

whole air catalog

ONE DOLLAR

SEPTEMBER — OCTOBER 1979



**Crestline Nationals
Rob Kells of Wills Wing
Flying Sites Premier
Glider Report: Seahawk**

Idea•Graphics, publisher
WHOLE AIR CATALOG
P.O. Box 144
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Coming Next Issue:
A Report on the American Cup
with Dave Murchison, Meet Director
Dual WAC Glider Report:
The Sky Sports Sirocco 3
and the US Lancer.
Preview of the 1980 Whole Air Catalog
Some nice changes are underway.

711 SUMMIT AVE E
SEATTLE, WA 98102

FLASH!

LANCER

When New Zealand's top designer-sailmaker develops a third-generation glider with supership PERFORMANCE, easy HANDLING, and proven STRENGTH and SAFETY, that's good news.

When the new glider turns out to float as well as the monster wings with 80 sq. ft. more sail, yet fly as fast as 1978's most successful contest glider, with a better L/D, give it a headline.

And when the same wing is certified in several foreign countries as the safest, strongest glider they've ever tested, stop the presses!

But when you find out that the glider is selling at 1976 prices, with an honest 2-4 week delivery, well, you're getting the idea. It's time for a new Front Page...with the name LANCER IV at the top.

Check it out.

LANCER IV S LANCER IV L

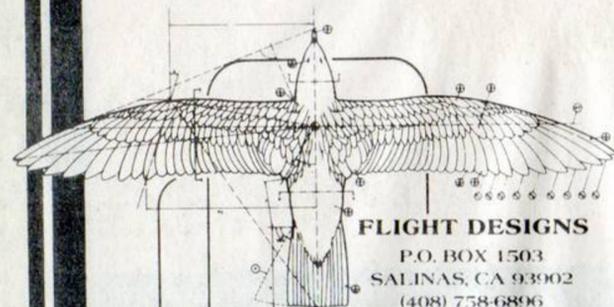
Span	32' 6"	34'
Nose Angle	120°	120°
Aspect Ratio	6.9:1	6.9:1
Root Chord	9' 0"	9' 10"
Weight	46 lbs.	50 lbs.

Pilot Kevin Keirnan
Photo: James Country

\$1175 small
\$1195 large

SO CAL DIST.

Jim Lawrence
15516 Bowdoin Sr.
Pacific Palisades, CA 90272
213-454-5126



FLIGHT DESIGNS
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(408) 758-6896

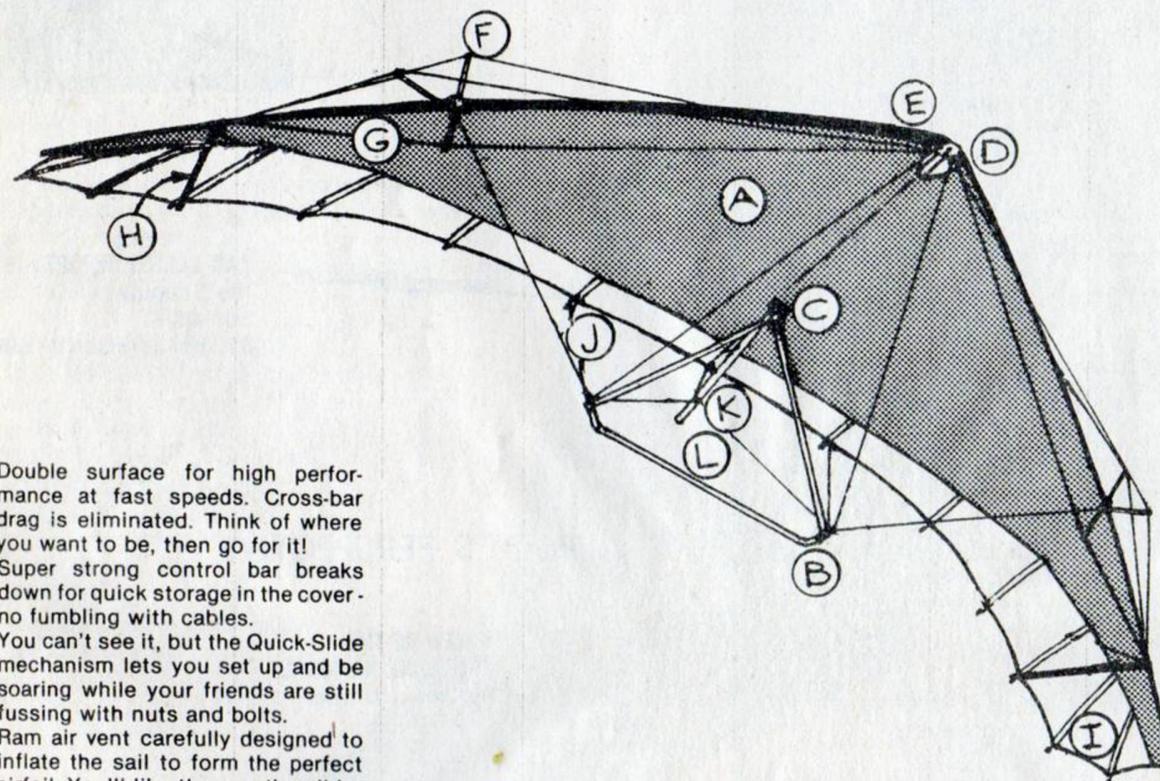
Your complete Supplier for: Harnesses, Instruments,
Emergency Parachute Systems, and Flight Accessories.

THE 1980 SIROCCO III IS NOW HGMA CERTIFIED

How do you improve a glider that had the most successful competition season of 1978? You listen to pilots, then calculate and experiment until you have an even better design. The **Sirocco II** showed up in the winners circle more than any other glider last year, so it would be easy to sit back and let the rest of the industry try to catch up. However, we couldn't resist the challenge to develop the best all-around glider possible. The results of our modifications and refinements is the sleek, new **Sirocco III**.

We concentrated on two design factors: pitch stability and handling. With the addition of a keel pocket, luff lines and stronger defined tips, the **Sirocco III** becomes one of the most "anti-tuck" gliders on the market. By virtue of the shifting sail, liberated tips and relocation of the batten cables, the **Sirocco III** turns as fast as any glider available. Of course, we have retained the super low sink rate, flat glide and speed range that made the **Sirocco II** a winner. In fact, we have improved the sink rate by slightly increasing the sail area while maintaining the glide and speed capabilities by reducing parasitic drag.

Wonder how we manage these feats of magic? The illustration below shows some of the **Sirocco III's** fine details.



- A. Double surface for high performance at fast speeds. Cross-bar drag is eliminated. Think of where you want to be, then go for it!
- B. Super strong control bar breaks down for quick storage in the cover - no fumbling with cables.
- C. You can't see it, but the Quick-Slide mechanism lets you set up and be soaring while your friends are still fussing with nuts and bolts.
- D. Ram air vent carefully designed to inflate the sail to form the perfect airfoil. You'll like the way the glider lifts immediately on takeoff.
- E. A differential deflexor system which allows the leading edges to flex in a limited amount to promote fast turning.
- F. Stronger deflexor posts add to the overall structural integrity of the glider.
- G. Leading edges are specially constructed of 1 3/4 inch tubing to increase strength and allow breakdown to about 3 1/2 meters.
- H. The defined tip is now connected to a supporting cable. These firm tips help keep the glider more pitch positive.
- I. New tip design increases the performance as well as adds flexibility for handling.

- J. Lines from the kingpost create a large amount of reflex at negative angles of attack, improving pitch stability tremendously. Note how the batten is held down in flight by a cable which reduces washout and increases performance.
- K. New curved keel permits the sail to shift which greatly improves the roll rate.
- L. The only thing missing is a pilot. Why don't you put yourself in control of a **Sirocco III** and enjoy the freedom of the sky with safety, performance, and response. See your dealer soon and become part of a continuing success story. Test fly a **Sirocco III**.

Sky Sports
Incorporated
P.O. Box 507
Ellington, Conn. 06029
U.S.A.



WHOLE AIR CATALOG

Volume 2, Number 5, 1979

CATALOG NO. 9

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ROB KELLS**
Wills Wing
President 16

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WILLS WING OMEGA

A NEW DIMENSION IN SOARING PERFORMANCE

PURE PERFORMANCE

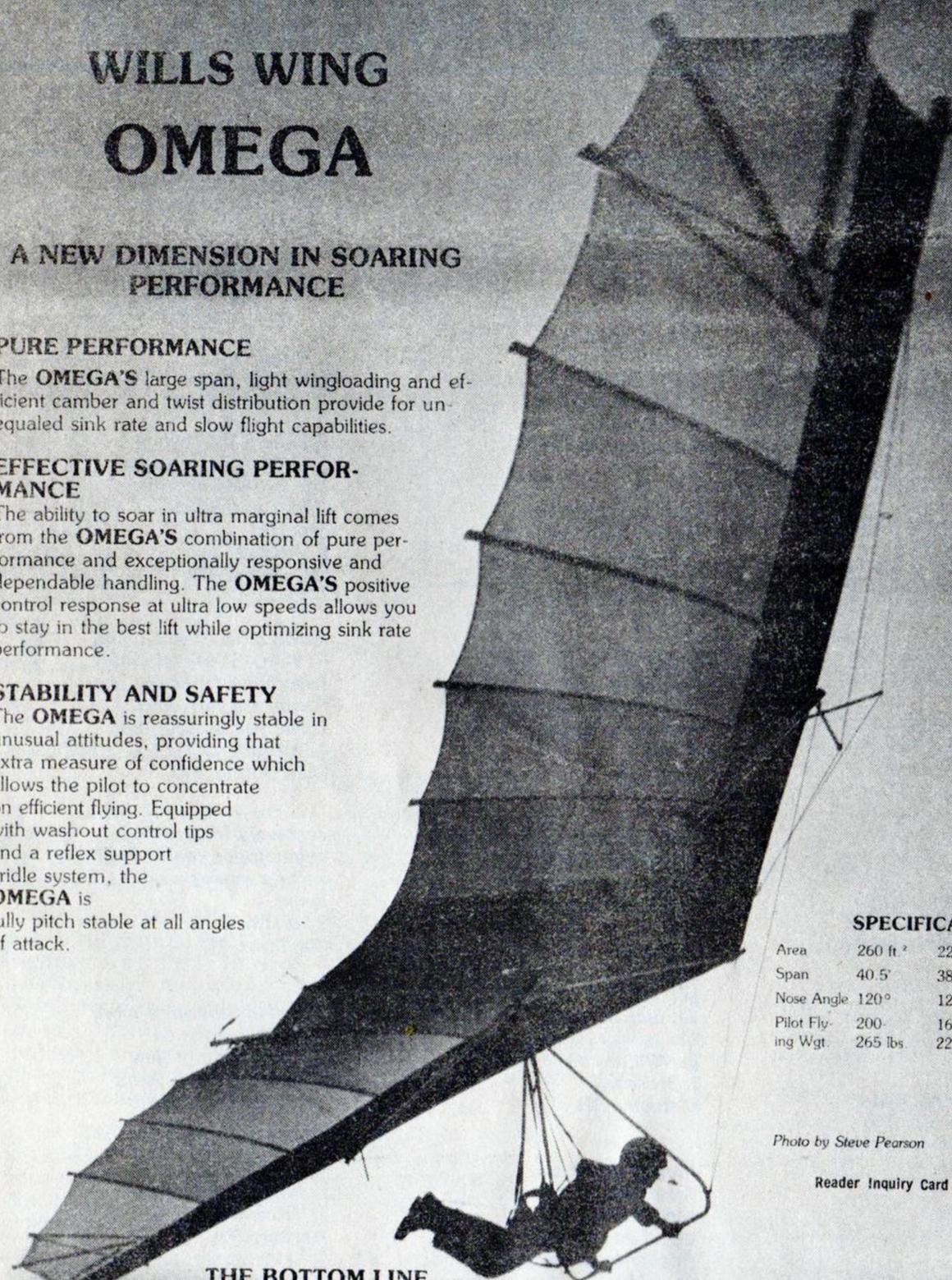
The **OMEGA'S** large span, light wingloading and efficient camber and twist distribution provide for unequalled sink rate and slow flight capabilities.

EFFECTIVE SOARING PERFORMANCE

The ability to soar in ultra marginal lift comes from the **OMEGA'S** combination of pure performance and exceptionally responsive and dependable handling. The **OMEGA'S** positive control response at ultra low speeds allows you to stay in the best lift while optimizing sink rate performance.

STABILITY AND SAFETY

The **OMEGA** is reassuringly stable in unusual attitudes, providing that extra measure of confidence which allows the pilot to concentrate on efficient flying. Equipped with washout control tips and a reflex support bridle system, the **OMEGA** is fully pitch stable at all angles of attack.



SPECIFICATIONS

Area	260 ft. ²	220 ft. ²	180 ft. ²
Span	40.5'	38'	35.5'
Nose Angle	120°	120°	120°
Pilot Flying Wgt.	200-265 lbs.	165-220 lbs.	130-175 lbs.

Photo by Steve Pearson

Reader Inquiry Card No. 3

THE BOTTOM LINE

The proof is in the flying. We could go on forever about the **OMEGA'S** extraordinary capabilities, but nothing we could say will impress you as much as your first flight on the **OMEGA**. You owe it to yourself to check out this extraordinary new soaring machine. See your dealer today for a test flight on the new **WILLS WING OMEGA**.

WILLS WING INC.

