at very low air speeds; even at mush speed, the Mars provides an impressive degree of roll authority — a valuable asset for the student pilot.

In the minds of many pilots, the Moyes Mega Mk. II is one of the easiest-to-land gliders ever designed. The Mars seems to share this all-important quality. Zero ground speed landings in even the lightest

of wind conditions were easily accomplished with a good flare. Purposely executing crosswind landings revealed no tendency to tip stall, as wings-level landings were the norm rather than the exception. At mush speeds, the Mars will perform steep, yet directionally-controllable descents — a safety valve for small landing areas.

The 170 Mars was designed by Bill Moyes in June 1982. Enthusiastic acceptance in Australia and Europe prompted the 150 model in 1983. Early 1984 saw the creation of the 190 Mars, and interestingly, the Mars has become the most popular Moyes glider ever!

The Mars 170 features a beginner/advanced frame modification. For entry-level pilots, the inside crossbar setting is recommended. For the advancing pilot, the outside setting increases the nose angle while flattening the sail a bit. The only change necessary to complete the modification is a change of the shackles which mount the flying wires to the control bar. An addition of mylar leading edge inserts is recommended to enhance the advanced configuration.

Over the past few years, advancing development has threatened many flying sites on the West Coast. Mountain launches with local landing zones are becoming an increasing rarity. As a result, towing on flat lands may just be the future of hang gliding. For those pilots already expanding the frontiers of towing (or those with no nearby mountains), please note that the Mars is built for towing in the tradition of all Bill Moyes' designs.

Although an excellent glider, primarily aimed at the beginner, the Moyes Mars should not be overlooked by the advancing pilot. From sand dunes to soaring, the Mars gives the pilot plenty of growing room. Add to this its towing capability, and the Mars adds up to versatility and performance at an affordable price.

At present, only the 170 size is certified to 1984 HGMA requirements. §

BOX SCORES

MOYES DELTA WING MARS

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

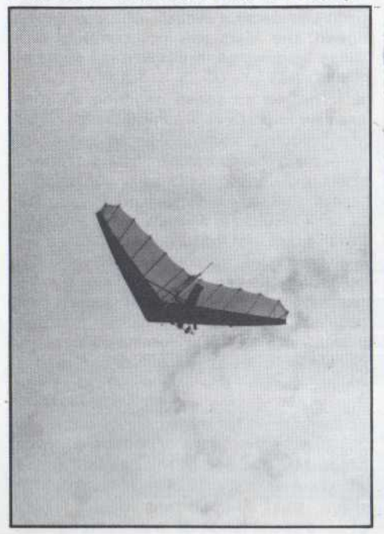
GENERAL CHARACTERISTICS	
Set-up times/Ease	5
Ground Handling	5
Static Balance	5
Frame Hardware/Finish	4
Sail Quality/Craftsmanship	4

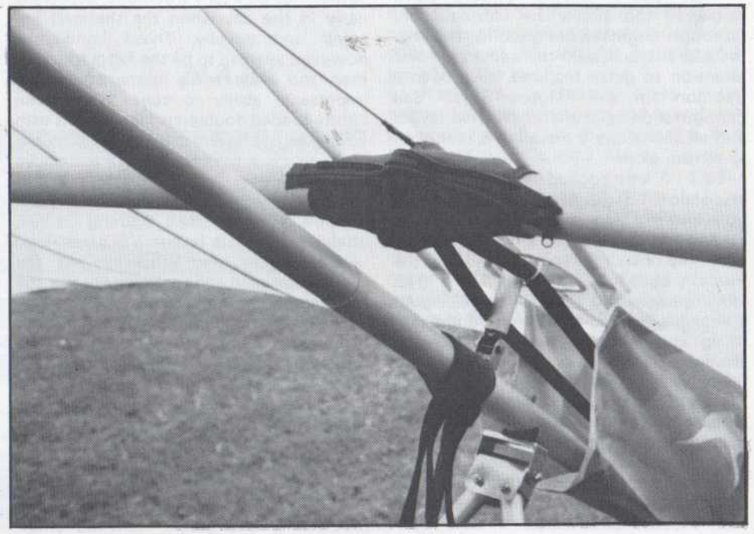
FLIGHT CHARACTERISTICS	
Handling — Low Air Speeds	5
Handling — High Air Speeds	5
Bar Pressure — Roll	5
Bar Pressure — Pitch	4
Roll Control Initiation	5
Roll Reversal (45° to 45°)	5
Yaw Stability	5
Turn Coordination	4
Speed Range	3
Sink Rate Performance	5
Glide Angle Performance	2½

