COLVER VARIOMETER
Audio/visual, dual battery packs, dual range, up/down audio mode, up only audio mode, or visual only mode.

THOMMEN ALTIMETER
Twenty-foot increments to eighteen thousand feet, wrist strap included.

CHAD AVT FLIGHT DECK
Altimeter, variometer, and digital timer in a streamlined case.

WW PRONE HARNESS
Padded leg and shoulder pads, quality, strength and comfort.

WW WOMEN'S PRONE HARNESS
Special cut version of above with extra thick padding in the right places.

WW FULL LENGTH HARNESS
Additional support, warmth, and drag reduction.

EQUIPMENT BAG
Huge capacity, velcro side pocket, double pull zipper, padded handles.

PADDED INSTRUMENT BAG
Thick foam, internal velcro pocket for altimeter, cord lock closure.

BELL TRIALS HELMET
Maximum protection in an open shell design.

ADVANCED AIRSPORTS PARACHUTE
Easy pull deployment in a small light package.

DOUBLE PARACHUTE CONTAINER
Convenience pouch for gloves, glasses, etc.

GLIDER STORAGE BAG
Full-length zipper, internal applied control bar pocket.

RAVEN SHIRTS
Available in men's and women's styles.

AMERICANA HAKI
The newest game for downwind days, manual included.

WILLS WING TEAM HAT

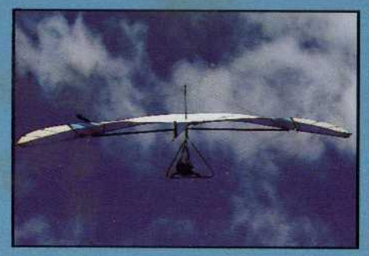
WHOLE AIR MAGAZINE
P.O. Box 144
Lookout Mtn., TN 37350

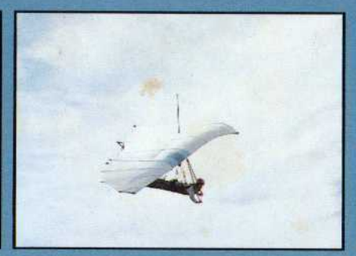
U.S. Postage PAID
Blk. Rte. Permit No. 7
Lookout Mtn., TN, USA
Address Correction Requested

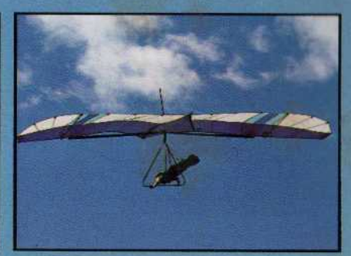
whole air magazine

ONE DOLLAR

JULY-AUGUST 1980







SIERRA
THE PERFORMANCE YOU'VE DREAMED ABOUT

FROM THE COMPANY THAT HAS ALWAYS SET THE STANDARDS

★ excellent L/D at penetration speeds

★ broad speed range

★ unprecedented climbing ability

"The SIERRA offers world class performance to the seasoned pilot who places a premium on fine handling." Tom Haddon

1980 SIERRA: PRESSING THE LIMITS OF HIGH PERFORMANCE

SEAGULL AIRCRAFT

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

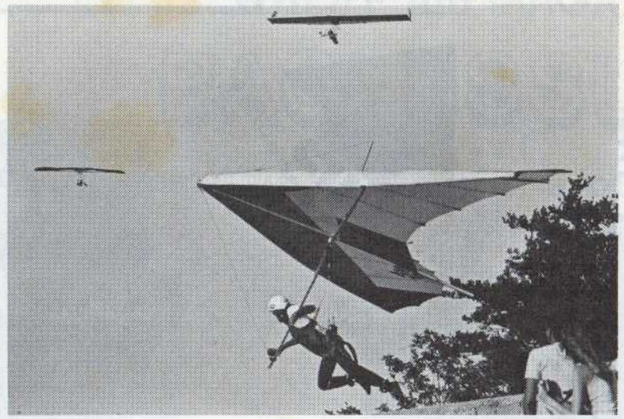


PHOTO BY JIM HENDERSON

ATLAS
ON TOP OF THE WORLD

Seven **ATLASES** made the top ten at the 1979 world championship. And now the **ATLAS** is winning over America.

With its innovative mylar-stiffened leading edge pockets, internally sleeved control bar uprights and cross bars, break down bar, and deflexorless, split cross bar airframe, the **ATLAS** is newer than 1981.

The **ATLAS** has defined tips and trailing edge lines, contributing to its impeccable pitch stability. Full HGMA certification is pending.