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

FORUM

Great work — WAC compliments the other two HG publications nicely.
E. Lefson
Ann Arbor, MI

I am surprised at apathy of pilots to impending FAR's for unpowered wings. We should fight.
J. C. Carpenter
La Mesa, CA

Articles were informative and brief enough to keep attention going to the next page. Good work!
J. Matulevich
Goldens Bridge, NY

I hope I remember to subscribe. Will you send me a notice if I didn't?
D. Adams
Seattle, WA

I would like to see more about tow systems, and safety tips. Keep up the good work.
M. Shahan
Marlow, OK

Asked for some glider test reports and this month you started them. Super!
R. Bailey
Portland, OR

More flight testing info, please.
J. C. Harison
Sacramento, CA

I would like to receive your mag, a lot of my friends read it.
C. Croes
Miami, FL

Would like to hear what the Glider manufacturers feel about Grafspan.
D. Henderson
Las Vegas, NV

How about something sites around the country? Your mag looks better every issue. I'll buy in January.
K. Mayforth
Albuquerque, NM

I will buy Graphite leading edge spars on next kite — keep it up!
P. Maher
W. Henrietta, NY

WAC has a vital and informative format which is strongly consumer oriented. Thanks.
D. Dix
Largo, FL

Just because Larry Whitney's Grafspan Alpha seems to be indestructable to the reader and apparently to himself, should no way cause the logical, sensible pilot to press his luck by flying dangerous conditions as Whitney has done.
J. Stokes
Memphis, TN

I enjoy the whole magazine. It is hard to rank articles 1st, 2nd, etc. I do rank your Reader Inquiry articles very high.
F. Howe
Sumpter, OR

I am against any kind of government regulations and for vigorous self-regulation.
A. Millat
Cincinnati, OH

If the government regulates Hang Gliding — Will I be eligible for a grant?



J. Forburger
Heavener, OK

Excellent publication. Looking forward to the site articles and more Glider evaluation reports.
B. Jenkins
Mt. Gilead, OH

Along with Hang Gliding — WAC is very informative. Your Directory and Forum are very good. Thank you for your mag.
A. Carter
Glen Burnie, MD

Just want to say that a subscription fee of \$5.00 will be money well spent.
R. Smith
Somerset, NJ

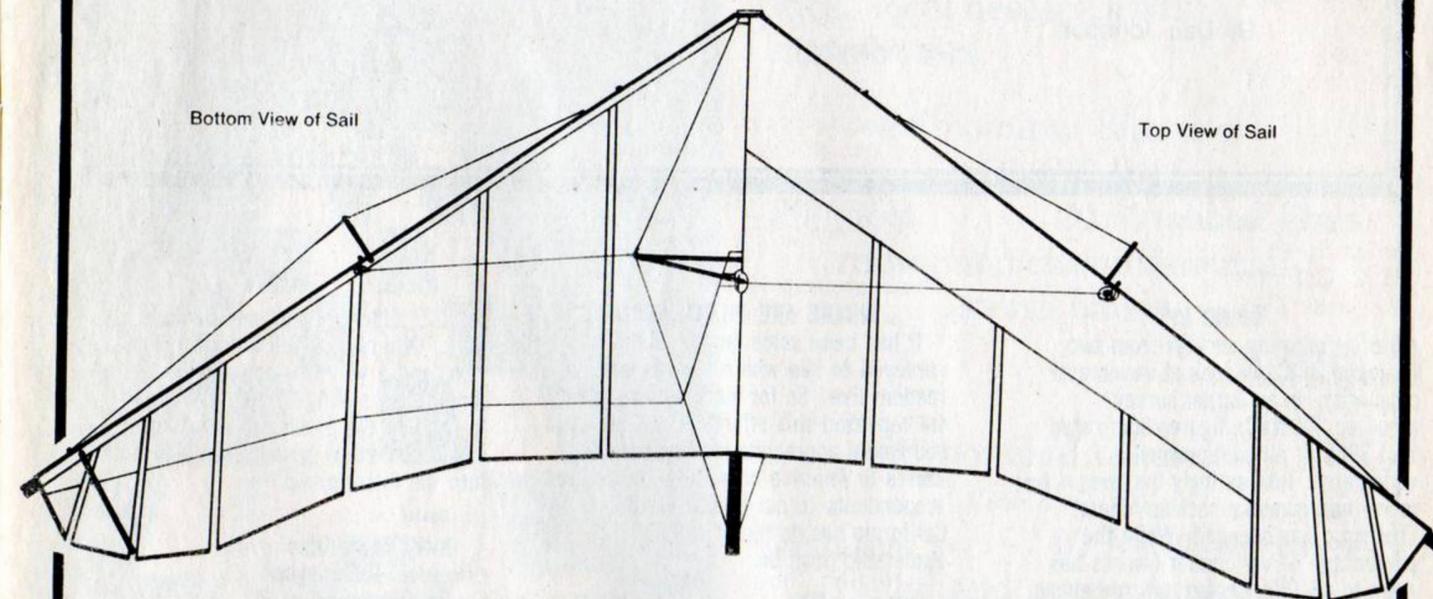
I couldn't disagree more with Paul Burns on supine flying. I flew supine for three years and then switched to prone. You couldn't pay me to launch supine again. And you call his column "Safety Tips"?
D. Stewart
Carlisle, PA

Please keep the excellent WAC inexpensive. Do more product evaluations and print "no" rumors.
D. Beeman
Medicine Lodge, KS



Highster Aircraft, Inc.

1508 Sixth Street Berkeley, California 94710



More Reasons for Owning a Highster — The ALL SEASON GLIDER !!

Most gliders excell at something; there are gliders designed for marginal days, for ridge flying, for thermal flights . . . which is fine — if you're a "one-condition" pilot. Most flyers aren't.

If you're a pilot who likes to fly in everything from 0 to 40 mph, there's now a glider just for you — **Highster** for 1979! Through extensive research and development, our wings are capable of very slow flight, while still retaining their famous top end. The speed range is nothing short of fantastic. Right through the whole line, whether the 150, 170 or the 190, you'll find proof that **Highster** has designed the first all-condition glider.

The roll rate is faster than in 1978, and just as docile. The sink rate has been improved by approximately 10%. There is also an increase in L/D due to the constant refinements being made to this time-proven design.

Other manufacturers are still trying to equal **Highster's** performance capabilities, yet need many specialty models to cover the broad spectrum of our double-surfaced glider . . . and **Highster** accomplishes all this with an airfoil that began flying in 1974!!

If you have fun flying, and don't want to miss a day because your glider's limits don't fit the conditions, then you'll have more fun — on the **Highster!!!**

HIGHSTER SPECIFICATIONS

MODEL	150	170	190
Span	30'	32'	34'
Area	152 sq. ft.	168 sq. ft.	188 sq. ft.
Leading Edge Length	18'	19'	20'
Aspect Ratio	6	6.02	6.1
Root Chord	9'8"	9'11"	10'2"
Nose Angle	110°	110°	110°
Empty Weight	50 lbs.	52 lbs.	54 lbs.
Pilot Weight Range	105-155 lbs	150-180 lbs	170 lbs +
PRICE	\$1,395	\$1,425	\$1,455

Fully ribbed 90% double-surface sail
Wing loading factor 6.5 positive - 4.5 negative (all models)
Passed 150° load test at 35 mph in 1978 (with quadral deflexors)

All Models

- includes deluxe bag assortment - cover bag, rib bag, cross spar covers and wire pouches
- Rainbow tips - no extra cost
- Custom keel pocket - no extra cost
- Special designs available upon request

Colors Available

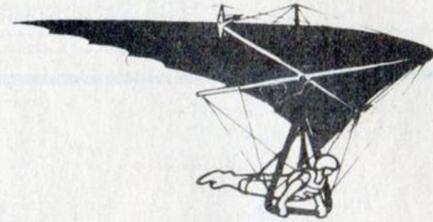
light blue, dark blue, dark green, lime, yellow, gold, orange, red, purple, brown, black, white

For the Dealer in your area
Phone (415) 527-1324

Reader Inquiry Card No. 4

HANG GLIDING STATISTICS

By Dan Johnson



GOING UP!

Here, following surveys from two issues of **WAC**, we look at variometer popularity. In an earlier survey (Nov-Dec '78 **WAC**), figures illustrated that 39% of all pilots owned a variometer. Interestingly that was a few more than owned a back-up 'chute. That ratio has changed. While the percentage of variometer owners has risen to 48.7%, 'chutes now run ahead at over 53%. We view that as healthy, but, still, it is obvious that more and more pilots find a vario helps them get it up.

Which variometers are selling the best? In the table below we show results from 4 months of surveying. This length of time is short enough to have significant errors possible. Please remember this, but surveying two issues brought similar results. At least for the more established brands (places 1-5), these percentages are probably reliable. Flight Designs and Paragon are somewhat newer market entries and could easily be on a rising trend. Plus, of course, sales of all are rising so continued rank shifting is inevitable. However, the results do substantiate the leadership positions of Colver and Litek.

VARIOMETER BRANDS

Cumulative Market Shares
(4 months of surveying)

Rank	MFR	Market Share %
1	Colver	27.9
2	Litek	23.5
3	Ball	12.8
4	Theotek	10.6
5	Makiki	10.1
6	Paragon	6.1
7	Flight Designs	2.8
	Homebuilt	3.4
	All other brands	2.8

WHERE ARE PILOTS FROM?

It has been some months since we surveyed to see where our responding readers live. So for marketing reasons we repeated this effort and we believed you would appreciate reading which states in America constitute the largest respondents to our Reader Cards. California has no threat to its leadership position.

Rank	State	Approx. %
1	California	20.3
2	New York	8.5
3	North Carolina	5.7
	Washington (state)	5.7
5	Pennsylvania	4.2
6	Texas	3.8
	Florida	3.8
8	Wisconsin	3.3
9	Oregon	2.8
	New Jersey	2.8
	Arizona	2.8

Other higher density states include: Colorado, Indiana, Massachusetts, Ohio and Tennessee.

THE BIG DEAL

Our on-going effort to locate the big dealerships has proved rather frustrating. The reason for this is the large number of dealers. After four months of surveying we count well over 150 dealerships. What this necessarily means is that even the certain large dealerships do not count for very many of the total sales. Therefore, we hesitate to say that any business is larger than the others, because with only a few new cards things can change rapidly. While 150 dealers may not be excessive, we suspect that many more exist, as we survey a rather small percentage of all pilots buying gliders.

The overwhelming majority of all dealers ended with a single sale credited to them. This could mean they

sell 2-5 gliders a year, not very full time. Others may sell a dozen or so a year, and a very few actually act as full time shops selling 25-100 units yearly. In spite of the problems, we could single out a few businesses which fall into the latter group.

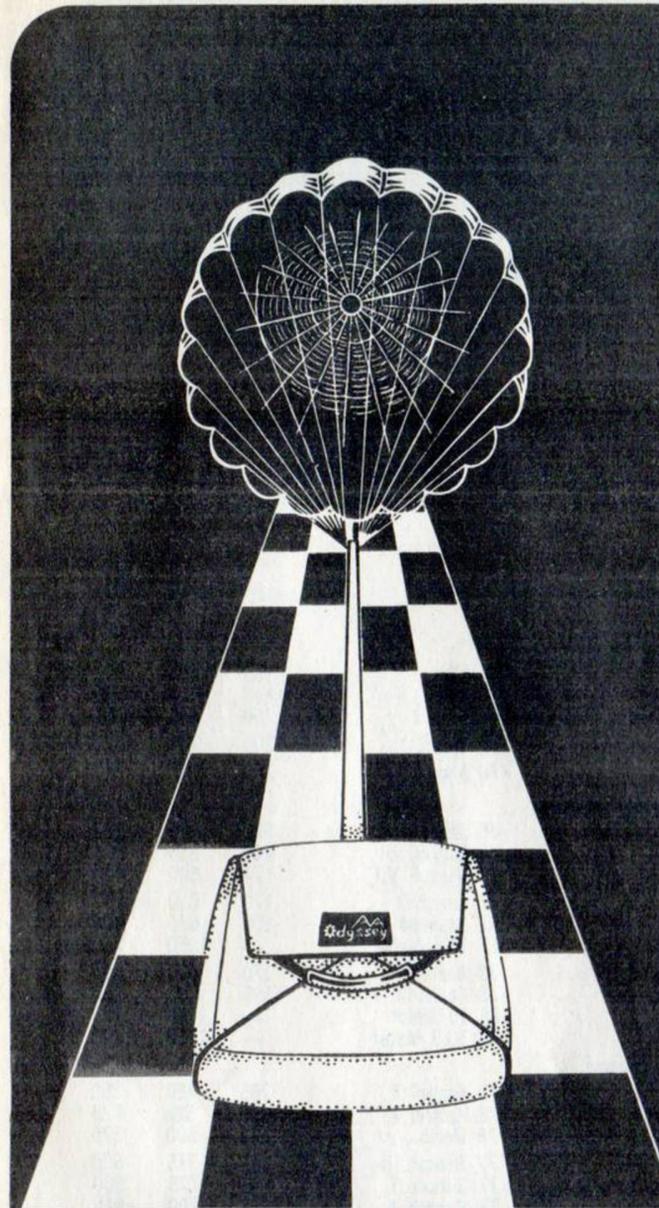
Dealer	State
Kitty Hawk Kites	NC
Aerial Techniques	NY
So. Cal School of HG	CA
Chandelle San Francisco	CA
US Hang Gliders	AZ
Sport Flight	MD
Crystal Air Sports	TN
Windhaven	CA
Eco-Flight	MI
Wasatch Wings	UT
Hang Flight Systems	CA
American Wings	CA

Finally for statistics, here is the brand survey following 14 months of surveying.

GLIDER BRAND Cumulative Market Shares

Rank	MFR	Last % Share	Now % Share	Change
1	Electra	15.9	16.3	+
2	Seagull	13.4	13.7	+
3	Wills	10.9	11.4	+
4	Sky Sports	8.0	7.9	—
5	Bennett	7.8	7.7	—
6	Eipper	7.1	6.6	—
7	UP	5.3	5.4	+
8	Hanta	3.2	3.6	+
9	UFM	3.3	3.3	=
10	Moyes	2.2	2.6	+
11	CGS	2.3	2.1	—
	All other brands	22.3	21.3	—

In the last **WAC** of 1979 we will give you some initial figures on other types of aviation experience, and we will repeat our survey on the year current pilots entered the great sport of hang gliding.



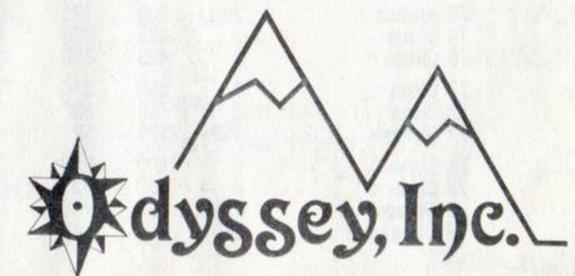
ODYSSEY offers you strength, quality and proven reliability with fast, single step deployment!