LANDING CHARACTERISTICS	
Flare Authority	5
Parachuteability	4
Directional Control at Mush Speed	5

MARS 190 SPEED RANGES	
Mars 190 (63 lbs) — 170 lb pilot = 1.2 lbs/ft² wingloading:	
Stall Speed	17 MPH Indicated
Top Speed	33 MPH Indicated

(Above) Author Paul Burns rates the Moyes Mars using his standard evaluation system (Below, left) Steve Moyes flies over the camera to allow a planform view. (Right) Crossbar junction at keel shows the neat cover which protects the keel from abrasion.





EUROPEAN CHAMPIONSHIPS 1984

In a country known for scenic beauty, the invitational European Championships were held in late July/text and photos by Alf Oppoyen

VAGA
[Vaga here: 'a' pronounced as 'au' in autumn]

A COMMUNITY IN NORWAY, some five hours drive north of Oslo, hosted both the European and World Invitational Hang Gliding Championships 1984. When organizing the competition, Vaga was a most natural choice for the hang gliding section of the Norwegian Aero Club. Ever since 1976-77 Vaga has been known as one of the better flying sites in Norway and Scandanavia. Situated in between the two main mountain areas in Norway, Jotunheimen and Rondane, the Vaga area offers excellent cross country potential.

However, this time no open distance task was to be run. According to the meet organizers, "The competition will be a free flying, cross country race through a set distance consisting of four pylons placed at or above take off level. There will be an open gate start, a basic score for given pylons (250 points each), a bonus score for early completion (maximum of 300 points), and extra points for average speed (average speed in kilometers per hour x 20 points). The bonus scores will only be awarded to pilots who complete the course and land in the designated landing area. Scores may also be achieved for time in the air (maximum of 120 points per single hour) and precision landings (maximum of 100 points)."

Thus, the maximum score a pilot could get in one round was about 2,000 points, depending on the average speed through the course. The task was to be the same during the whole competition. And the rules stated, "After each flight the pilot declares on his honor the pylons achieved, on the official declaration form. These details must be proved by the film taken by the pilot during his flight."

The course measured *"only"* 35.6 km [22.1 miles], and one of the reasons for doing so, was an attempt to make the competition more spectator-friendly. In fact, it *WAS* possible to follow the pilots through most of the course from the landing area.

Summing it up, in seven out of ten possible days, competition flying took place. Pylons were made in five of the seven flyable days, while the last two degenerated into pure duration/spot-landing contests. Unfortunately, quite a few competition days suffered from strong wind conditions, making upwind pylons almost impossible to reach.

Britain's Robert Bailey launches his Magic III in the international competition.

Final INDIVIDUAL Results

RANK	PILOT'S NAME	GLIDER MFR.	GLIDER MODEL	HOME	SCORE
1	Tony Hughes	Solar Wings	*Typhoon S4 Racer*	Britain	*3803*
2	Josef Guggenmos	Wings	*Bullet C*	Germany	*3613*
3	Pierre Girardet	La Mouette	*Profil*	France	*3497*
4	Otfried Heinelt	Airwave	*Magic III*	Germany	*3276*
5	Gerard Thevenot	La Mouette	*Profil*	France	*3141*
6	Dag Eberhardson	La Mouette	*Profil*	Sweden	*2931*
7	Stefano Bricoli	La Mouette	*Profil*	Italy	*2923*
8	Hans Holzmann	Saphir		Austria	*2856*
9	Folke Wickberg	Airwave	*Magic III*	Sweden	*2679*
10	John Pendry	Airwave	*Magic III*	Britain	*2651*
11	Davide Manna	Airwave	*Magic III*	Italy	*2520*
12	Wolfgang Genghammer	U.P.	*Comet 2*	Germany	*2454*
13	Jozsef Kocsis	Magus		Hungary	*2250*
14	Jean F. Fauchier	La Mouette	*Profil*	France	*2195*
15	Angelo Crapanzano	Airwave	*Magic III*	Italy	*2189*
16	Michael Carnet	Airwave	*Magic III*	Britain	*2180*
17	Robert Bailey	Airwave	*Magic III*	Britain	*2108*
18	Palle Jensen	Airwave	*Magic III*	Denmark	*2105*
19	Michael De Glanville	Airwave	*Magic III*	France	*2081*
20	Endre Hegyi	Boomerang		Hungary	*1975*
32	Ken Brown	Airwave	*Magic III*	USA	*1642*

(Ken Brown was the sole American pilot involved in the Vaga Championships.)