No other modern glider sets up as quickly; all you need is five minutes--no tools, wing nuts, or safety pins, just two ball lock pins. Velcro closures for battens, black coated cables, a batten bag, and a deluxe glider cover (with double zippers and a built-in protective cushion) make the **ATLAS** a true value.

Fly an **ATLAS**. The best evidence is your own experience. And the best experience is **ATLAS**.

Over six hundred **ATLASES** are flying in Europe. **ATLAS** — the French blueprint for next year's U.S. gliders.

SPECS:	ATLAS 14	ATLAS 16	ATLAS 18
leading edge	17'6"	18'8"	19'9"
keel	11'4"	11'4"	11'6"
nose angle	120°	120°	120°
span	30'6"	32'1"	33'6"
area	155 ft²	175 ft²	192 ft²
weight range	100-160 lbs	130-210 lbs	170-270 lbs
stall speed	14 MPH	14 MPH	14 MPH
top speed	47 MPH	47 MPH	47 MPH
glider weight	57	59	61

all **ATLASES** use 6061-T-6 greater than 1.75" dia.

IN EUROPE:

LA MOUETTE

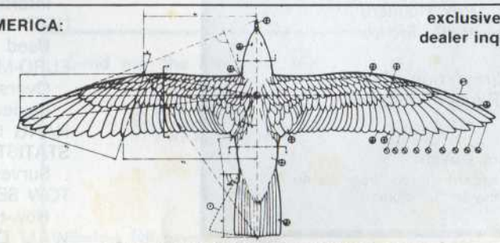
1. RUE DE LA PETITE FIN

21121 Fontaine les DIJON

tel. 80 /56.66.47.

IN AMERICA:

exclusive distributor
dealer inquires invited



FLIGHT DESIGNS

P.O. BOX 1503 SALINAS, CA 93902

(408) 758-6896

WHOLE AIR MAGAZINE

Volume 3, No. 4, 1980

ISSUE NO. 14

Publisher
Dan Johnson
Idea•Graphics

Editor
Starr Tays

Cover Photo
Leroy Grannis

Art/Photo Contributions
Jim Henderson
Hank Syjut
Don Whitmore
Noel Whittall
Lucy Glascock
Steve Cochran

Towing Editor
Ed Quirk

Editorial Contributions
Dan Johnson
Starr Tays
Chuck Slusarczyk
Harry Robb
Dan Chapman
Noel Whittall
Terry Ferrer

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

Circulation Manager
Randee Laskewitz

ON THE COVER:
Roy Haggard viewed "from the air," flying the UP Mosquito.

FEATURES

A PILOT'S PERSPECTIVE

ULTRA LIGHT TOPICS

Publisher's Column

A few years ago Southern Californian Trip Mellinger, wrote an article about flying sailplanes. His thrust was to justify flight in anything other than hang gliders. It was as though we pilots did not accept any flying crafts without Dacron sails and aluminum tube frames. I wonder, "Is that true?"

Our regular surveying once covered the topic of other aircraft experience. The results showed sixty percent had flown something else (80% tried airplanes, 48% tried sailplanes, and 16% balloons). Many of you have experimented with motorized and a large number have towed. Thus it was our opinion that we needed to cover all forms of ultralight flight.

In this issue we embark on a new endeavor by reporting on the GLA minibat sailplane kit. Still an ultralite at 105 pounds, it is one means of holding down the rising cost of getting high. And . . . we believe you'll appreciate Larry Haig's design philosophy.

Our second Pilot Report unveils the brand new Seagull Sierra. Response was overwhelmingly good to the new style, last time on the Wills Raven. We have added more spec's, more photos, and more text to continue the positive reaction.

Next issue we'll have yet another glider, and we will again break tradition by reporting a powered ultralight, the Sky Sports Humbug. Let us know what you think; the magazine is structured by your comments.

Our interview this month is with Pete Brock, owner of Ultralight Products. His up-tempo candor should be easily appreciated. Our stunning cover-by-Grannis helps commemorate this story as Haggard is viewed from the air while flying the UP Mosquito.

Of course, we also cover the European scene, inform you with new statistics, let you sound off in "Forum," direct you in "Sites," and warn you in a reprint on thunderstorms. We help you explore new ways in our tow section, give you power hints in "Motorized," survey you and listen to you via our popular Reader Response Cards, and update you through Product Lines. All brightly wrapped in color by Kodak.

What else can we do for you? We really, really do want to know. Write us, free, and tell your friends who do not receive the *WAM* to subscribe. We'll all know a little more if you do!