The Odyssey Emergency Parachute System is designed for fast, easy deployment and the fastest possible opening time. The quality and strength of our materials and construction is unsurpassed. It is available from most local dealers and distributors.

24' nominal diameter
(100-190 lbs.)
20 gores 20 V-tabbed lines
radial and circumferential
stress bands
\$325

26' nominal diameter
(170-250 lbs.)
22 gores 22 V-tabbed lines
radial and circumferential
stress bands
\$349

Write for our colorful new Odyssey Product Portfolio featuring a new line of harnesses, instruments, and accessories. (Please include \$1.00—refunded on order.) **Charge it!** We accept Visa and MasterCard, of course!



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WILTON, NH 03086
TEL. 603/654-6155

• DEALER INQUIRIES INVITED •

USED GLIDER BLUEBOOK

EDITION NO. 9

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

MANUFACTURER	YEAR	MODEL	SIZE	CLEAN PRICE	AVG. PRICE	MANUFACTURER	YEAR	MODEL	SIZE	CLEAN PRICE	AVG. PRICE
ALBATROSS SAIL GLIDERS						MOYES DELTA WING					
	76	ASG-20	C	550	300		76	Mini	180	525	400
	76	ASG-21	C	575	400		76	Midi	220	625	575
BENNETT DELTA WING						SEAGULL AIRCRAFT					
	76	Phoenix 6B	Jr.	425	350		75	Seagull III	220	325	250
	76	Phoenix 6B	Reg.	425	400		76	Seagull III	220	350	275
	76	Phoenix 8	Reg.	450	450		76	Seagull VII	174	600	350
	77	Phoenix 6C	Jr.	550	450		77	Seahawk	170	650	550
	77	Phoenix 6C	Sr.	400	425		77	Seahawk	190	675	600
	77	Phoenix 6C	Reg.	500	425		77	10.5 Meter	—	1050	750
	77	Phoenix 8	Reg.	650	375		78	Seahawk	170	825	600
	78	Phoenix 8 Super	Reg.	675	450		78	Seahawk	190	800	600
CGS AIRCRAFT						SKY SPORTS					
	76	Falcon V	225	550	450		76	Kestrel A	185	450	350
	76	Falcon V	185	575	400		76	Kestrel A	220	525	425
	77	Falcon V	185	650	500		76	Merlin	160	500	375
	77	Falcon V	220	600	475		77	Bobcat III	Lg.	775	600
	78	Falcon 5½	Med	800	625		77	Sirocco I	156	775	500
EIPPER FORMANCE						ULTRALIGHT FLYING MACHINES					
	75	Flexi II	240	400	200		76	Easy Riser	Compl.	1125	850
	75	Cumulus V	180	400	300	ULTRALITE PRODUCTS					
	76	Cumulus VB	180	450	375		76	Dragonfly Mk. II	174	575	375
	77	Flexi III	185	675	500		77	Firefly	174	650	500
	77	Cumulus 10	Med.	595	525		77	Dragonfly Mk. II	196	700	550
	78	Flexi III	Lg.	700	550		78	Spyder	176	850	675
	78	Cumulus 10	Med.	775	675		78	Condor	178	1000	825
	78	Antares	Med.	950	875	WILLS WINGS					
ELECTRA FLYER							75	Swallowtail	20-20	300	150
	76	Nimbus	20-17	200	125		75	Swallowtail	22-20	225	175
	76	Cirrus	3	425	350		76	SST	90	600	400
	76	Cirrus	2	425	350		76	SST	100A	625	450
	77	Cirrus	3	550	350		76	SST	100B	600	475
	77	Cirrus	2	450	300		77	SST	100B	750	550
	77	Olympus	160	575	525		77	Universal	100A	700	500
	78	Cirrus 5	C	800	650		77	X-C	185	800	650
	78	Cirrus 5	A	750	625		78	Alpha	185	1025	775
	78	Olympus	160	775	700		78	Alpha	215	1000	800
	78	Olympus	180	725	600		78	X-C	215	950	775
MANTA PRODUCTS											
	77	Mirage	175	700	550						

NOTE: DEALERS! Write to us to participate in the Used Glider Bluebook. We would like to get your input on prices, to better represent all parts of the U.S.

Continue The Experience Of Flight



With The

Photo by PAUL WILLENBORG; Pilot RON FOSS

Whole Air Catalog.

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TEAR
OUT
HERE

CONSUMER ACTION LINE

The Consumer Action Line responds this month to Larry Whitney's article in the last WAC. Larry presented persuasive writing to argue in favor of using his company's graphite/aluminum spars.

Most writing in hang gliding is done by agents of one or another of the sport's businesses. These authors have the time, experience, and desire to communicate.

The result is that not everyone agrees. Of course, in any technical writing attempts, more than one opinion will emerge. This is exactly the case as designer Mike Meier of Wills Wing "answers" the points put forth by Whitney last issue. WAC gladly accepts differing views as the reader can then compare and evaluate on his or her own.

We asked Grafspan if they wished to counter-reply, but the offer was declined. In lieu of this, to illustrate his dedication to the sport, Whitney chose to give us a look at the Nationals of '79. (See page 14.)

GRAFSPAN RETROFIT KITS

For the past several months a company known as "Grafspan" has been heavily promoting the use of graphite reinforced aluminum spars in hang glider airframes. In the course of such promotion, particularly with regard to "leading edge retrofit kits," Grafspan has seriously misrepresented the facts on several occasions. Out of concern that the hang gliding community not be misinformed on subjects which bear on the safety of pilots, Wills Wing, Inc. has issued the following:

Wills Wing has not authorized the production of Grafspan retrofit kits for any Wills Wing glider, and does not recommend that such retrofit kits be installed on any Wills Wing design.

Claims by Grafspan that replacing stock parts with retrofit grafspars will "double the strength" of the glider and "eliminate the (possibility) that the glider could break" are in total conflict with all of the extensive loads testing that Wills Wing has conducted and documented during HGMA certification. Neither Wills Wing

nor Grafspan has conducted actual loads tests on a grafspar equipped Wills Wing glider, but form an analysis of failure modes which Wills Wing glider, but from an the 1979 HGMA certification of the Alpha, Omni and Omega, we strongly suspect that the effective structural strength of a grafspar equipped Wills Wing will not be significantly greater than that of a stock glider, and may in fact be less.

A Wills Wing glider fitted with grafspars will not retain its HGMA certification.

Claims by Grafspan that grafspars can dramatically increase the speed range, aerodynamic efficiency, performance, roll response, etc. of a glider are in complete conflict with all of our design and performance testing experience.

Additionally, if there were even, say a modest 20% increase in the top speed of a glider such as the 215 Alpha mentioned in Larry Whitney's article in the July-August 1979 Whole Air Catalog, (in which Larry claims the speed range on his grafspar equipped Alpha "has literally gone off the scale!"), the structural strength of the glider would have to be increased by 44% merely for the glider to retain the same effective structural strength relative to its speed range, which is how load factors are specified in the HGMA standards. In fact, the effective structural strength of Larry's Alpha is probably no better than it was when stock, and Larry's implication in the article that he is now flying an unbreakable ultra-performance, fully aerobatic glider is in total conflict with all of our empirical design and testing experience.

The above statements are made on the basis of Will Wing's analysis of the retrofit leading edge which Grafspan has installed on Larry Whitney's 215 Alpha, which was inspected by Wills Wing's design department at the May 15th meeting of the HGMA, as well as on the basis of several conversations between Wills Wing and representatives of Grafspan. Wills Wing has made numerous attempts to obtain sample leading edges from Grafspan for testing

and evaluation, and has also made numerous attempts to offer suggestions to Grafspan on how to modify the retrofit design so that the structural balance that was designed into the glider could be maintained and the overall strength actually improved. Grafspan has declined to take advantage of such opportunities, and Wills Wing can in no way endorse or recommend a product which we have not fully tested and evaluated. We do believe that graphite has a significant future in hang glider design, and are actively developing designs employing graphite in a number of structural applications, but we will not release or endorse any such design or product until we have conducted the full range of appropriate analysis and empirical testing as specified in the HGMA airworthiness standards.

Wills Wing has taken the above stated position on Grafspan retrofit kits on the basis of a lengthy process of analysis and only after pursuing every reasonable opportunity to work with Grafspan on resolving what we considered to be serious problems with both the product and the promotional claims being made for it.

Wills Wing, Inc

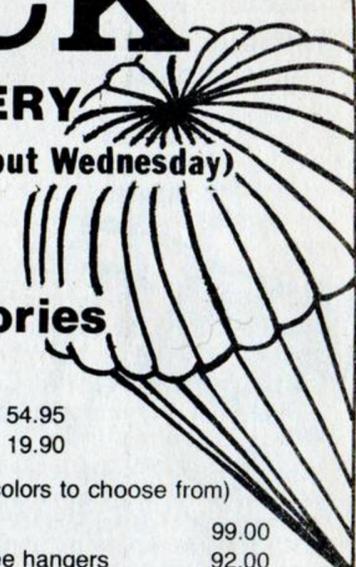
Since the above was written we phoned Mike Meier to get an update. Wills has been able to work with Grafspan to some extent. They will provide specifications so that Grafspars can be made for Wills' new deflexorless Raven. Then, Wills will do some evaluation testing to determine just exactly how the product might be used to improve their design.

WAC hopes these two companies can agree on a method to employ graphite. Reader interest is extremely strong for new structure in hang glider airframes, and for graphite in particular. It seems an inevitable part of the future. We at the *Whole Air Catalog* expect that, soon, graphite will become an optional item available on many models. It is all in the interest of safety . . . a worthwhile objective.

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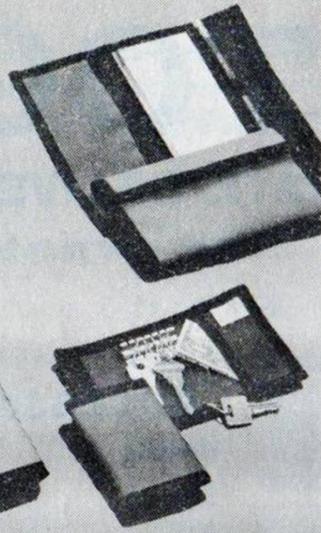


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A VIEW OF THE CRESTLINE NATIONALS

By Larry Whitney

Monday morning, opening day. Visibility is getting filthy; the San Bernadino smog is fulfilling every one of my lousiest expectations. It's grimy. We stand upwards of 5700 feet ASL, and the visibility appears to be less than a mile. Perhaps it was our perseverance in launching 42 heats that day that gave us clear and wonderfully soarable conditions for the next five days. Whatever, the meet was working. There was transportation, ham radio communications, adequate set-up room, shade, ice water, and much more than just rising air. My hat goes off to Tom Milkie. As Meet Director, he kept the meet on purpose, and the argument and protest to a minimum.

Eighty-four pilots were officially checked in, gliders and helmets were stickered; and, after seven days in the California sun, only ten individuals remained to "go for the trophy". The launch arena often resembled the busiest intersection of a flea mart — firelanes, fluttering plastic flags, overflowing trashcans, and stinky urinals. Spectators often mixed with flyers while continually being monitored to observe "No Smoking" and traffic control regulations. Newspeople clambered over boulders and underfoot to capture the shots that would best immortalize the moment. The nervousness of the flyers audibly shouted their approval as each morning the launch windows were announced: "Heat one, 30 seconds to open window. 5, 4, 3, 2, 1, GO!" Surprised by his anticipation, a spectator would stare anxiously as our legendary Chester Thunderwing continued to calmly adjust his vario. Silence respectfully carried the moment, each pilot had thirty seconds from GO to choose independently his moment for initiating launch. Mentally the moments stretch

as the launch, in microcosm, represents the entire flight to come. The tension of the moment clears as the pilot reviews the task . . . "10 seconds left in launch window", demands the amplified Launch Director. "5, 4, 3, . . ." NOW! A simultaneous launch, a soaring launch! Cocons and stirrups are stretched and the search for bigger thermals, positional strategy, and distance timing to the gate merge visibly into the consciousness of each pilot. It was exciting!

It was a treat for me to meet the representatives from the Regional contests. That opportunity came daily as I arranged the on-deck pilots for launch according to their sequence and whether they were listed for the left launch or right launch. As each day gave me a new opportunity to get more acquainted with the eventual winner, the value of the Nationals became clearer. This competition is the result of months of contests, a process of elimination involving hundreds of flyers. The Nationals serve as a target, as the reason to participate. Becoming a winner at each level builds anticipation for the next contest and beyond. The recognition is a powerful incentive.

As a result of my participation in the production of the Nationals, I have an appreciation of the scope of this event and the elements that make it work. I saw the effects that site and task selection make, that glider classification, spectator viewing space, media coverage, sponsorship participation, and political maneuvering had on the outcome of this event.

If we only use half of what we learned at Crestline as a foundation for the 1980 Nationals, it promises to be an incredible experience. I look forward to seeing you there. Bring a friend.



photo by Tim Cocker

EXTEND YOUR LIMITS

Grafspan, Inc., specializes in providing your glider with components that complement your directions in flying. Our custom graphite products go beyond "stronger and lighter"; we work for design improvement and new designs — it's what graphite is really good for.

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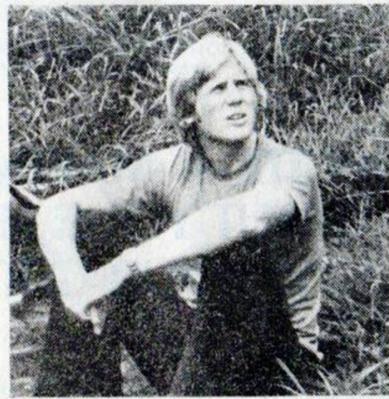
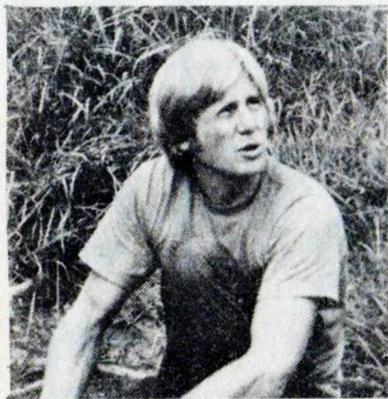
WIC INTERVIEWS ROB KELLS

Everyone recognizes Bob Wills as one of hang gliding's legendary personalities, and rightfully so. When an unnecessary accident claimed his life in June of 1977, many of us believed such a tremendous loss certainly forecast the end of the flight for one of Bob's primary concerns, Wills Wing, Inc.