(Above) The team from Finland takes a break. (Left) Pendry and Hughes contemplate the strong conditions.

Gliders, Equipment, and Pilots/ A look at the list of competitors shows that Airwave's Magic III, La Mouette's Profil, and UP's C-2 were the most preferred gliders, in that order. A total of 35 pilots — out of 55 registered — flew one of the designs mentioned above. The remaining twenty were a mix of "look-a-likes," some with wider nose angles, others with curved tips, or both. One exception, however, was the clean-looking German Saphir, reminding one of the UP Mosquito from some years back.

Many pilots also used some kind of "servo-steering," either *French Connections*, or *Harrycons*, or both. And, of course, nearly everyone flew with one of the new integral harnesses that made them look like bees on the ground and goldfish in the air.

The pilots came from the following countries (four pilots each):

Norway
Hungary
Britain
Italy
Austria
France
Denmark
Switzerland
Finland
Bulgaria
Sweden, and
Germany

Disappointingly, only Ken Brown from the USA, Hakon Lorentzen from Brazil, and two pilots from Morocco made the meet a World Invitational Championship.

Launch Site and Course/ The launch site used during the competition is called Vole, and lies at 1080 meters MSL [3543 ft], facing south towards the landing area situated at 340 meters ASL [1115 ft]. As mentioned earlier, pylons C and D (see map of site) lie across the valley, so in the rather strong southerly winds that dominated, they were hard to get. This resulted in pylons A and B being the most frequently used. Often pilots ridge-soared most of the distance from Skagsnebb to A, flying at altitudes around 10 meters, "jumping" from one small top to the other. Another reason why pilots started out with A instead of B, was that B is situated somewhat in the lee when it is blowing from the south. Pilots therefore could expect both penetration problems and sink/turbulence when heading out into the valley again after having done pylon B. This clearly points out one of the main dilemmas with a closed-course competition where all the pylons are preset and stationary regardless of weather conditions. A common solution is, of course, to set the course every morning, but this time the meet director, Stein A. Fossum, seemed to have made up his mind on that point. Ask any of the team leaders..