Thanks,
Dan Johnson

FORUM

Dear Editor:

I consider myself a very safety-minded pilot. I fly only when it is worth it, with the best equipment, and always with a parachute. Well, now I know that my parachute works.

The Region I Qualifier was held over the 4th of July weekend at one of Washington State's finest thermal sites during which there were two (2) inadvertant chute deployments. First, Lynn Gleason in the first round of flying, launched and immediately noticed all of his parachute lines had deployed. He succeeded in clutching the chute itself for nearly 3000 ft. and half way around the mountain to land a little ways short of the landing field. On the next day the very same thing happened to me but I did not notice that the lines were out. Fortunately, not until I was directly over the landing field did the chute fall away and deploy.

We both had different harnesses, different gliders, different size chutes, but the same deployment system — the new Windhaven W-I and W-II. These chutes are held shut by a pin that is a little too small. The pin closure is superior to other systems provided the pin is a bit larger.

I must say that it was an interesting experience and I was impressed with how fast the chute deployed. I was at about 150 ft. and moving slowly and the chute was totally deployed, giving me time to try climbing into the control bar before I hit.

I hit with a thunk but was not hurt. My brand new Moyes Mega was not damaged, nor was my Hummingbird. I repacked my parachute using a 2½ inch cotter pin of equal gauge to the original and flew with the same equipment later the same day. Fortunately, the next flight got me 8,500 ft. AGL for 3½ hours. Whew, what a day!!

Steve Hollister
Aerosails H.G. Shop
Seattle, Washington

MOTORIZEDDDDDD . . .

I recently purchased a popular motorized unit from a well known manufacturer. Constructing the kit was not a lot of trouble, but without my acquired knowledge of ultralight construction, I think it would be a big headache. Instructions for these kit-built units need to be more clear with more parts labeling and diagrams. But the biggest hassle is not getting all the parts.

G. Rinck, Jr.
Grand Ridge, FL

Come on you guys!! Get with it on Motorized! I've got three of them now and they all could be improved.

R. Sallee
Kamuela, HI

You have an outstanding publication. I enjoy your article subject mix and regular departments. Keep up the good work. Chuck Slusarczky's Motor Column is excellent!

R. Dustman
Willoughby, OH

FOR OUR INFORMATION

After much careful testing, I and the only other person I know flying a Fledge IIB supine have concluded that the control bars are rigged *eight inches* too far forward, but that only extension handles can solve the problem without seriously limiting speed range.

We are notifying the factory and through you, other potential hard landers with a "stall proof" and "flare proof" glider.

J. Hobart
Los Angeles, CA

Pilots may wish to use plastic bag ties instead of duct tape on back-up system bridles. Attached to harness strap, it will break away clean during deployment. Old sun-baked and melted duct tape will hold and yank the pilot torso not the "beaner."

J. Klein
St. Petersburg, FL

TECK-PANEL FEEDBACK

Enjoyed questions and answers in "Tech-Panel" article, it gives us all the benefit of understanding manufacturers and designers.

Also I liked your bigger size and better paper. I had to look twice before I realized it was *WAM*

D. Tyler
Melborne, FL

Your new format is very impressive, particularly the "Tech-Panel" segment.

Because *WAC* going *WAM* may be considered news, I have taken the liberty to include a copy of your subscription order card in the next issue of the *C.H.G.A. Yankee Flyer* -newsletter.

Editor
John Hameln
Wallinsford, CT

John, we appreciate the support. — Ed.

HANG LOOP SAFETY

More attention should be given to suspension system safety. Every hang loop should have "built-in" secondary back-up strap or line."

G. O. Hartman
Kayenta, AZ

Congratulations and thanks to Tom Phillips and Crystal for the candid and informative article on the recent hang loop failure at Crystal. Such an attitude of openness is a vital and appreciated contribution to flying safety.

Congratulations to *WAM* also — now one of the big three in HG publications.

B. Walter
Asheville, NC

Dear *WAM;*

I am writing to inform you that I did receive a follow-up on my discontent with Seagull Aircraft and my 11 Meter.

Tom Haddon sent me a letter of apology and regret and I will soon receive the parts and items that did not originally arrive with my glider. It was your magazine and personal efforts that brought action to my problem which otherwise probably would have been neglected.

Hang gliding may not yet have a consumer protection agency, but your magazine is taking the first fruitful steps toward its origination.