A universal sadness was felt by flyers. First, over the end of a career for an amazing pilot, but secondly over the inevitable closing of a leader company like Wills Wing.

That closing never came, and in the two years that have transpired since, Wills has continued strongly

in a leadership position. One name is closely associated with that success; it is Rob Kells. In this interview, Rob tells how he became involved with hang gliding and Wills Wing, relates some of the changes to Wills Wing during his involvement, and gives us a glimpse into the future direction of the company.



How did you become interested in hang gliding?

When I first saw hang gliding 5½ years ago it didn't seem very safe. But two years later I watched as several friends soared in SST's for over an hour. The change that had occurred was quite obvious, and it was then that I realized I had to get involved. I started taking lessons from a long time friend named Mike Goodfellow. We had been living in Sun Valley, Idaho, pursuing our love of skiing. Mike was an excellent pilot and was primarily responsible for keeping me in one piece during my early learning and go-for-it stages.

How did you end up at Wills Wing?

Some of Mike's friends in N.Y. were working on plans for a promotional tour which was to involve gliding shows and demonstrations at state fairs and other crowd gathering events. We left Sun Valley to become involved with these people. The five of us purchased a motor home and traveled to Southern California. Several of the pilots involved were then flying Wills Wing gliders and we decided to purchase Wills Wing XC's for the tour.

When we arrived at the Wills Wing factory we were amazed. They were building great gliders, but their production efficiency and general organization left a lot of room for improvement. We spent

a month flying with Bob Wills and Burke Ewing and came to love and respect them and the rest of the members of the Wills Wing "family," which we had come to feel very much a part of. We decided to stay at Wills and offer our help in reorganizing production for better efficiency, and I eventually stayed on as production manager.

What were some of the problems?

One of the biggest problems was too many employees; the first move was to fire half a dozen people. Secondly the production specifications were largely in people's heads, or scrawled on the walls. We spent a lot of time picking the brains of people and



writing down information in a more organized manner. At the same time, we had a design related problem with the XC. Although there had been no serious accidents or injuries as a result of the problem, we felt it was our responsibility to ground the glider while we worked out the necessary design modifications. We eventually retrofitted every XC in the field with the modifications, which cost us roughly \$25,000, just at a time when we could least afford it. However, Bob and I felt that it was the responsibility of Wills Wing to absorb the costs of grounding and modifying the XC. In the midst of the modification program came the biggest setback of all — Bob's death. It was a shattering blow that no one thought the company could survive.

After Bob's death, I wanted to be sure that we would not go under without first producing the remainder of the gliders and accessories on order. The Wills family and all of the long time employees were a great source of encouragement at that time. The employees were so devoted that they were willing to work without compensation to fill the remaining orders. Our dealer network was small, but very loyal, and their continued support helped us tremendously. The tragedy of Bob's death seemed to bring the entire

Wills Wing "family" even closer together, as everyone worked with a new determination to see things through. Since that time we owe our success to the continued support of our employees, our original dealers, and an increasing number of new dealers, and of course to the pilots who fly our gliders.

Having lost Bob, you had also lost your designer. How did Mike Meier and Steve Pearson fit in with regard to Wills Wing's reorganization?

We realized in the late summer of 1977 that we needed to begin a design program for a new glider for the '78 season, or the rest of the industry would pass us by. Mike and Steve had been flying and working with Bob for a long time. Both had strong math, physics, and engineering backgrounds, and both were excellent pilots. We had hired Mike to handle production test flying following Bob's death. Steve had a job which allowed him to spend a lot of time at Wills Wing, and he and I built a second prototype of the "Pulley Special," one of Bob's last designs, and a glider that was extremely well liked by everyone who flew it. In October, Mike was hired full time to do design work, and by March of '78 he and Steve had completed development work on

the Alpha, which became our most successful glider ever, and to this date has the most flawless safety record of any glider I know of.

Other key personnel at Wills Wing include Linda Liquori and Mike Nash. Linda, who has been working for Wills longer than almost anyone, somehow manages to keep the business side of the operation completely organized, despite the incredible complexities involved in running a manufacturing/distributing/service operation like Wills Wing. Mike Nash, new to Wills this year, has one a tremendous job in production management and materials acquisition, keeping production flowing smoothly despite severe problems with materials availability this year.

What are some of the new approaches to marketing and design implemented by Wills Wing since the reorganization?

Since day one I have felt that flashy ads, contest wins, and heavy promotion were not nearly as important as a safe, well made product, factory support of the dealer, and, above all, honesty. We have tried to be scrupulously honest in our advertising, so that in the future the public will believe in us and not dismiss what we say as typical industry hype.

Continued on Page 24

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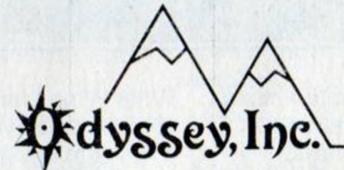
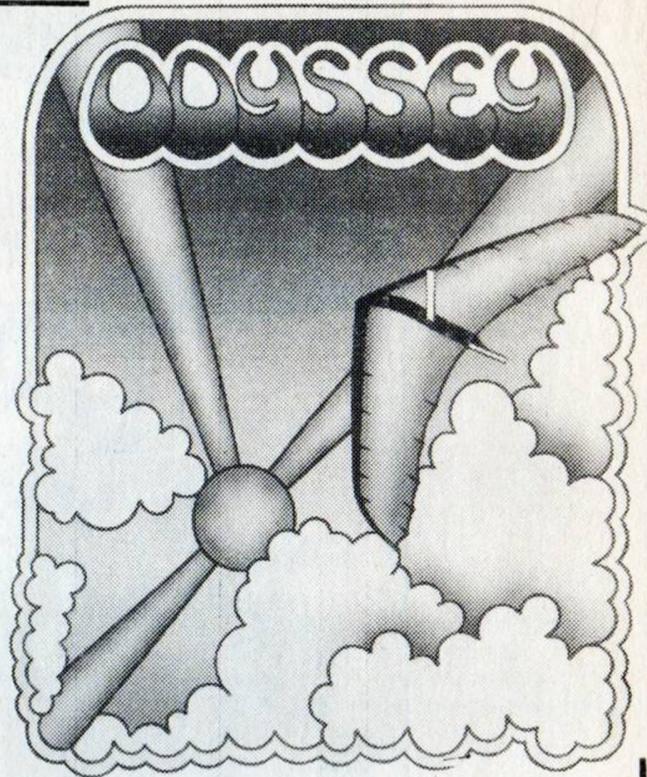
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After much positive input from the Reader Service Cards, we have decided to attempt a comprehensive listing of America's flying sites. Something we saw as very necessary, since through statistical surveying we have established that pilots regularly travel long distances from home. Therefore, we estimate they need to have answers to site questions prior to leaving.

We begin with Tennessee. We are aware we are going to need help in this endeavor. By presenting our home state first, we feel we can better aid clubs, organizations, and individuals who might supply information. These sites, also in great demand, are easily accessible to WAC and this effort offers a format in which site information can be provided.

We would be especially interested in corresponding with clubs or businesses since they usually have a storehouse of information regarding local flying sites. The questions we have answered are merely our compilations, and may be improved. We welcome your suggestions.

For flying site information, we need photos, general writing, or interesting notes, and answers to the questions. On photographs, we prefer a shot of launch and the landing area, from the air, if possible. These views will help the reader evaluate the facilities.

Send information to the attention of WAC Editor Starr Tays. We'll appreciate it.

clinch mtn. KNOXVILLE

Clinch Mountain is an incredible place. The first time I went there to fly, the wind was coming up the NW face at about four or five. "Too bad it's not soarable," I thought. I took off and hugged the ridge anyway, and to my amazement, punched through to witness the most awesome sight I can ever remember. The crest of the mountain stretched to the NE as far as I could see. I missed the landing field by six miles. I was hooked. I found a log cabin for rent a few miles from takeoff and made Clinch Mountain my new home.

Cross country potential is one of the main attributes of the mountain (the world record out and return sailplane flight was made along

this ridge, as was the East Coast hang glider distance record). Clinch Mt. is two sites in one. Often you can decide which side of the mountain you want to fly after you set up. Earlier this summer I ran off the Southeast side in a two mile an hour tailwind and gained 3700 feet. Then Matt Wagner ran off the other side and also gained 3700 feet.

General: SE side: 1500 feet vertical; 3:1 to large landing area. Seldom soarable on pure ridge lift, but the fields below have all been known to produce boomers. The real thrill of flying the SE side is to turn right and head for the "switchbacks," for some rodeo air — very small but strong thermals boiling out of the rocky road that winds up to takeoff. An excellent natural takeoff of sandstone slopes off about 10 degrees to the Southeast. In runoff conditions, it's suitable for Hang II with previous mountain cliff launch experience. If it is soarable, it's likely to be prefrontal and very nasty, so keep an eye on the sky.

N.W. site: This is the side for

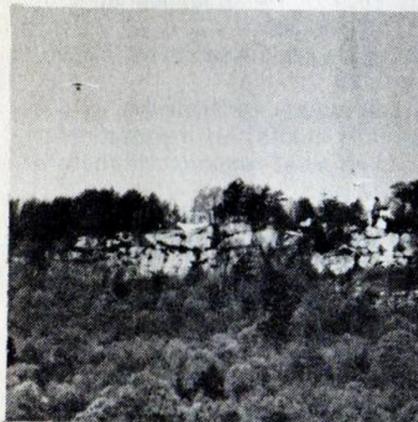


Above: Looking Northeast along the crest of Clinch Mountain.

FLYING IN TENNESSEE



raccoon mtn. CHATTAHOOGA



1. Direction — mountain, dune or cliff faces: 100°.
2. Rating required to fly: Novice (Hang 2).
3. Any club(s) or organization(s) you must register with before flying: You must register with the Crystal Flight Resort office in the landing field.
4. Fees you must pay: \$2.00, \$5.00 grounds pass, \$1.25 - \$1.50 lift fees.
5. What conditions for a) gliding, and b) soaring: Acceptable in 0-12 in winds from 0°-180°, soarable in winds from 045° to 135° and in thermals.
6. Flying season: when best (consistently fly/soarable): Flyable year around; soarable predominately spring and fall, fall best.
7. Transportation necessary to get to launch site: Tram car system.

cross country flying. Fifteen to twenty miles is a breeze on most soarable days. The steep face is 1250 feet vertical at launch, and averages 1000 feet for the first 20 miles or so, when you come upon five miles of deteriorated ridgeline. Then it picks up again and goes another 70 miles to the next gap (check with local fliers about which fields are OK and which ones from which you'll be escorted at gunpoint).

There is a road that parallels the mountain as far as you can fly, so pick-up is no problem.

The launch itself is no jewel. There's plenty of room, but it seems to be a slightly uphill run, or level at best. The rest of the takeoff is through a slot in the trees, so it can be slightly more turbulent than the general airflow.

Location: 22 miles NE of Knoxville, TN, on Highway U.S. 11W, a few miles SW of Rutledge.

Whom to see: Taylor Watkins at Valley Grocery and Motel and Exxon Station, located on 11W a mile or so past the turnout for the takeoff and landing areas. There's a locked gate at the bottom of the mountain road and you'll have to get a key, sign a release, and pay a few bucks at the store.

Phone: 615/828-5543.
The Road Up: Ten minutes and 1.5 miles of rocky switchbacks. Vehicles suitable for off road use will make it up easily eleven months a year, but a 4WD is needed when it's really muddy in late winter and early spring.

There's a sign hanging on the gate at the bottom of the mountain, but don't let it bother you. It reads, "This property is guarded by high-powered rifle three days a week — You guess which three." It's just to keep the Whuffo's from tearing up the place.

8. Glider set-up area capacity: 20 gliders.
9. Landing field (a) approx. miles from launch: 1/2 mile.
(B) Size: 5 acres.
(C) Any obstructions: Power lines or trees on two sides.
10. Launch (A) Elevation: 1500 M.S.L.
(B) Vertical descent: 835 ft.
1. Special notes on site: Popular intermediate mountain for early cliff launch experience. Commercial campground on site. Crystal Air Sports Motel 1/4 mile away.

lookout mtn. CHATTAHOOGA



1. Direction — mountain, dune or cliff faces: 315°.
2. Rating required to fly: Novice (Hang 2) in mild, Intermediate (Hang 3) in 10 m.p.h. and over.
3. Any club(s) or organization(s) you must register with before flying: Register with Air Space in the landing field.
4. Fees you must pay: \$5.00 per day, \$10.00 for 10 days.
5. What conditions for a) gliding, and b) soaring: Acceptable in 0-10 in winds from 260° to 360°, soarable in winds from 280° to 340° and

- in thermals.
6. Flying season: when best (consistently fly/soarable): Flyable year around, soarable spring, fall and winter.