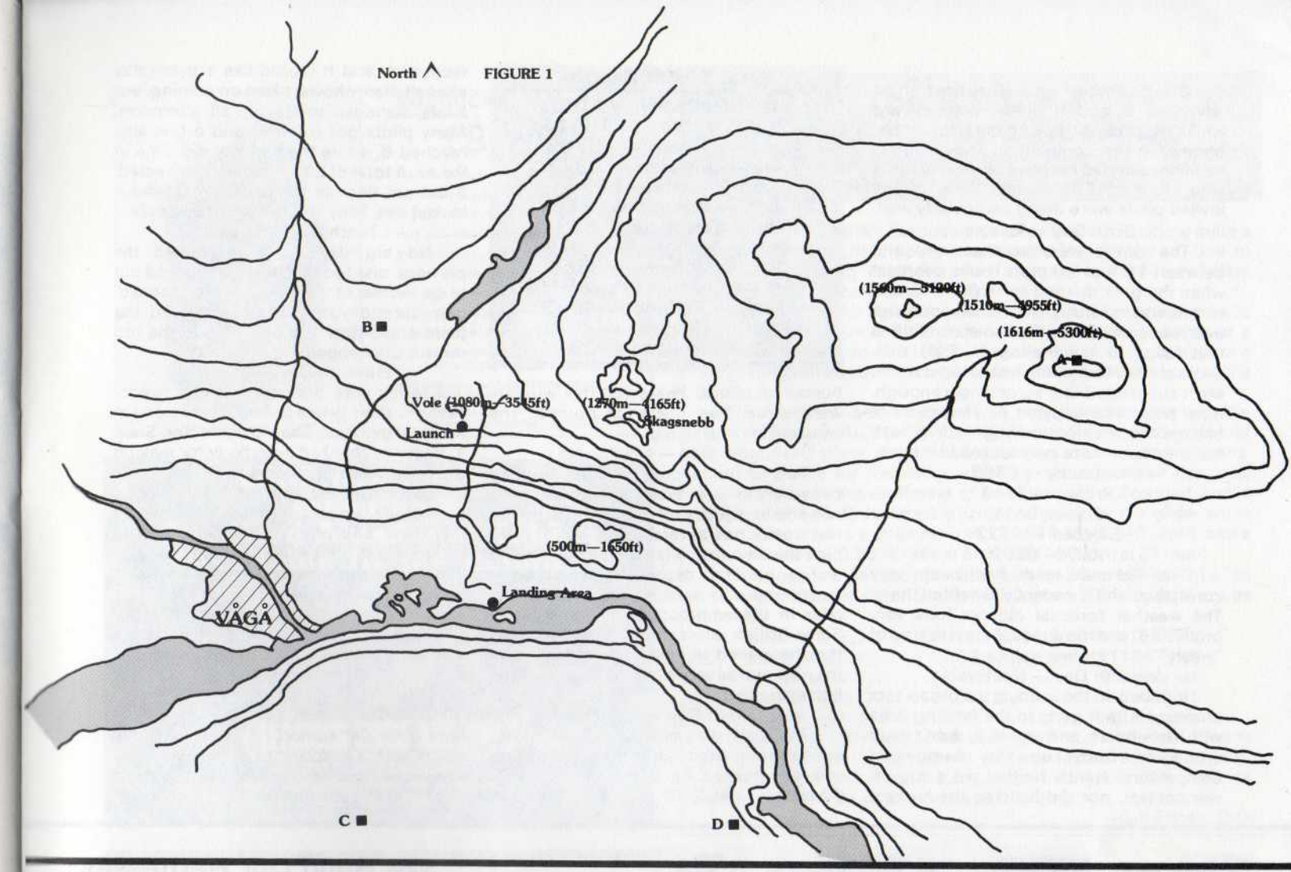
The Competition

First Day — Not Flyable

Winds were northerly like they had been all week (!). This meant between 20 and 30 mph at launch . . . from behind. Needless to say, the organizers were more than a bit on their toes.

Second Day — Flyable

At last, southerly winds and rows of "cummies." The gate opened at 11:00 a.m. and before noon, most pilots were in the air. Expectations were high on the Norwegian Team, but alas, Gerard Thevenot (France was the first one to



complete the course and pass the timegate with 1617 points. However, the reigning European Champion, Tony Hughes (Britain), did the same 17 minutes faster and won the day with 1637 points. The following places were occupied by Holzmann (Austria -- 1522 points), Eberhardson (Sweden -- 1482 points), and Heinelt (Germany -- 1446 points). These pilots also were the only ones to complete the course. The next ten pilots also made all four pylons, but had to land out. Many pilots who previously had commented on the course being too short did not say much about that by evening! The team score after one round was the following:

Britain — 4137
France — 3867
Germany — 3578
Sweden — 3307
Austria — 3072

The landing area seen from launch.

Third Day — Flyable

In the morning it was overcast, but at 11:00 a.m. it looked quite promising with the sun peeping through. For more than two hours the conditions *looked* good, but the wind dummies kept going down. The scoring system favored making one pylon (250 points) instead of duration (120 points)/spot-landing (100 points), so pilots waited. And the weather got worse; the wind turned more westerly and the sun disappeared. Only one Italian, Angelo Crapanzano, did some time in the air this day. The rest were stuck on the ground waiting for better conditions. However, Angelo's 109 points did not change the ranking much.

Fourth Day — Flyable

This was round 3, and everyone tried hard in the marginal conditions. The average time in the air was two hours, ten minutes, but all this effort resulted in only one pylon (A) for Jean Francois Fauchier (France). Some of the top pilots even forgot to pass the time gate before landing, so the standings among the five best were practically unchanged. Only Holzmann (1622) and Heinelt (1618) eased by Thevenot (1617). It was a nice day to spend in the landing area and watch the spot landing contest though . . . from one of the British, observers got a demonstration on how streamlined uprights will not bend. They break!