Thank you,
David A. Yanashot

Whole Air Magazine;

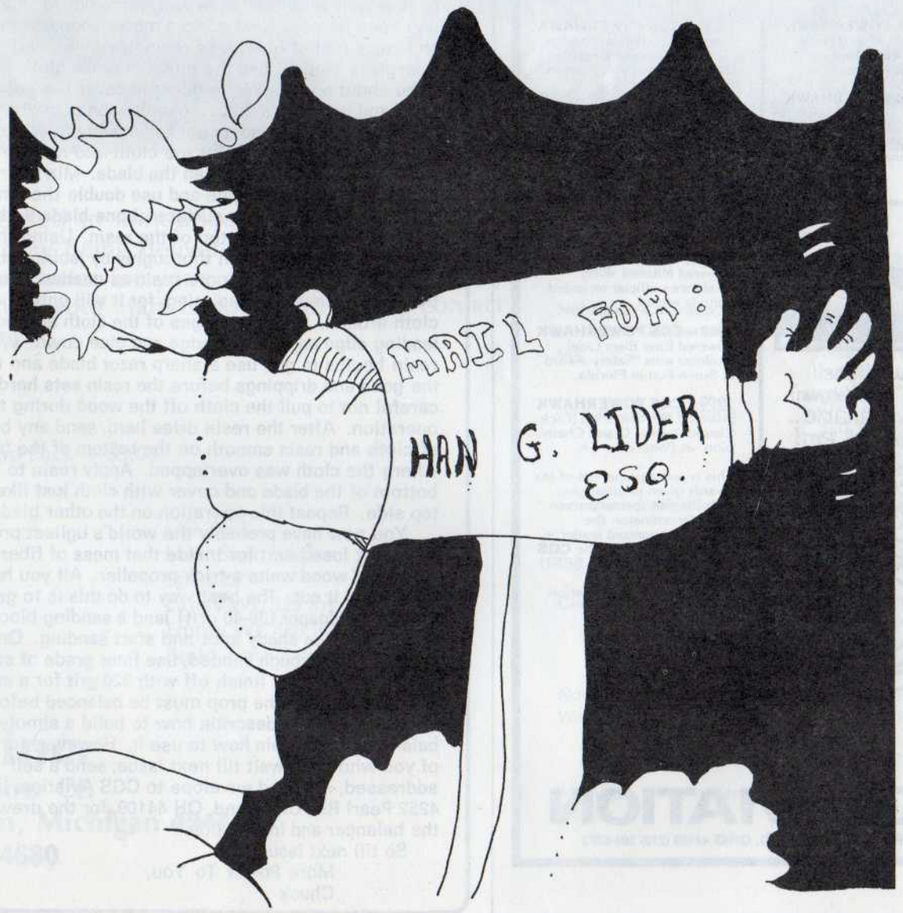
With regards to T. Reynolds of Pine, CO in Forum of your May-June issue . . . Don't worry about losing a subscription to *WAM.* The tow pilots in Florida will continue subscribing to *WAM,* and being open minded, will continue to enjoy the articles on towing, as well as those on mountain flying. If T. Reynolds would like to send one of his Rockies to Sebring, Fla., we would be more than happy to use it. That is, when we are not setting up our gliders once, early in the a.m., and taking them down once, at dark, with numerous flights in between. Granted, at present we are not getting four and five hour soaring flights, but when we tow up and release at 2000 feet or more, we are into hang gliding as much as any cliff diver ever was! Recently, several tow pilots have gotten over an hour in flight time after release and gone more than 20 miles cross country. We are looking better!

The point I am trying to make is that a dedicated tow pilot is as much into (quote T. Reynolds) the "spirit and practice of hang gliding" as any mountain flyer. Most tow pilots have flown in the mountains and loved it, however, when mountains are as scarce as they are in central Florida you make do with what is available. Incidentally, our Sebring mountain is pictured on page four of the May-June *WAM.* It's the 3500 foot Emerson tow winch belonging to Wadette and Ronnie Elrod. Releases of 2500 foot plus, are not uncommon on this particular mountain — (whoops, I mean tow winch.)

To T. Reynolds of Pine, CO. I say, "If you don't feel towing belongs in a hang gliding publication, come on down to Sebring. We'll give you a quick lesson on towing, and if after a few lock-outs you still feel tow pilots are not hang glider pilots . . . well then, hell, I'll buy you a subscription to *WAM!!!*"

Wade Goolsby
Sebring, FL

Did YOU forget to SUBSCRIBE?!!



Motorized

This month I'm going to tell you how to fiberglass a wooden propeller. You may wonder why we do this, but it's for very good reasons.