7. Transportation necessary to get to launch site: Paved road bottom to top.
8. Glider set-up area capacity: 15 gliders.
9. Landing field (a) approx. miles from launch: 1 mile.
(B) Size: 22 acres.
(C) Any obstructions: Trees one side, some turbulence from foot hills nearby.
10. Launch (A) Elevation: 2100 M.S.L.
(B) Vertical descent: 1325 ft.
11. Special notes on site: Transportation vehicle available and famous soaring site.

hensen gap DUNLAP

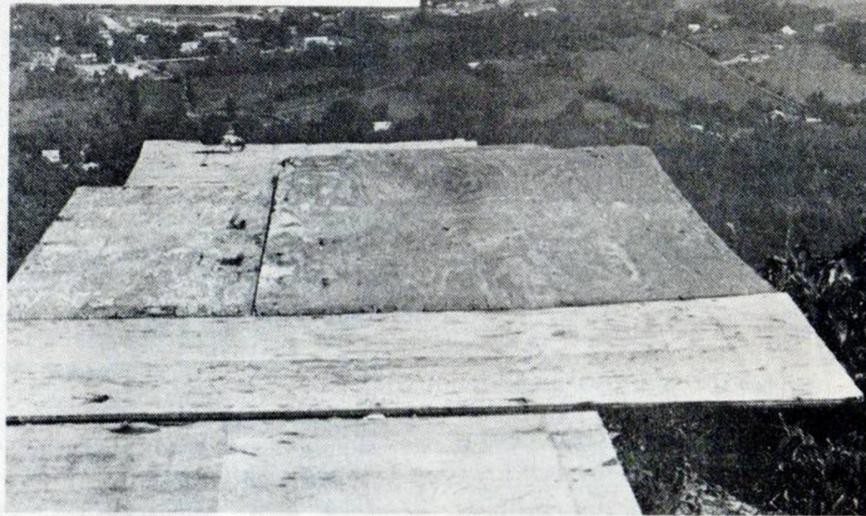


1. Direction — mountain, dune or cliff faces: 315°.
2. Rating required to fly: Intermediate (Hang 3)
3. Any club(s) or organization(s) you must register with before flying: Register with any Tennessee Tree Topper Club clearance official. Many officials, visit any Chattanooga flying site or hang gliding business.
4. Fees you must pay: \$5.00 for three days, \$10.00 for 10 days, also yearly rates.
5. What conditions for a) gliding, and b) soaring: Acceptable in 0-10 in winds from 260° to 360°, soarable in

winds from 280° to 360° and in thermals.

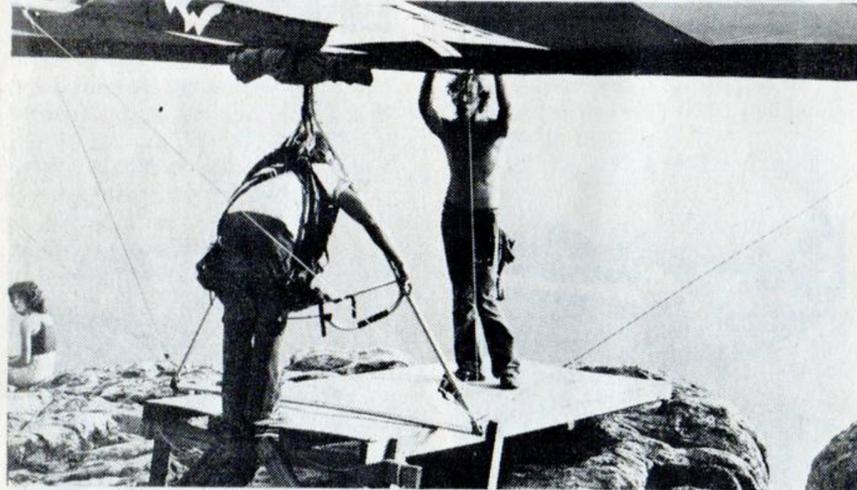
6. Flying season: when best (consistently fly/soarable): *Flyable year around, soarable spring, fall and winter.*
7. Transportation necessary to get to launch site: *Passable in 2-wheel drive all year.*
8. Glider set-up area capacity: *15 gliders.*
9. Landing field (a) approx. miles from launch: *1 1/4 miles.*
(B) Size: *Two fields, 10 and 20 acres.*
(C) Any obstructions: *Small tree line, one side.*
10. Launch (A) Elevation: *2200 M.S.L.*
(B) Vertical descent: *1400 ft.*
11. Special notes on site: *SW launch available for SW winds. See clearance official. Camping at launch available to members.*

whitwell
WHITWELL



Above: Launching at 1600 foot Whitwell.

Below: Chattanooga is finally open to Southwest winds at Hensen's Gap SW.



1. Direction — mountain, dune or cliff faces:
2. Rating required to fly: *100°.*
Intermediate (Hang 2)
3. Any club(s) or organization(s) you must register with before flying: *Register with any Tennessee Tree Topper Club clearance official. Many officials, visit any Chattanooga flying site or hang gliding business.*
4. Fees you must pay: *\$5.00 for three days, \$10.00 for 10 days; also yearly rates.*
5. What conditions for a) gliding, and b) soaring: *Acceptable in 0-10 in winds from 060° to 160°, soarable in winds from 090° to 145° and in thermals.*
6. Flying season: when best (consistently fly/soarable): *Flyable year around, soarable spring, fall and winter.*
7. Transportation necessary to get to launch site: *Paved road top to bottom.*
8. Glider set-up area capacity: *Six gliders*
9. Landing field (a) approx. miles from launch: *1 3/4 miles.*
(B) Size: *12 acres.*
(C) Any obstructions: *Trees two sides.*
10. Launch (A) Elevation: *2400 M.S.L.*
(B) Vertical descent: *1600 ft.*
11. Special notes on site: *Highest site in Chattanooga area.*

WILLS WING ALPHA!



SAFETY, PERFORMANCE, QUALITY YOU CAN DEPEND ON.

"The **ALPHA'S** handling inspires **total** confidence. Within seconds after launch on my first flight in the **ALPHA 215 I knew** I had the control to safely turn back into the ridge to follow the first marginal thermal that came along. So I did."

- Chris Price

"I'm **totally** impressed with the **ALPHA**. Its combination of easy handling, stability in unusual attitudes, and excellent sink rate makes it an exceptional thermalling glider. The quality of the workmanship and hardware is unsurpassed."

- Dick Stern "Old Man of the Mountain"

"The **ALPHA** is a true **supership**...it feels utterly stable regardless of the bank or pitch angles...this may make the **ALPHA** the best thermalling glider I've written about in this series."

- Dan Johnson, Glider Rider

NEW FOR 1979!

Wider leading edge pocket
Expanded upper speed range
Improved sail design
Velcro batten retainers
Durable fiberglass/foam battens

SPECIFICATIONS

AREA	245 ft.	215 ft.	185 ft.	155 ft.
SPAN	37'	34.5'	31.9'	29.3'
PILOT (FLYING) WGT	190-250 lbs.	165-205 lbs.	140-175 lbs.	110-145 lbs.
GLIDER WEIGHT	56 lbs.	49 lbs.	46 lbs.	43 lbs.

AFTER ONE FULL YEAR OF PRODUCTION, NOT A SINGLE ALPHA HAS EXPERIENCED A STRUCTURAL FAILURE OR PITCHOVER

Reader Inquiry Card No. 13

WILLS WING, INC.

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

ROB KELLS

Continued from Page 17

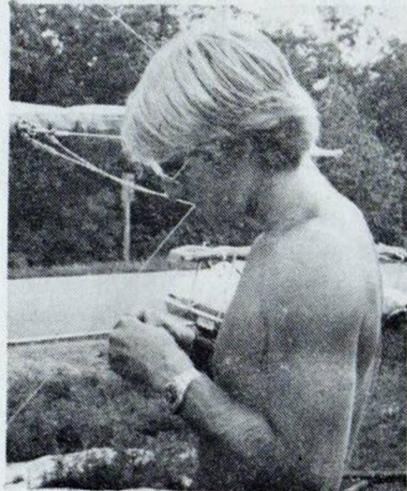
As far as promotion, I feel that safety, handling, and performance, in that order, are the best promotion for any glider. But in addition, a qualified dealer network and pilot education is a must. In the past two years I've been spending a great deal of time traveling around the country doing demo days, and letting the consumer experience the characteristics of our gliders first hand. I've made a point of showing our certification films to groups of pilots and to our dealers so that everyone understands the design parameters and what to expect from our gliders. In addition, I've held tuning and service seminars at various dealerships and tried to get dealers and customers better acquainted with tuning and maintenance techniques.

We have also supplied all of our dealers with a service notebook which contains spec sheets, brochures, certification certificates, price lists, owner's manuals, glider dimensions, tuning and maintenance manuals and dealer bulletins. The end result is that any dealer having one of these notebooks should be able to service any Wills Wing product.

In addition we will sell replacement parts to any qualified dealer at our normal discounts so as not to penalize a customer that does not have a Wills Wing dealer close by. There are a number of other programs in the works such as tandem clinics, parachute seminars, along with another dealer service seminar that will, well, I guess I better keep the lid on that one for now.

The main focus of our design program has always been safety and handling. Mike, Steve and I all work closely together evaluating a prototype, and changes are made continuously until it becomes a glider that we personally enjoy flying. I think that this type of approach has, and will continue to bring the public the best handling gliders. There are four other fundamental aspects of our design program.

First, Mike and Steve develop each design in rough, mountain thermal conditions, where it takes a special balance of handling and stability to optimize soaring flight.



Second, the designers themselves put the glider through very rigorous and radical maneuvers, as well as other maneuvers specifically designed to show up any handling deficiencies. Most companies employ a test pilot to do this type of testing for them and often much is lost between test pilot and designer.

Third, our test flying program has taught us as much about improving our designs as any other single factor. We've been making a big stink about this point in the media lately, but we feel it is important for the customer to know that Mike, Steve or myself has personally test flown his or her glider prior to delivery. The average airtime per unit is about 15 minutes, and all adjustments, the test site, the pilot's name and even the time it was in the air are all carefully logged and filed at our office.

The Alpha, Omega, and Omni designs are doing well, and the new Raven looks promising, what is Wills Wing's future in terms of design?

What a loaded question! That's a tough one, Dan. Mike and Steve have several projects in the works; everytime I go into their office they're buried under yards of computer tape and pages of diagrams. One project I'm personally pushing for is the development of an "aerobatic" glider. HGMA Standards do not exist yet for aerobatic gliders and the term is being used loosely. What I would like to see is a glider which could survive repeated tumbles or any other conceivable

flight maneuver without breaking. The purpose of such a glider, as I see it, would not be to encourage people to do aerobatics, but to provide the pilot with the peace of mind and safety that such a design could offer. It has been suggested that an aerobatic glider would represent a disregard for our sport and human life. I take a totally opposite view. I believe that the availability of this type of glider would save lives rather than take them. I think that pilots will continue to push their own limits and the limits of their gliders whatever cautions we may put on the glider placard or publish in the media. I think glider design needs to keep pace with advancing pilot skills, and I think an "unbreakable" glider can't help but be a safer glider.

Wills Wing has always been known for large gliders, what about gliders for ladies and small men?

It's true that we have built a number of gliders that were considered huge by most people's standards, and that in general we design for light wing loadings. However, we haven't ignored the small pilot. In 1978 we introduced the 155 Alpha. It is the best small person's glider we make, and, by the feedback I've gotten from a number of excellent women pilots, I might get away with saying it has been the best small person's glider to date by any manufacturer. The market for gliders designed for very small or very large people is obviously quite limited and therefore not as profitable. But tiny and huge people need good equipment too. I would love to see a lot more women pilots; I think we all would. With the new small, high performance gliders, no one has an excuse any longer. We have gliders in the Alpha series alone to cover people from 95 to 300 lbs. That should take care of just about everyone.

What does your future hold for you?

Flying is something in which I have become totally immersed. I'm sure that I'll be with Wills Wing for quite some time. I believe very strongly in what I'm doing. The sky's the limit! And there's a lot of work to be done. I think I'll take you up on those power lessons for my license this winter and get more involved in other types of flight like sailplanes and skydiving, and whatever else I have time for. But I think I'll be with Wills Wing as long as I have something to contribute.

AT CGS AVIATION, WE'D RATHER OUR CUSTOMERS DID THE TALKING.

TERRY FINGER, MICHIGAN

"Needless to say, but I'll say it anyway, your reduction unit is great! It's nice to know you have the power to take off clean and climb, even with the poor airfoil on my wing..." "I'm looking forward to many enjoyable flights, thanks to my CGS Power System."

TOM CANFIELD

"After a slow start, only one word can describe your West-Bend engine package's performance: EXCELLENT!" "I have a couple of buddies who have a ----, and a ---- (belt driven) engine systems. My engine out performs them like crazy! I can outclimb both of them like anything! No comparison!"

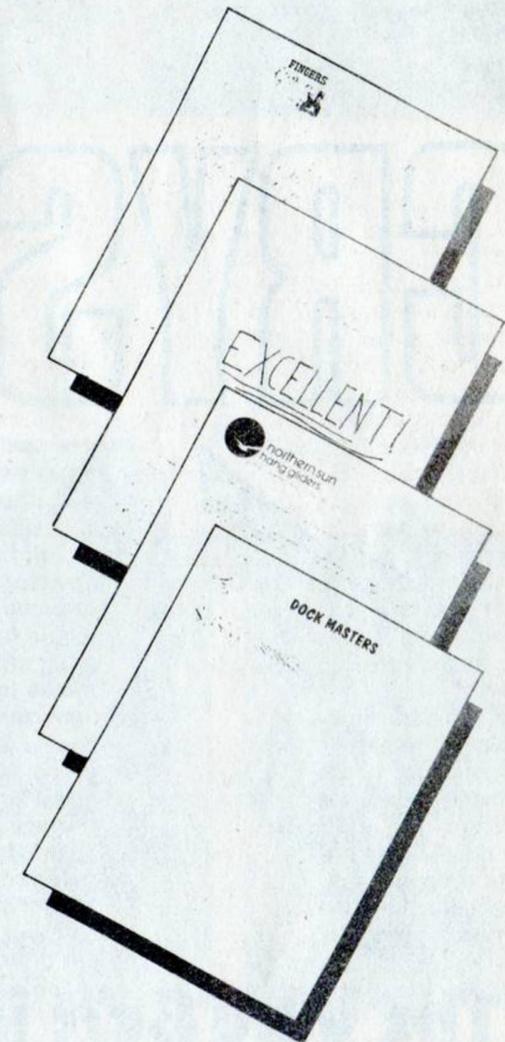
NORTHERN SUN HANG GLIDERS, ST. PAUL, MINN.

"After selling more than sixteen CGS Power Paks, it has come to our customers and my conclusion that the CGS unit is the best all around power package available on the market today..."

JAY SAMPLE, FT. PIERCE, FLA.