Fifth Day — Flyable

The fourth round started out as a calm and overcast day. At 10:30 a.m. the sun started showing, and suddenly the conditions were really good. Typical of this day was the rather short period of time it was possible to do any real cross country flying. In the early afternoon, the forecasted warmfront came drifting in and killed everything. Therefore, most pilots who did well had started around 12:00 a.m. Once more only a few pilots completed the course; this time it was the following:

Guggenmos (Germany)
Hughes (Britain)
Girardet (France) and Bricoli (Italy)

At the end of the day the score looked like this:

Hughes — 3218
Guggenmos — 2758
Girardet — 2629
Heinelt — 2368
Thevenot — 2367

Guggenmos and Girardet had advanced 9 and 8 places respectively, while Holzmann had gone done six. Midway in the competition Tony Hughes had consolidated his position, now leading with close to 500 points. None of the invited pilots were doing particularly well.

Sixth Day — Flyable

The winds were southeasterly and between 15 and 20 mph. It was overcast when the gate opened at 11:00 a.m., and no one was in a hurry. Not much happened; everybody waited for the better conditions that failed to materialize. At 2:30 p.m. pilots started launching just to log airtime. Most succeeded, but surprisingly enough, nine pilots made pylon A. This did not change the positions among the five best, but the team score now looked like such:

Germany — 8865
Britain — 8743
France 8471
Sweden — 6722
Italy — 6607

The German team had been very consistent, and it evidently benefited them. The weather forecast did not look very promising, and the atmosphere was kind of "weary."

Seventh Day — Not Flyable

It rained. In the evening the organizers arranged a grill party in the landing area with free beers and steak. It didn't help much to buoy up the dampened competitors' spirits. Neither did a tug-of-war contest, nor did building the highest human pyramid. Prizes for the winners were more free beers, of course. The competition was idling.

Final TEAM Results

1st — Germany — 11082
2nd — France — 10914
3rd — Britain — 10742
4th — Sweden — 8877
5th — Italy — 8275
6th — Austria — 7866
7th — Denmark — 6634
8th — Hungary — 6579
9th — Norway — 6558
10th — Switzerland — 5199
11th — Finland — 4933
12th — Bulgaria — 4808
13th — Holland — 2696

Eighth Day — Not Flyable

Part of the landing area was flooded because the river was running high; the rain showers just kept on coming. Briefing was postponed several times, but at 3:00 p.m. the day was called off. With no flying and a general depressed atmosphere, maybe the only sensible thing to do was relax in the whirlpool at the local hotel. Some British pilots did so. Unfortunately, they happened to spill some shampoo in the pool. It was very eventful . . . just ask the hotel manager!

Ninth Day — Flyable

The start was closed at 11:00 a.m., due to strong winds (30 + mph). Some rain showers passed by, but it did not look threatening. At 2:00 p.m. the start was reopened, and it looked like a pylon day after all. Rain showers kept on coming, but pilots managed to stay up all afternoon. Many pilots got pylon A, and a few also reached B, while the majority did time in the air. A total of 21 pylons were collected. It did not change the top ranking, and it looked like Tony Hughes was quite safe.

Tenth Day — Flyable

No big day, as it resembled the previous one too much. It even turned out to be worse as no pylons were reached; only duration/spot landings altered the point standings. The positions in the top remain unchanged.

Eleventh Day — Awards

Today was Sunday, and the twenty best got their prizes during a ceremony in the local gym hall. The meet director, Stein A. Fossum, thanked everybody for making the championships come true, especially the chef in the restaurant at the local hotel (everybody agreed). Fossum pointed out that there had been no accidents during the competition, and he also reminded us that his second name was Arne — not Adolf — like some pilots and team leaders had hinted . . .

Looking back, most people felt it was a traditional meet, plagued by the weather as most are, but the best pilot won, no doubt about that! §

Note from the author: I'd like to end this article with a welcome to all foreign pilots who would like to visit Norway. Come to Vaga and fly, usually it's worth it!

The B L U F F
ULTRALIGHT SAILPLANE PROJECT
Nurflugler Update on the MONOWING OR SLICKWING

IT SEEMS THAT MANY European manufacturers are putting quite a bit of effort into developing foot-launchable sailplanes. One in particular, Ludwig Thalhofer, has designed a foot-launchable, aerodynamically-controlled flying wing.