First off, wood is an excellent material for propellers. The feature that stands out best about wood is the fact that it doesn't fatigue (in the usual sense). Remember trees stand for years and years swaying back and forth, flexing, bending, and twisting, without fatigue. Although wood has many good features, it has a few drawbacks. It can absorb moisture, split, and is easily eroded by sand, grass, rain, etc. Metal and composite props have an advantage over wood in that they can be made thinner and still be structurally strong and neither absorbs moisture and both resist erosion. However, for a metal or composite prop to be trustworthy, a fatigue test has to be performed for *each* aircraft and engine combination. On one-of-a-kind or small scale production this is not possible due to high cost. Therefore an excellent method for achieving the fatigue benefits of wood with the skin strengths of metal or composite props is to cover the wood prop with fiberglass cloth and resin.

To cover a wood prop with fiberglass we must first remove the existing finish. Use lacquer thinner to remove the varnish finish, and sand the wood smooth. Using steel wool dipped in lacquer thinner is an easy way to do this. It is best to do this operation outdoors or in a well ventilated area and watch out for matches and open flames. Next go to a model shop or boat store and buy a pint of fiberglass resin, hardener, and fiberglass cloth. I use the medium grade cloth. You'll need about a yard. We're going to cover the entire prop front and back, tip to hub. I usually don't cover the hub or bolt pattern area so as not to possibly throw the propeller out of track. Cut the cloth into four strips about two inches wider than the blade. Mix the resin about one ounce at a time and use double the amount of hardener. Paint the top surface of one blade with the resin. Lay the cloth on top of the resin. Using the end of the brush, soak the cloth thoroughly by jabbing the cloth with the brush. Apply more resin as needed. Don't use the brush like you are painting, for it will only slide the cloth around. Wrap the edges of the cloth around the leading edge and trailing edge and glue down. When the resin begins to gel, use a sharp razor blade and trim off the gobs and drippings before the resin sets hard. Be careful not to pull the cloth off the wood during this operation. After the resin dries hard, sand any big lumps of cloth and resin smooth on the bottom of the blade where the cloth was overlapped. Apply resin to the bottom of the blade and cover with cloth just like the top side. Repeat this operation on the other blade.

You now have probably the world's ugliest propeller. But don't lose heart for inside that mess of fiberglass, resin and wood waits a trick propeller. All you have to do is sand it out. The best way to do this is to get some coarse sandpaper (36-40 grit))and a sanding block. Find yourself a nice shady spot and start sanding. Once you have the prop rough sanded, use finer grade of sandpaper (100 grit) and then finish off with 320 grit for a smooth glass-like finish. The prop must be balanced before flying.

Next issue I'll describe how to build a simple balancer and explain how to use it. However, for those of you who can't wait till next issue, send a self addressed, stamped envelope to CGS Aviation, Inc., 4252 Pearl Rd., Cleveland, OH 44109, for the drawing of the balancer and instruction.

So till next issue . . .

More Power To You,
Chuck

USED GLIDER BLUEBOOK

EDITION NO. 14

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
BENNETT DELTA WING	76	Phoenix 6B	Jr.	425	350
	76	Phoenix 6B	Reg.	425	400
	76	Phoenix 8	Reg.	450	450
	77	Phoenix 6C	Jr.	550	450
	77	Phoenix 6C	Sr.	425	400
	77	Phoenix 6C	Reg.	500	425
	77	Phoenix 8	Reg.	650	375
	78	Phoenix 8 Super	Reg.	675	450
	78	Phoenix 12	Reg.	650	525
	79	Phoenix 6D	185	875	775
	79	Lazor	190	1000	900
CGS AIRCRAFT	76	Falcon V	225	550	450
	76	Falcon V	185	575	400
	77	Falcon V	185	650	500
	77	Falcon V	220	600	475
	78	Falcon 5½	Med.	750	625
EIPPER FORMANCE	75	Flexi II	240	400	200
	75	Cumulus V	180	450	300
	76	Cumulus VB	180	450	375
	77	Flexi II	185	525	475
	77	Flexi III	185	575	500
	77	Cumulus 10	Med.	550	525
	78	Flexi III	Lg.	700	600
	78	Cumulus 10	Med.	675	500
	78	Antares	Med.	975	800
	79	Antares	Med.	975	900
	79	Antares	Lg.	1000	900
ELECTRA FLYER	76	Nimbus	20-17	200	125
	76	Cirrus	3	425	350
	76	Cirrus	2	425	350
	77	Cirrus	3	600	400
	77	Cirrus	2	500	300
	77	Olympus	160	575	525
	78	Cirrus 5	C	700	600
	78	Cirrus 5	A	700	575
	78	Olympus	160	775	625
	78	Olympus	180	725	550
	79	Trainer	—	650	550
	79	Cirrus 5	A	850	725
	79	Olympus	160	900	850
	79	Floater	205	925	825
MANTA PRODUCTS	79	Fledge	IIB	1200	1000
MOYES DELTA WING	76	Mini	180	525	400
	76	Midi	220	625	575
	76	Maxi I	200	650	550
	77	Maxi I	200	700	625
	78	Maxi II	200	1000	800
	79	Maxi III	200	1150	1000