"Your MAC 101 reduction drive power unit is an engineering masterpiece. I became airborne very quickly in my "Easy Riser" even though I weigh nearly 200 lbs. I have just ordered a new CGS power unit for my new Mitchell Wing..." "After seeing another beautifully crafted "Easy Riser" barely get airborne with another power unit, it is truly a relief to have power to spare."

THESE PEOPLE AND HUNDREDS MORE HAVE ONE COMMON DENOMINATOR TO THEIR SUCCESS...

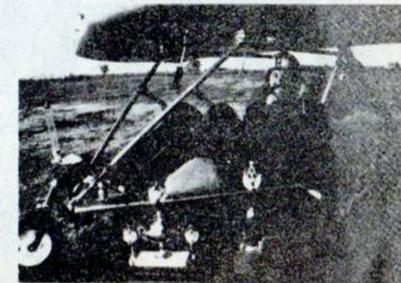


CGS POWERHAWK



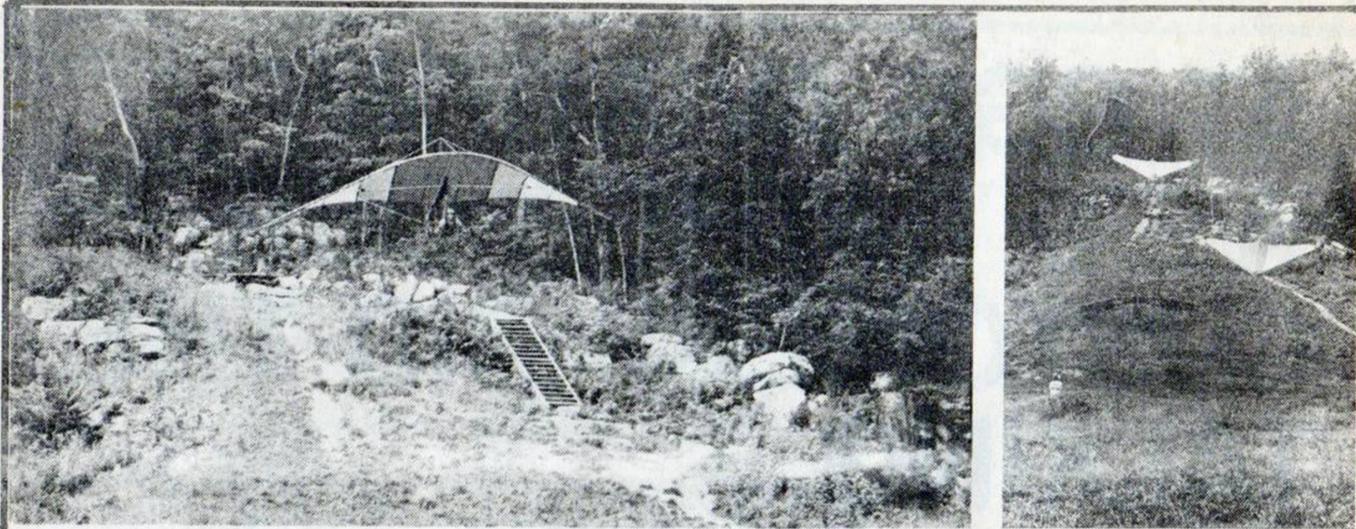
★ ★ ★ LATE NEWS FLASH ★ ★ ★

Dick Clauson set an official altitude gain record for powered hang gliders of 11,700 ft. He did it at the Mitchell Wing Meet in Porterville, California and he did it with a CGS Powerhawk unit, of course.

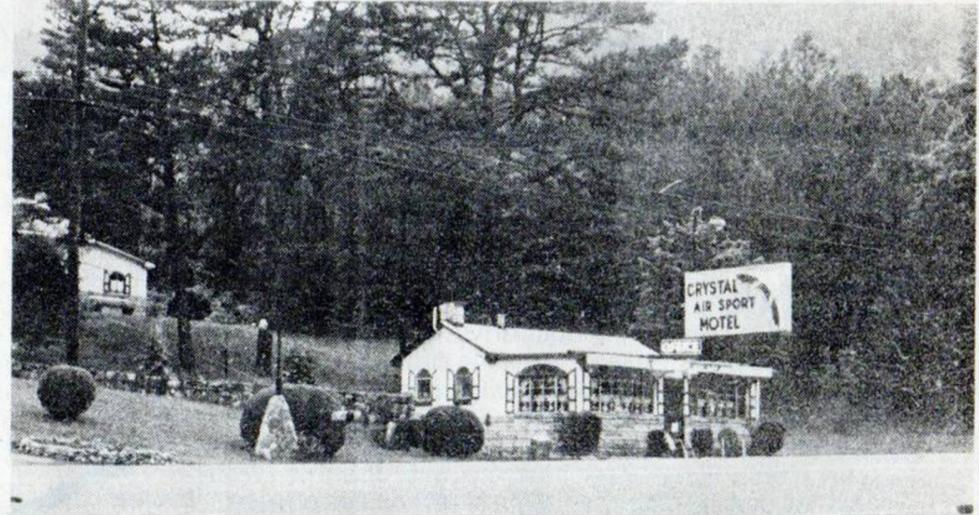


CGSAVIATION

4252 PEARL RD., CLEVELAND, OH. 44109 (216) 398-5272



CRYSTAL AIR



The Very Best in Hang Gliding Services

SITE — The most used "First Cliff Launch" mountain in the United States
INSTRUCTION — From the Ground to the Mountains
SALES — Wills Wing, Seagull, and Sky Sports Quality Brand Names
SHOP — Home of Crystal Accessories — Quality Repair Work
MOTEL — Quiet, comfortable lodging — "Where the Flyers Stay"
 Eipper Dealership — Sky Gear Gifts — Munchies

photos by Paul Willenborg

**CRYSTAL
FLIGHT
RESORT**



**CRYSTAL
AIR SPORT
MOTEL**

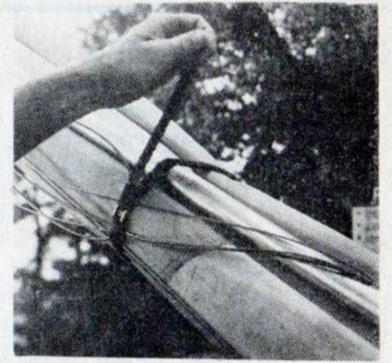
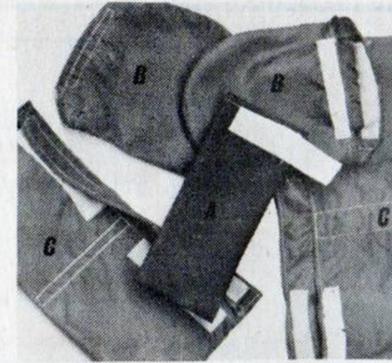
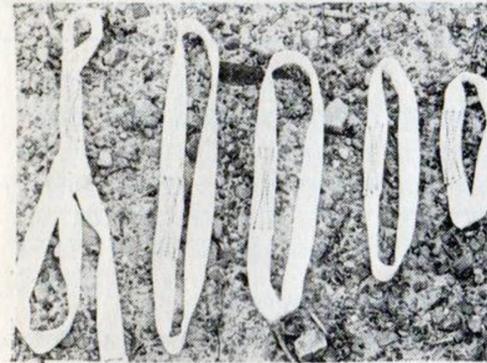
Resort — Rt. 4, Cummings Hwy., Chattanooga, TN 37409,
Phone 615/825-1995 9-2 daily

Motel — 4328 Cummings Hwy., Chattanooga, TN 37409,
Phone 615/821-2546 daily

Reader Inquiry Card No. 15

CRYSTAL accessories '79

Reader Inquiry Card No. 16

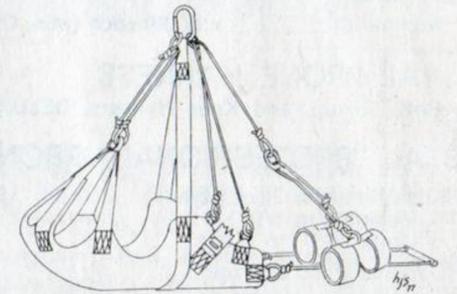


SUSPENSION LOOPS

Crystal's deluxe line, all tested to 20 G's! Will fit all bar/harness combinations. Adjustaloop — 9" to 22" hang range tested to 4,000 pounds. 9", 12", 15", 18" fixed length loops tested to 5000 pounds.

COVER BAGS

Protect your sail and spars from tears and dings with Crystal's small bag line. Single pouch for small coils (Seagull). Dual pouch holds all lower wires (Wills, Electra). Kingpost or Tensioner bags keep rough nicos and sharp fittings covered. All use velcro closures.



VELSTRAPS

The finest in hang glider tie straps. Strong. Long Life. 24 inches long by 3/4 inch width. Metal clinch ring. From Velcro Corp. Minimum order of five earns the lowest price anywhere.

PRONE HARNESS

Deluxe knee hanger harness, with foot stirrup, and locking carabiner. Adjustable leg straps tighten snug for a secure launch, then loosen in flight. One size fits all up to Extra-large. Padded throughout with full floatation foam. Very popular harness, with continuous main strap.

STROBALITE

Inexpensive, powerful strobe light. Visible for miles in all directions. Floats in water. Seven hour average battery life on 2 "C" cells.

LOCKING CARABINER

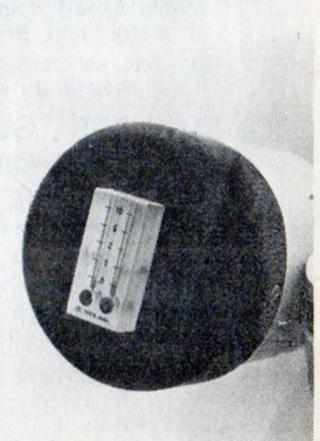
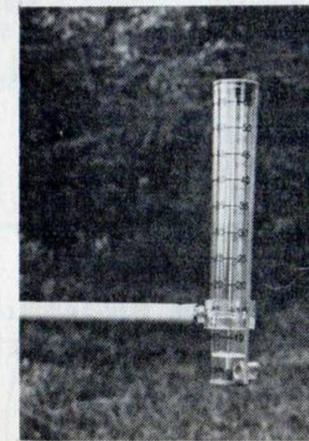
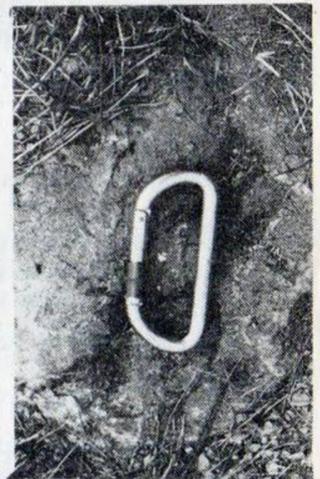
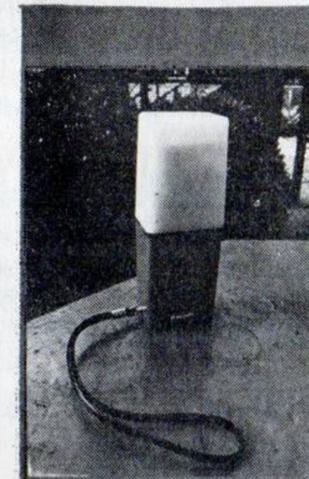
Mail order special price. 2000 kilogram (5500 pound) capacity, with friction-hold locking gate. Tested, aluminum. Was \$7.95.

MAKIKI VARIOMETER

Pellet vario. Very durable. No batteries ever needed. Very sensitive and easy-to-read. One quarter the price of electronic varios.

HALL WIND/AIR SPEED METER

Accurate, easy-to-read meter. Very durable. Disc-on-shaft indicator resists dirt jamming. Prone bracket 15 inches long fits all bars easily; rises for landing.



See order form, next page.

CRYSTAL accessories '79

SUSPENSION LOOPS

- ___ A Deluxe Adjustable Loop \$ 7.00
- ___ B 18 inch Standard Loop \$ 4.00
- ___ C 15 inch Standard Loop \$ 3.75
- ___ D 12 inch Standard Loop \$ 3.50
- ___ E 9 inch Standard Loop \$ 3.00

BAGS

- ___ A Kingpost/Tensioner \$ 2.00
- ___ B Lower Cable (Single Pouch) \$ 3.00
- ___ C Lower Cable (Dual Pouch) \$ 4.00
- ___ New Crystal Flight Bag, Std. \$35.00
- ___ X-L \$39.50

VELSTRAPS

___ Number of _____ x \$0.99 each (Min. Order — 5)

CRYSTAL PRONE HARNESS

___ Both Stirrup, and Knee Hangers, DELUXE \$89.00

CRYSTAL "PROFESSIONAL" PRONES

- ___ Knee Hangers, Pivot Style
 - ___ Medium (to 5'9") \$109.00
 - ___ Large (5'9" to 6'5") \$109.00
- ___ Optional Foot Stirrup \$ 15.00
- ___ Long Apron, Stirrup Style —
 - ___ Medium (to 5'9") \$109.00
 - ___ Large (over 5'9") \$109.00
- ___ Optional Spreader Bar \$ 15.00

CRYSTAL SUPINE

___ With Foot Stirrup \$79.00

CARABINER

___ Aluminum, 2000 kg, with locking gate \$ 5.95
 Mail Order Only Price \$ 4.97

BACK-UP PARACHUTE

- ___ 24 foot, warehouse stocked \$319.00
- ___ 26 foot, warehouse stocked \$329.00
- (National Brand — Drop Shipped Direct, COD;
 Send 50% deposit; Add no extra shipping charges.)

STROBALITE

___ Complete (batteries not included) \$20.00

HALL WIND/AIRSPPEED METER AND MAKIKI VARIOMETERS

- ___ Hall Meter, with spinning disc \$18.50
- ___ Hall Meter Prone Bracket \$ 5.50
- ___ Complete, self-contained, pellet variometers,
 with mounting hardware \$55.00

CONTROL BAR "SUPERGRIP"

- ___ (feet) Plastic Oversleeving
 - ___ 1 inch per foot \$ 1.50
 - ___ 1 1/8 inch per foot \$ 1.95

REQUIRED ORDER INFORMATION

Name _____
 Address _____ Zip _____

Please indicate method of payment:
 ___ Check, or Money Order, or Bank Draft, in US Dollars, enclosed.