The idea for this rigid wing was born when he built his three axis ultralight, the Bronco. That craft has a firm wing consisting of a plastic body covered with fabric in the usual way. His prototype of a flying wing will be constructed in a similar way and will be called the Bluff.

The pilot will be integrated into the wings like that with the Horten Alita (see JULY 84 *Whole Air*). Control will be accomplished by two control sticks, one actuating rudders and the other ailerons.

The profile for the wing, which contains fourteen ribs, was developed by Professor Eppler of the University of Stuttgart, and is called 624-626. Calculated efficiency figures of the glider show that it should have a glide ratio of 23 at 65 km/h [40 mph], and a minimum sink of 0.65 m/sec at 50 km/h [130 fpm at 31 mph].

The speed range is supposed to be from 35 to 180 km/h [22 to 112 mph]! Further data for the 45 kilogram [100 lb] Bluff are as follows:

Span ..... 11.5 meters [37.7 ft]
Wing Area ..... 17.33 square meters [186.5 ft²]
Anhedral ..... 4.5 degrees
Aspect Ratio ..... 7.63 to 1
Nose Angle ..... 148 degrees

When I recently contacted Ludwig, he stated he had already built the Bluff but that it had not yet been tested, so he wished to defer talking about it until some time in early October. I will, of course, try to provide an update at that time.

—Gib Eggen, D.O.

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37, 38B

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31, BTFN[19/20]

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37B, BTFN[3/00]

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38B, 39B[5/20]

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37, 38, 39

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33B, BTFN[12/20]

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35, BTFN[12/70]

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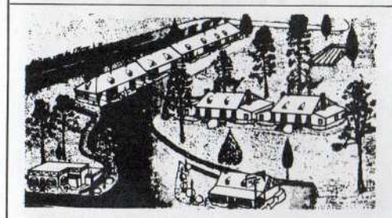
38C, CTFN[0]



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35B, MXB/TFN [10/20]

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27B, MXB/TFN

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  Internal pulley for smooth rope movement.
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PRODUCT LINES

CHATTANOOGA, TENN. — Well, it's mostly **good news** this edition of "P.L.," and we're tickled to say so. Except for the *pressing needs* mentioned in the "Publisher's Column" on page 4, we remain full of hope for resurgence in American hang gliding. Let's begin this time with what we consider among the BEST NEWS items. That'd be a *major improvement* in the healing progress for Mitchell U-2 guru, **Tim Morley**. We spoke to Tim to hear the very enheartening news that he's begun to get movement in both arms and legs, following his paralyzing accident at the end of June. The doctor who once told Morley he had only a 1% chance of walking out of Santa Clara Valley Medical Center improved the odds to an amazingly more satisfying 50%!! The doc' was prompted to do so as Tim was using one arm, moving the other, and experiencing increasing feeling in both legs. YAHOO is our response! Though Morley has enjoyed this excellent surge in progress, plateaus also arrive when improvement seems to "take a break." As a good attitude is VITAL, and even tho Tim is very determined to "beat the reaper," we still hope many of you *keep on* sending Tim notes of encouragement as his recovery continues. For those who missed it elsewhere, here's his address again: (Tim Morley; Santa Clara Valley Medical Center; 751 Bascom; Room 179-A; San Jose, CA 95128).