Manufacturer	Year	Model	Size	Clean Price	Avg. Price
SEAGULL AIRCRAFT	75	Seagull III	220	325	250
	76	Seagull III	220	350	275
	76	Seagull VII	174	600	350
	77	Seahawk	170	725	625
	77	Seahawk	190	700	600
	77	10.5 Meter	—	800	500
	78	Seahawk	170	900	725
	78	Seahawk	190	800	600
	78	10 Meter	—	975	875
	78	10.5 Meter	—	900	800
	79	Seahawk	180	1000	875
	79	10 Meter	—	1050	850
	79	11 Meter	—	1150	975
SKY SPORTS	76	Kestrel A	185	500	350
	76	Kestrel A	220	525	425
	76	Merlin	160	500	375
	77	Bobcat III	Lg	675	600
	77	Merlin	160	600	500
	77	Sirocco I	156	600	475
	77	Sirocco I	175	575	400
	78	Osprey	175	800	675
	78	Sirocco II	164	875	825
	79	Eaglet	191	550	425
	79	Osprey 2	175	900	800
	79	Sirocco III	189	1200	1025
ULTRALITE PRODUCTS	76	Dragonfly Mk. II	174	575	375
	77	Firefly	174	650	500
	77	Dragonfly Mk. II	196	700	550
	78	Firefly	154	800	700
	78	Spyder	176	850	675
	78	Condor	178	1000	825
	79	Mosquito	166	1400	1200
WILLS WINGS	75	Swallowtail	20-20	350	150
	75	Swallowtail	22-20	225	175
	76	SST	90	600	400
	76	SST	100A	625	450
	76	SST	100B	600	475
	77	SST	100C	750	575
	77	SST	100B	775	550
	77	Universal	100A	650	500
	77	X-C	185	700	650
	78	SST	100C	775	650
	78	Alpha	185	875	775
	78	Alpha	215	950	800
	78	X-C	215	950	775
	79	Alpha	185	950	750
	79	Alpha	215	1000	850
	79	Omega	220	1100	950
	79	Omni	187	975	950
	79	Raven	209	1175	1075
	80	Raven	229	1250	1200

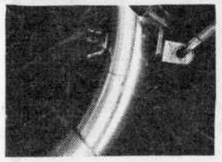
NOTE: DEALERS! Write to us to participate in the Used Glider Bluebook. We would like to get your input on prices, to better represent all parts of the U.S.

SHOP BY MAIL

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 1⅛ inch I.D. size available now.

1 inch . . . per foot $ 1.50
1⅛ inch . . per foot $ 1.95



BACK-UP PARACHUTE

Mail Order Only opportunity. Small pack chutes $300 Large (450 square feet) Size $325. Sorry, no counter sales at this price.

HANG GLIDING HELMET

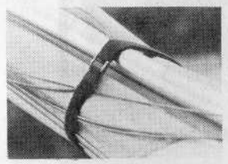
Finally a reasonably priced helmet is available again. This quality American-made helmet is of lightweight yet strong construction which passes Z-90 rating code. One size for all with liner pads provided assuring a comfortable, snug fit.

$19.98

VELSTRAPS

The finest in hang glider tie straps. Strong. Long Life. 24 inches long by ¾inch width. Metal cinch ring. From Velcro Corp. Minimum order of five earns the lowest price anywhere.

$1.each (min~5)



CRYSTAL accessoaries

ORDER FORM ON PAGE 42

COMING NEXT ISSUE

In the September-October WAM

WAM Premier Ultralight Aircraft Report .... the Sky Sports Humbug

"Pilot Report" on the Moyes Mega

WAM Interview with Don Miller, Canada's Competition Director

Thermals and Thermalling

A new column by Michael Jones

Don't miss the September-October WHOLE AIR MAGAZINE

Subscribe now!

EURO-MARKET

By
Noel Whittall

The "Solar Storm" from Solarwing Gliders, and Southdown Sailwings' "Sigma" fairly represent the state of the art as far as gliders commercially available in the United Kingdom are concerned.