Make checks pay to: "CRYSTAL".
 ___ or charge to VISA/BankAmericard, or
 charge to ___ Master Charge.

Account number: (list all digits) _____

Expiration Date _____

Signature _____
 New Crystal Flight Bag

*Colors available (all have black
 webbing and white zipper):
 Red, blue, black, orange.
 Allow 3 to 4 weeks for delivery.*

Special Instructions: _____

Merchandise total _____

Tennessee residents,
 add 6.25% sales tax _____

Handling/Shipping
 95c minimum, or
 5% of total order _____

Allowed Discount, less _____

TOTAL _____
 Amount Enclosed _____
 COD _____

(COD orders will involve COD charges)

MAKE SURE FUNDS WILL NOT FALL OUT!

CRYSTAL accessories '79

Reader Inquiry Card No. 16

FLIGHT EQUIPMENT BAG

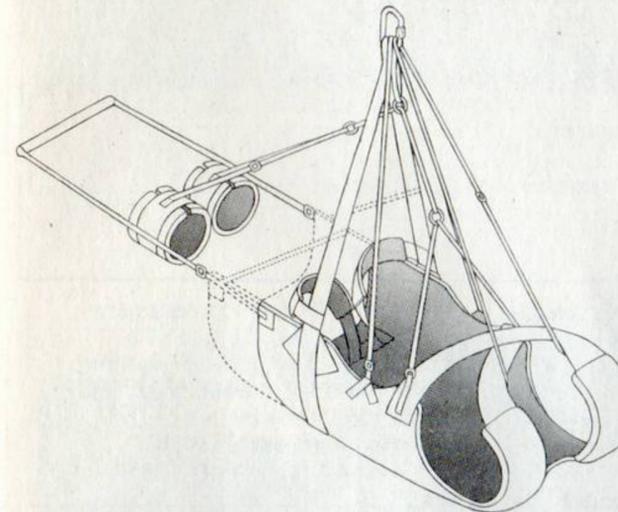
Deluxe, carry-all equipment bag. Three inch main support and padded handles. Adjustable shoulder strap. Padded bottom. Inside pocket with velcro closure. Standard size adequate for most pilots. Those with cocoon harnesses or extra gear can use the Extra Large size. Colorful.



NEW!
 1980 Product
 Ready

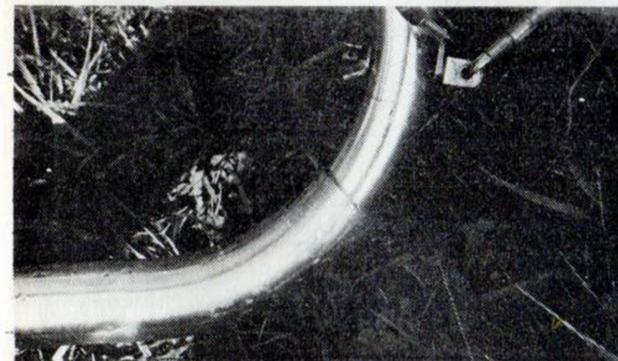
CRYSTAL "PROFESSIONAL" PRONE HARNESSSES

Our finest prone harness line ever, at a preview introductory price. Two styles, two sizes. The "Pro-Short" for pilots who prefer a knee hanger to shoulder pivot line. Five point support on both styles. Stirrup available, too. The "Pro-Long" for pilots who prefer long aprons with stirrup. Sit-down ease, also. Optional spreader bar. Both styles with continuous main strap. Both use 3" webbing and professional craftsmanship. Buckle adjusted supports.



CONTROL BAR "SUPERGRIP"

Tough, clear, plastic cover for control bar base tubes. Protects bar completely from scarring on rock or rough set-up areas. Insulates hands from cold. Offers excellent grip with larger diameter. One inch I.D. in stock regularly. Special 1 1/8 inch I.D. size available now, but on an intermittent basis. Now lower price.



BACK-UP PARACHUTE

Special, limited-supply price on two nationally advertised brands (Odyssey and Advanced Air). Send 50% deposit for COD balance. Sent direct from warehouse stock; one week delivery customary.



Send order form to: CRYSTAL, Box 144, Lookout Mtn., TN 37350 — No phone orders, please.

CRYSTAL



WAC GLIDER REPORT

by Dan Johnson

Here is our second glider report. The large number of responses to our first by Reader Card illustrates the popularity of such writing. We're glad you liked it.

This issue covers an intermediate glider, the Seahawk, as requested by many readers. Next issue we will feature two reports, on the Sirocco 3 and the Lancer IV.

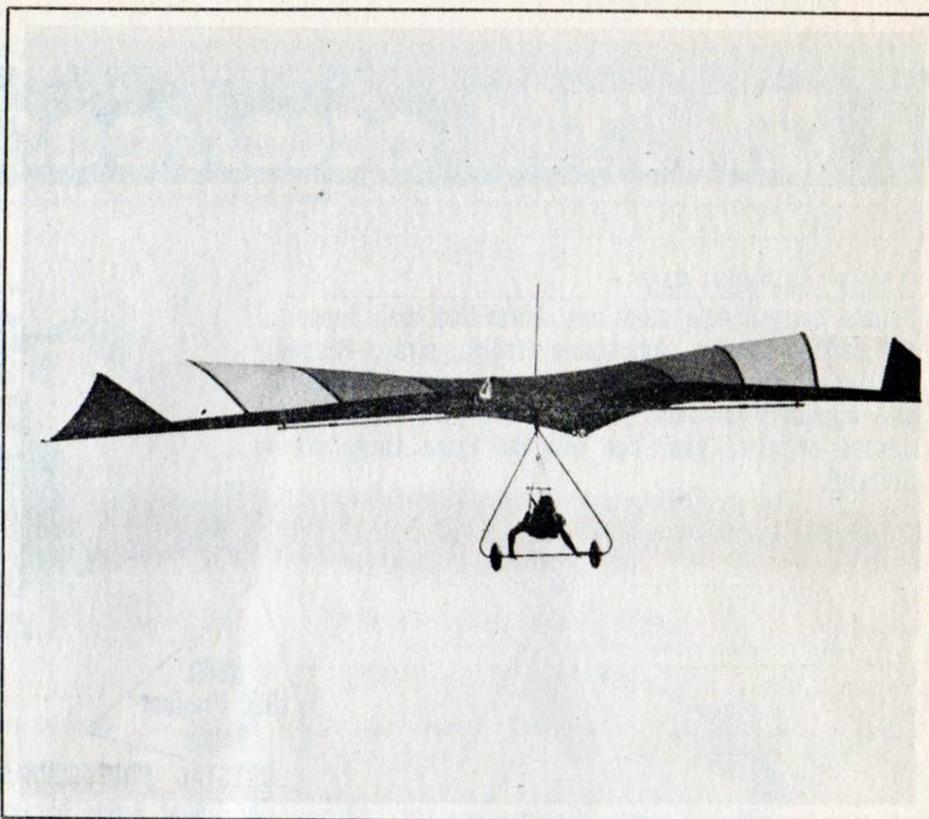
In addition to many other nice surprises for 1980, we will continue a glider report or two each issue. You subscribers who will receive the '80 magazine are cordially invited to inform us which gliders you'd like to read about, and we will do our best to arrange it.

THE SEAGULL AIRCRAFT SUPER SEAHAWK

The Seahawk. Practically an institution all by itself, this glider has come out as the Number One Model for hang gliding in every WAC survey.

This popularity pulled a sluggish Seagull Aircraft (from Seagull IV and VI doldrums) into high activity almost immediately when it was introduced in late '76. Really, this is no wonder, and it easily explains why the design remains a best seller for the California manufacturer.

The Seahawk is no Xerox copy of any other craft. It does share some history with many other Seagull models, however. The curved leading edge spars are a virtual trademark of the manufacturer. Also Seagull has used sail cambering as long or longer than any other company. And the split crossbar set-up initiated with the IV was carried to the Seahawk and today appears as another sort of trademark. But the Seahawk broke a tradition, too, as the numbered models ended with its predecessor the Seagull VII.



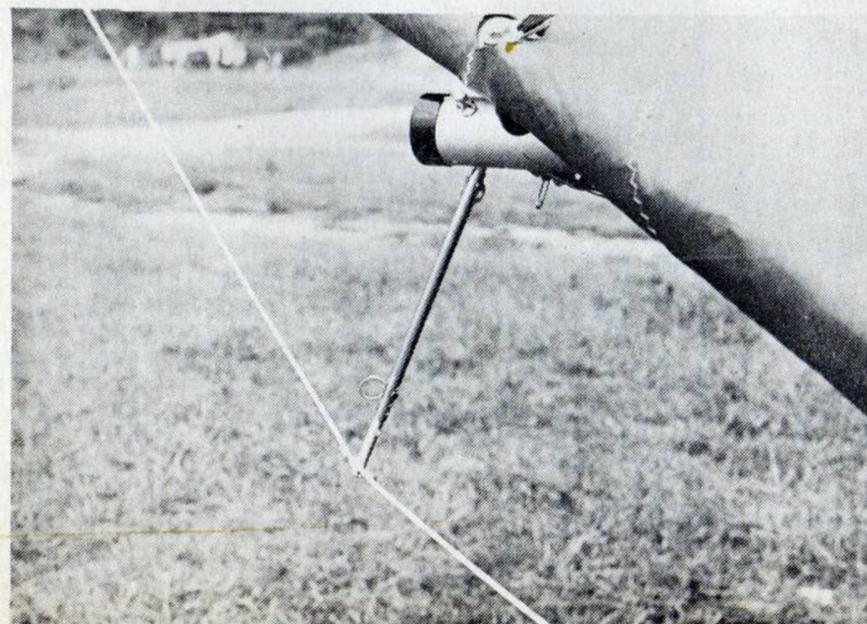
At the time of its entry into the market, the Seahawk was in competition with the Cirrus 2/3, the Phoenix 6B, and the SST. These models have been replaced by newer refinements but the first Seahawk continues basically as it was. Changes for the '79 model are subtle.



More obvious is a taller, more sculptured keel pocket. In the trend of today, Seagull uses more curve via sail shaping at the keel to replace its heavily cambered and reflexed keel spar of before. This will simplify repairs a bit. The sail itself is constructed of more substantial fabric than is customary, especially so for intermediates. This stiffness, apparent when rolling up the sail, offers a more uniformly smooth airfoil.

Two other '79 developments are the wingposts and the use of a reflex bridle. The deflexor system has eliminated all turnbuckles, and done so efficiently by use of the same wingpost rods as were introduced last year on the Meter ships. Four holes on the wingpost rod are drilled offset to two more holes on the rod inset (attached to the cable). This gives a sufficiently wide, yet fine adjustment to permit leading edge tuning. The reflex bridle, like the keel pocket, is a popular device industry-wide. It, of course, is placed on the glider to assure positive pitching. Since it supports a generous area of the sail at the trailing edge, this system provides enough nose-up force in a dive to effect recovery without defined tips.

Just viewing the glider gives evidence of its design quality and thoroughness. Seagull has always been a company known for late releases of new designs. Delay, tho, can be justified with the likes of the Seahawk. My favorite view of the design shape is one from the rear. The Seahawk, with its curved leading edges, maintains an ideal shape with billow held quite flat, and wash-out concentrated far out toward the tip. Undoubtedly this is an efficient method to maintain the stability derived from wash-out, while keeping all the performance possible from the airfoil. Compare this view to other gliders you see, even some advanced crafts.



photos by Paul Willenborg

Another primary point of the Seahawk is its very wide use in schools throughout the country. In the opinion of instructors at Crystal Flight Resort, and many others, "The Seahawk is the best training glider we've ever used."

However, this ability in training will not detract from its desirability as a ship to own. Lets fly the Seahawk and see why.

It is very strong. Strong means long lasting. And it can mean peace of mind in the air. It has simple lines, which help keep the cost in line (\$1135 complete). These two factors couple nicely with top re-sale-ability. For example, see the Kitty Hawk Kites advertisement in this issue which has the message "Wanted — Used Seahawks."

When you pick up the Seahawk which best suits your weight, I believe you will be pleased with its light weight. The large size (200) is rather statically tail heavy, but this is not so noticeable on the small sizes (155 and 180). However, as with many models which exhibit this tail heaviness, no difficulty arises as the problem disappears quickly on the take off run.

Take off and landings are straightforwardly easy. It controls very nicely in pitch, but is damped in response as you move out of the cruise attitude.

In flight, you will say the roll is pleasantly light, acting as power steering, it is often phrased. I had estimated the tall keel pocket would produce a lighter roll pressure. While the action is positive, the feeling of banking was not so easy as I thought. Nevertheless the Seahawk is a natural step for intermediate pilots toward Seagull's also popular Ten Meter Series.

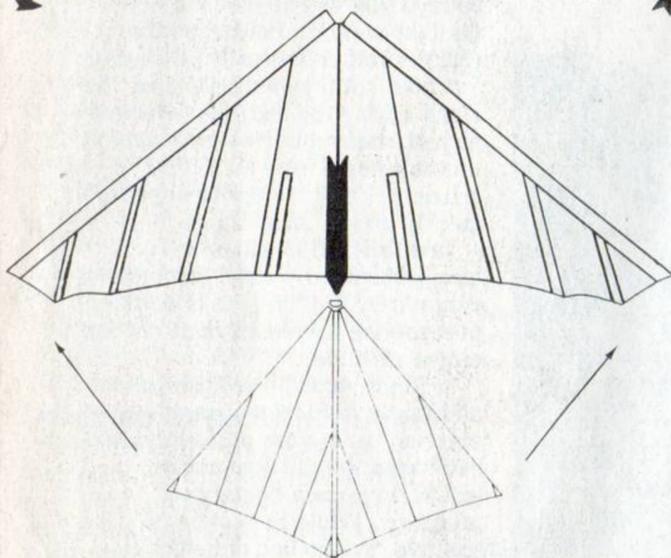
In Chattanooga, and for me personally, the Seahawk has an enviable performance record. Dave Harris once set a record with a 7400 foot altitude gain on his Seahawk at Lookout Mountain. Chris Smith, another Canadian, placed in the '78 Tree Topper Club contest, flying a Seahawk 20 miles. And a while ago, my best altitude gain was on a school stock Seahawk complete with wheels.