The above triggers us to mention that **Crystal Air Sports** (home of newly crowned Rookie-of-the-Year, *Tom Phillips)* has been approached by *blind* entertainer David Hume who intensely wishes to learn to hang glide. Not just a desire to fly *tandem* (Sep/Oct '81 *Whole Air)*, Hume wants to learn to solo-fly a diver. Can it be done? Only time can answer. Should it be allowed? Who's to pass judgement and say, "No," we wonder? Anyway, the Crystal folks' Simulator will be most useful to determine aptitude for the high energy, deeply motivated Hume. Certainly it offers a chance at national publicity, which, we hear, is how Hume approached Crystal for the opportunity to try. He reportedly said that he'd take care of publicizing his efforts so no one need develop guilt over exploitation. On publicity, the group known as the Hang Gliding Consortium — the group of 16 businesses who spent $5,000-plus in *Outside magazine* — will be happy to hear that a new aviation magazine is going to run their full-color ad for FREE in its premier issue. **Take-Off** magazine is due out in early 1985, with 75,000 copies printed, 40,000 of which will be general newsstand sold. A bit earlier that that, **Gallery** (yep, the "skin mag") will run a piece in their NOV 84 issue — due on newsstands everywhere in October — covering hang gliding at *Kitty Hawk Kites* and *Crystal Air Sports*. The full-page travel report is titled, "High Times Down South." In case you can't find the write-up, as you're hypnotized by all that beautiful flesh, check the table of contents for the author's name... a Mr. *Chris Dubbs*. With paid circulation of 700,000, many readers will certainly see the story (at least once they've checked out the pictures!). USHGA's address is also reported. A last bit of the ole *good press* for our sport came in the August '84 issue of Mariott's *World of Sport* magazine (pg. 57). The international glossy mag — which is distributed at Marriott and other selected hotel chains throughout the world — carried a three page, full color story on Britain's world-class competition pilot, **Tony Hughes**. It's a pretty well written piece with some good photos. And it'll be read by big and small, old and young businessmen from everywhere, plus all other guests of these finer hotels. ATTABOY, Tony!