Two more different-looking flex-wings would be hard to imagine — the Storm having traditional lines and a fairly conventional airframe distinguished at first sight only by a particularly elegant distribution of the tip battens, while the Sigma is a lean and racy looking bowsprit glider which reflects designer Ian Grayland's success in applying the old engineering dictum of "simplify and add lightness."

On the hill my experience is that they are both most pleasant and efficient soaring machines which are well suited to the open hills and high winds which characterize most British flying conditions. If that statement suggests they don't like light air and thermals then I would be misleading you: on a recent trip into Europe examples of both Storm and Sigma consistently aquitted themselves with honors against those acknowledged Kings of the French Alps, the Atlases.

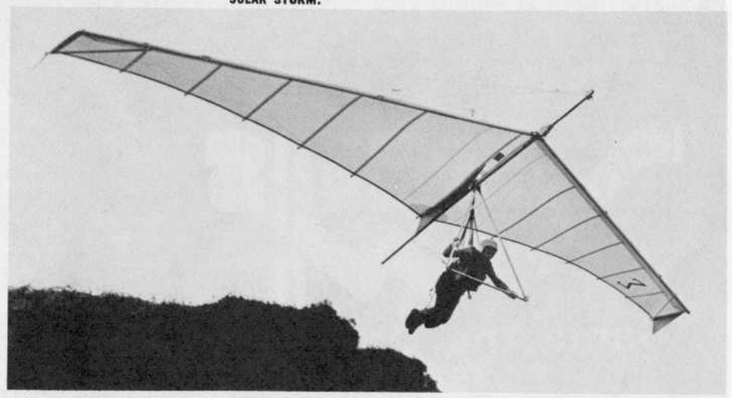
Both aircraft rig really fast: the English flier will not tolerate loose nuts and bolts — but if it ever came to a rigging race, the Sigma would normally win although a second pair of hands nearby is reassuring in high winds when pushing the control frame apex back along the keel to finally tension the machine.

Assembling the Storm may take a minute longer. A novelty is that the sail is tightened at the tips after the crossbooms have been fitted — designer Dave Raymond's neat solution to the problem of plug-in booms allied to a zero billow sail. A neat nose-catch supplied under license from Hiway completes the job. Spin-off advantage is that the sail is not under tension all the time the glider is in the bag, surely a long-life bonus.

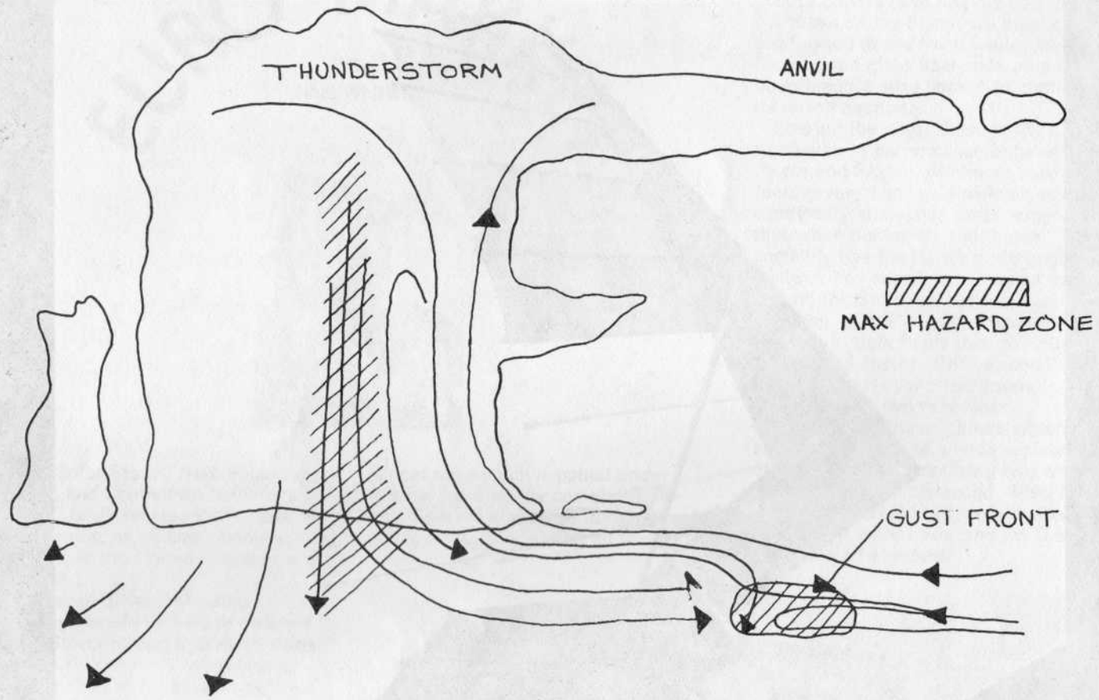
Both gliders have flexible battens, but those on the Sigma are plastic, pre-formed at the front, while the Storm uses glass-fiber rods plus a deep leading edge pocket to control its airfoil section.