For many students emerging from schools, and from many pilots who cannot fly on a regular basis, the Seahawk will continue to provide an easy-to-enjoy glider with ample performance and handling backed with an excellent safety record, still reasonably priced.

LEAF "STANDARD" SAIL & FRAME "CONVERSIONS"



Convert your STANDARD glider
to a
LEAF TALON 79



MODEL SIZES	140	155	170	185	200	215
Leading Edge - ft.	16.1'	17'	18'	18.5'	19.5'	20'
Keel Length - ft.	11.1'	11.5'	12'	12.5'	13'	13.5'
Wing Span - ft.	24.9'	26.2'	27.5'	28.7'	28.9'	30.8'
Wing Area - sq. ft.	140	155	170	185	200	215
Aspect Ratio	4.45	4.45	4.45	4.45	4.45	4.45
Nose Angle - degrees	103	103	103	103	103	103
Sail Billow - degrees	1.5	1.5	1.5	1.5	1.5	1.5
Weight - lbs.	38	41	43	45	48	49.5
Pilot Weight - lbs.	100-	121-	139-	152-	167-	182-
	130	145	164	176	191	210
Wing Loading - lbs. per sq. ft.	1.1 recommended wing loading					
Set-Up Time - minutes	8 minutes set-up for all sizes					

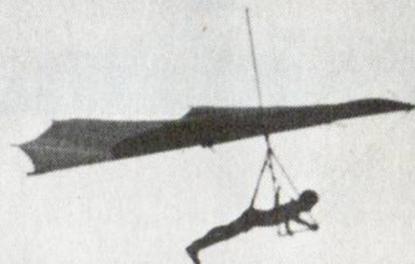
Special Features

raised keel pocket
4 battens per side
tip limitors
bridle system

331 SOUTH 14th STREET
COLORADO SPRINGS, COLORADO 80904
(303) 632-4959

Reader Inquiry Card No. 17

WHY PAY \$5.00 A YEAR TO RECEIVE WAC?



1—Five Dollars is a reasonable value. That's 83 cents per copy, less than a single gallon of gas these days. And it's 17¢ less than the newsstand price.

2—With this extra "fuel" we can continue to provide you with helpful information. Like our Action Line, Bluebook, Statistics, Product Lines, Safety Tips, and WAC Directory.

3—We'll add special articles on regulation, performance, glider evaluations, equipment reviews, site listings, new technology, and so on. But, we won't make them so technical that you'll need a degree to read them.

4—We have increased our size 67% since we were just a catalog, and with your help, we'll keep that expansion going.

5—More than anyone else in hang gliding, we hear what you say. By our very popular Reader Inquiry Service, WAC knows what you want, and we're going to see that you get it.

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PILOTS. WE CARE BECAUSE
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Send your subscription in today, and we with the hands will do our very best to delight you with the eyes . . .

See order form, page 5

Pictured here, FRANCIS ROGALLO, age 67, flying his SEAGULL by SEAGULL AIRCRAFT.



"The State of the Art"

Over the years, people have told us that they believe the SEAGULL leading edge shape was a trademark or gimmick. This could not be further from the truth. Much care goes into the intricate curves of the SEAGULL semi cylindrical/anedral leading edge. The price of such an airframe is not inexpensive, considering the specially trained fabricators, custom bending machinery and jigs. So why is the SEAGULL shape superior?

First, when discussing sail glider design, an accepted fact is that the lower the aerodynamic twist of the wing (keeping the camber and planform the same), the better the glide angle and the lower the sink rate will be.

There are two methods used for achieving low twist on a flex-wing sail glider. On a glider with straight leading edges, one can only tighten the sail to reduce aerodynamic twist. This pulls the trailing edge of the sail/wing down toward the theoretical minimum, a flat twistless trailing edge. This method of twist reduction has been used on many gliders, from short-keeled standards, to the "super ship class" of today.

Glider using this method of twist reduction have several drawbacks. Simply tightening the sail reduces the overall flexibility of the glider. This slows the roll rate and increases the pressure considerably. The decreased flexibility hurts the stall/spin characteristic by not allowing the sail to shift to the side that needs more twist. This would help prevent a tip stall from occurring. The structural drawback is simple. The sail glider with the tighter sail will put an increased load on the airframe making heavy reinforcements necessary to retain adequate strength.

The SEAGULL method using the semi cylindrical/anedral leading edge shape, reduces aerodynamic twist without flattening the sail. This is done by raising the front of the sail, (curving the leading edges to a cylindrical shape), to produce a sail leading edge curve that matches the trailing edge shape. So . . . instead of pulling the trailing edge down to produce low twist, the SEAGULL technique is to raise the leading edge. This allows a low twist wing on a relatively slack sail. SEAGULL gliders have always had very low twist, compared with all other gliders on the market, yet their handling and safety have always been superior.

TOM PEGHINY



Photo by Scott

SEAHAWK
155 180 200

SEAGULL AIRCRAFT

Reader Inquiry Card No. 18

CALL OR WRITE TODAY: SEAGULL AIRCRAFT, 1160 MARK AVENUE, CARPINTERIA, CA 93013 (805) 684-8331 OR CONTACT YOUR LOCAL SAIL GLIDER DEALER.

WAC DIRECTORY

WAC DIRECTORY INTRO:

Many readers and dealers alike responded favorably to our initial installment of the WAC Directory. We've already heard of several "connections" where a reader and a dealer got together, some for lessons, some for the right glider or harness, and some just for information.

We are delighted that our source proved easy enough and effective enough to aid both buyer and seller. This is a founding objective of the **Whole Air Catalog**.

Now, the Directory settles into a regular niche in WAC. We extend a welcome invitation to any dealers not included. The charge is very low, and paves the way for that shop to become a retail outlet for our new 1980 magazine. The listing will also act as service and product advertising at prices all dealers can afford. Readers enjoy the geographical breakdown as well as the details on what each business provides.

Thanks to all for making us feel like we've done something useful.

EASTERN

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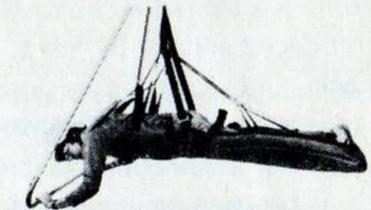
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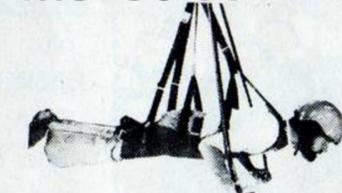
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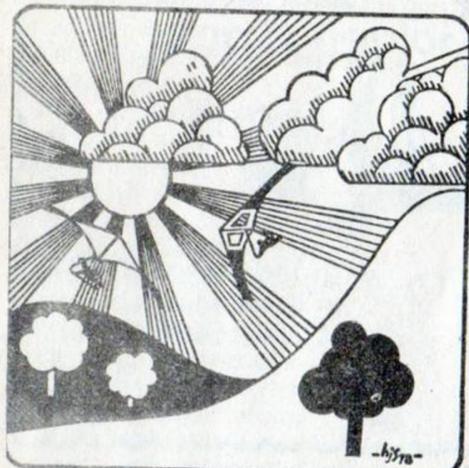
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The edition is still limited to 250 and **no more** will be printed. The block will be cancelled by defacing and a cancellation proof pulled! The first 60 prints were printed black and white only in greeting card format. A few of these B & W prints are still available for \$14.50, plus 50 cents postage and handling. The remaining 190 prints are in full, vibrant color on a larger paper size for easier framing. The cost is only a fraction of the usual price paid for a Hank Syjut original . . . \$29.00 (plus \$1 postage and handling) with documentation sheet. Prices subject to change without notice. Call for quotes on artist's proofs or framing!



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SKY



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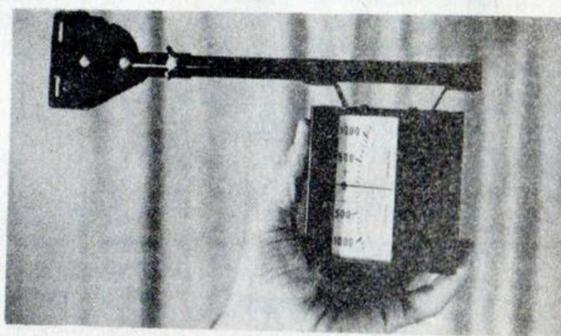
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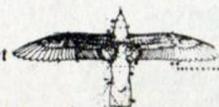
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Reader Inquiry Card No. 25



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PRODUCT LINES with calendar items

Chattanooga, TN — Fall is here; in Chattanooga September seems to have kicked off the soaring season right on cue. Good altitude gains at Crystal on the 4th, and 5th, 6th, and 7th were also outrageous soarable at Lookout. It's pretty hard to sit and write in such conditions, but they'll continue I guess. Well, let's see what news for September/October. First, a local success we're proud of, as last WAC cover pilot, Tim Dunlap, set a **Crystal altitude gain and distance record** in his new Omni 187. Tim nearly flew cross-valley to the Air Space bullseye, after gaining 2400 feet at 835 foot Raccoon Mtn. **The Nationals are over.** Congrats to winner Eric Raymond. George Worthington, writing in our First Anniversary Issue (May-June '78) believed Raymond would do well this summer . . . good forecast, George. Meanwhile **George has something new** in the works, pen in hand; keep your eyes to the hang glider rags for details. At the Nationals, while the Fledges took the marbles, the Magnan/Stahl **Herron attracted great interest** from many, including top designer Dick Boon of Delta Wing. Also at the Nat's, it's said **Keith Nichols is organizing pilots** who'd just as soon not fly ragwings against Fledges. While foldable, the Fledge is a fixed wing — we wonder what will come of it. How 'bout a word, Keith? Speaking of Keith (with Electra Flyer still), news is **Tom Price has left Electra**, and is pursuing a couple ventures. One is the ASG-23. The other is a service aimed at assisting designers and manufacturers with testing difficulties. I sure can't think of anyone more qualified. Good luck to Tom. Apparently this also means **Larry Newman** is back at the design table, which ought to be interesting. Larry did very well with his own design efforts, most notably the Cirrus 2/3 and the Olympus. Speaking of doing well, **Highster Aircraft** reported some exciting news. Their Lake Tahoe dealer, John Beebe, just broke all records in Washington flying 11 hours, 20 minutes at Dog Mtn. ('77 Nationals site). John's been in the sport 5 years, and must have given his logbook its best entry. Of course, he flew a Highster 190. Great, John! A lot of glider company news bits — Wills has their **new Raven ready**. It's Wills' first deflexorless craft. We saw it here in Chattanooga in late July. Handling is better than any other Wills, which is quite a mouthful for a

company which sort of specializes in quality handling. The 209 was certified prior to release (rather unusual) and designer Mike Meier was out certifying other sizes in early September. In Wills tradition, a wide range of sizes is available. Sky sports is ready to introduce the **1980 Sirocco 3** in September '79. In classic Detroit style, this may be an excellent time to release next year's model. Look for the **WAC Glider Report** in Our Nov./Dec. issue. Marty Alameda, owner of Flight Designs reports the **US Lancer is certified**. Good work, Marty, to get this impressive machine certified and fully in production here in the US of A. Along with the Sirocco 3, we'll have an evaluation of the US Lancer next issue as well. **Seagull is building gliders!** Reports from Chuck Toth (who just spent time investigating for WAC while out west) and from E-Z Wider's Malcom Jones, say Seagull is cranking out 8 a day. That's good news for those of you waiting in line, eh? Seagull did OK in Europe, but American pilots had their hands full with some very hot German and French pilots. The **WAC Directory** got super response from its first installment, gaining several new dealers. Be sure to examine this regular WAC source. Welcome to all new names and mainstays, plus we've plenty room for more, so dealers, drop us a line, or call. Speaking of dealers, **Jerry Kitchens of Lone Star** (Texas) called with some promising news of a dealer organization. Jerry's been in touch with us on this for months and we're pleased to see results. Good work Jerry; **WAC** has extended the offer to help in this effort toward more sport professionalism. Last word is calendar items. Biggest news is the Super Meet of the season right here in soarable Chattanooga. It's the **Second American Cup** . . . welcome one and all to the Big Event. Plus we'll have a look at this major happening; call it the **'WAC view'** as we take our different perspective (in Nov./Dec. '79 WAC). Also check with Air Space for dates on the Great Race. At **Crystal**, a fly-in will happen for Halloween, on Oct. 27th and 28th Plus **Kitty Hawk** is to sponsor a Soaring Seminar at the time of their **Orville Wright Fly-In**. This will be the 20th and 21st of October (commemorating a soaring flight by Or' in 1911). **Got News Or Opinions?** Send 'em all to Product Lines, Box 144, Lookout Mtn., TN 37350.

Use your WAC Directory.
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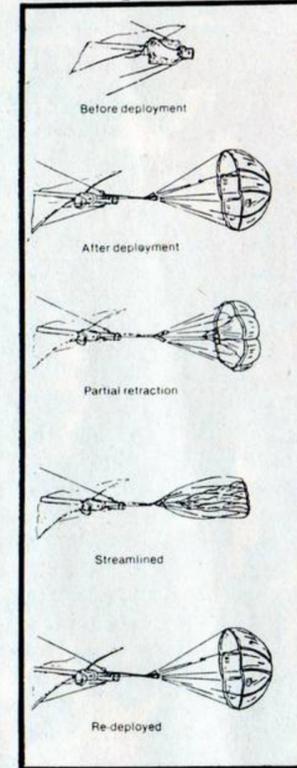
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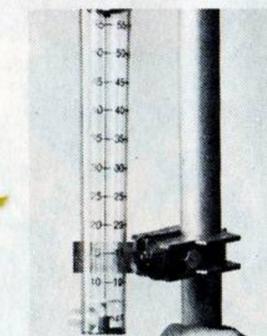
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