In other exciting developments that involve large masses of the public (up to 2½ b-i-l-l-i-o-n via satellite TV), discussion has begun again on the possible inclusion of hang gliding in the **Olympic Games**. True, this has been a Rumor Mill item in the past, nevertheless some *OFFICIAL ACTION* maybe heralding a real-time development. *Whole Air's* German Correspondent, Gib Eggen, first alerted us to an inquiry made to the Austrian (national) hang gliding club on the subject. Next, we spoke at length with USHGA Vice Prez, Dick Heckman, who had more light for the subject. Heckman's a delegate to the FAI, and reports that that world body is looking into aviation involvement, apparently as an Olympic Committee wishes to replace some shooting events with, *possibly*, hang gliding. The issue has come up at earlier FAI meetings, but no action occurred as the common guy-in-the-street has little interest or knowledge of aviation — as if everyone knew about all Olympic activities, like, of all things, the LUGE — but also because of the politics involved, and because aviation, except for sky diving and hang gliding, doesn't fit the Olympic format very well. But in spite of these objections, the issue is not dead. At the most recent FAI meeting, Austrian delegate, Sep Hamberger, was appointed to interface with the Olympic committee. Far from even being in the planning stages, some gnarly problems still face Hamberger and fellow delegates. The Olympic committee has indicated it is seeking further activites for the *winter* games, as it has more schedule room available then, but this is a poor time for hang gliding participation. Also, FAI will insist on retaining control of the activity, and as we were informed, Olympic committees like to "take charge." Still, it's an intoxicating chance; we'll keep ya posted. At its last meeting, the CIVL (hang gliding division of FAI) chose **Austria** as the site for the **1985 World Meet**, with **Australia** getting most's nods of agreement for '87... especially as that's a big celebration year in Australia and the festivities of a World Meet would be more valued by the country and hence promoters. *Communist Hungary* appeared slated for the next World Meet to be held in Europe. That'd be interesting, eh? Back here at home, we told you last issue in this column about a pilot who'd earned — but not filed for — a new altitude gain record. We hadn't heard the fellah's full name but UP informs us it was **Ian Huss** of Boulder, Colorado. Congratulations to Ian even if he didn't feel legal enough to claim an official FAI record. As long as we've mentioned UP, it's worthy to say that Comet 2's got the Total Mileage Award for Owens flights this year. The August **UP Newsletter** says, "Reports from around the world have been somewhat similar. Too much water in the system. Apparently a world wide problem, most good XC sites have suffered the same malady of early over-development. This has caused many XC pilots to be frustrated in their quest for long distance flights. No one has eclipsed Tudor's 221 miles." But **Rick Masters** did a compilation of all over-100-mile flights (*only* over 100 miles counted) in the Owens from May 26-Aug 8, 1984. Of 62 century flights *reported* (it was voluntary to do so), total mileage was 7,244... for an average of 116.8 miles, the longest being a pair of 170 milers [274 km] by Brad Harris (Fledge on July 7) and Jim Zeiset (Comet on July 8). Fledges accounted for 5 (8%): Magics -- 10 (16%); Ducks -- 4 (6%); Comets -- 25 (40%); Sensors -- 4 (6%); Meteor -- 1 (2%); and unidentified brands -- 14 (23%). Congrats to all 62 pilots for some great flights and *thanks to Rick* for the effort of recording all these on behalf of the XC Pilots Ass'n. Well, Sensors and Ducks may not have figured too heavily in the above recapitualtion, but they *did* at the **Masters** and **Nationals**. Ducks comprised "over half the field" at the Grandfather contest (see pg. 8), finishing with 3 of 8 in the money, more than any other design (2nd—5th—8th). This represents a sharp reversal from prior years. A Sensor in the capable hands of **Rich Pfeiffer** took its second Nationals in four years. Both designs had new variations at the Nat's, specifically the **Duck HP** and Sensor 510 VG (which though not *new, was certified!)*. As we heard it, an industrious **Steve Pearson** was up at 4 AM daily for the week preceding the Nat's so his Duck HP design would be certified *prior to* the meet, and he achieved his goal. Then he also led the field going into the last day, when a fluke round demoted him. "Heartbreaking," according to a Wills contingent spokesman. **Bob Trampenau's** successful 510 VG has caught some flack along the way for being uncertified, yet for-sale. It was still that way just before the Nat's, when organizers gave Seedwings an extra week (*while* the meet was on, so goes the report) to earn the certificate of compliance. The eleventh hour effort worked tho, and the 510 VG under Pfeiffer's pilotage took the marbles home. Both efforts deserve applause, but Pearson's merits bonus points for adhering to a known deadline. The process of glider manufacturing involves not only certifying, but test flying, and the **Pacific Windcrafters** have finally accessed aero towing to assist. Their fall newsletter had an interesting section titled, "Where's the Sand?" Seems some new owners missed the sand normally hiding in the coverbag after test flying at the nearby Monterey beach dunes. Why? Not because test flights had been omitted, but because that effort didn't happen at the dunes. Their sister business, Skylines, offered aero-tug-launched test flights away from all that sand. We're glad to see practical use of the Cosmos trike tug. PWC has just concluded their second year, and they're pleased with success to date. To augment their 3rd year in biz, Bernasconi & co. plan a program of importing more accessory gear from Europe, as the dollar's amazing strength during the last couple years of Reagan-omics makes these import purchases a dandy deal. To wrap up yet another installment of *Product Lines*, we've some comparative information from the "real" world of conventional aviation, compliments of AOPA's monthly newsletter (Aug '84 "News Analysis" by Steve Bassett). Quoting that source, we read, "Recent aviation history reveals tales of woe. Student starts are down 26 percent. Private Pilot [license] issuances are down 21 percent. Instrument rating issuances are down 24 percent. The sale of new aircraft continues to decline. As early as 1979 general aviation aircraft manufacturers were building as many as 17,000 new aircraft annually. Last year, little more than 2,000 new aircraft were added to the general aviation fleet. Additionally, the price of new aircraft has skyrocketed out of sight for the average potential owner." Another source (AOPA news release item) says, "In 1983, 1,811 single-engine aircraft were delivered, down from 14,398 in 1978... and the cost of Cessna's two-seat 152 [trainer-type] is about $40,000." Continuing, "... [manufacturers must deal with a] $2-5 *million* current certification cost for new, lightplanes." No wonder none of the GenAv builders are rushing to design and certify new designs. It causes us to ask if American hang gliding — whose present down-cycle too closely parallels that of general aviation — has been held back by our own strenuous certification. Former Pacific Gull owner, **David Beardslee** admits it was certification that helped push him out of the business. Looking to Europe, we can see more new ideas (good or bad) being tried, as their certification programs are less well established. UNDERSTAND we are *most emphatically NOT* saying HGMA certification should be ceased or diluted, but it does give one some initiative to consider how much newer development could have occurred without certification pressures. Guess it's only idle speculation, as we know of very few pilots who'd trade the peace of mind brought by certification just to see some (potentially) hot new ideas emerge. It's all meant as food for thought. And that's it for now. Got news or opinions? Send 'em to *Product Lines*, Box 144, Lookout Mtn., TN 37350.