Soaring the ridge, these is little to choose in performance between Storm and Sigma: Minimum sink feeling very similar. However, my admittedly subjective tests suggest that when pulling on, the Sigma certainly has the flatter glide angle, while at low speed and close to the ground the Storm scores for ease of handling. If one's flying frequently ends up in tight fields then the Storm is a natural choice. Differences there may be, but they are not dramatic. Here we have two very nicely coordinated flying machines which satisfy the needs of a wide variety of pilots ranging from hang two way up to the very experienced. How I wish that such aircraft were available back in '74 when I acquired my first baggy-sailed standard!

The Author flying his **MONROE** Shock Absorber sponsored **SOLAR STORM.**



The **SIGMA** launches from IlkLey Moor.



THUNDERSTORMS ARE WIND SHEAR GENERATORS

Thunderstorms and certain frontal systems are the most prominent cause of low level wind shear problems.

Wind shear can be found on all sides of a thunderstorm cell and in the downdraft directly under the cell. The wind shift line or gust front associated with the thunderstorm can preceed the actual storm by 15 nautical miles or more. Therefore, if a thunderstorm is near a flying area, low level wind shear hazards can exist.

Wind shear occurs with a cold front just after the front passes. For example, if the front is moving 30 knots or more, the front surface will usually be 5,000 feet above the area about three hours after frontal passage.

Data compiled on wind shear indicates the amount of shear in warm fronts is much greater than found in cold fronts.

Strong surface winds and small hills or large buildings that lie upwind of the approach or departure path can produce localized areas of wind shear. This type of wind shear can be partially hazardous to ultralight aircraft.

Large bodies of water can create local air flows due to the temperature differential between land and water. Changes in wind direction and velocity can occur in relatively short distances because of this.

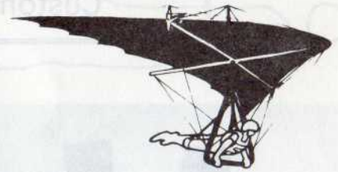
DETECTING WIND SHEAR

Since wind shear does not strike without warning, it can be detected by:

1. Analyzing the weather during preflight. If a thunderstorm is observed or forecast at or near the flying area, be alert for wind shear in arrival and departure areas.
2. Check the surface weather charts for frontal activity. Determine the surface temperature differences across the front and the speed at which the front is moving. If there is a 10-degree or more temperature differential and/or the front speed is 30 knots or more, there is a good possibility that significant low level wind shear exists.
3. Be aware of pilot reports at Flight Service Stations (Pireps) of wind shear.
4. Assume that severe wind shear is present when the following conditions exist in combination:
   a. Extreme variations in wind velocity and direction in a relatively short time span.
   b. Evidence of gust front such as blowing dust on the surface.
   c. Surface temperature is in excess of 80 degrees F.
   d. Dew point spread of 40 degrees F. or more.
   e. Virga (precipitation that falls from the base of high altitude cumulus clouds but evaporates before reaching the ground).

Excerpted from the **Flight Instructor Bulletin, Department of Transportation — Federal Aviation Administration — Southern Region.**

HANG GLIDING STATISTICS



By Dan Johnson

In the Second Anniversary Issue, May/June 80 **Whole Air Magazine,** we polled you pilots in the accessory topic area. We had surveyed both harness and vario brands in past issues (Harness in Nov/Dec 79; Vario in Sep/Oct 79). Some changes were expected but the results were well formed previously.

We also asked when you bought these items, and then we asked what accessories you pilots expected to purchase in the next year. We found this so intriguing that we will devote a whole survey to just this topic in the Nov/Dec 80 **WAM.** Besides its immense value to advertisers and other hang gliding business persons, we believe you readers will be held by the forecast areas for new equipment purchases.

We also broke down harnesses and varios as to the **type** of equipment. This had not been done before. Insight was gained by this useful information.

HARNESS TYPE

1	Knee Hanger	34%
2	Stirrup	28%
3	Cocoon	11%
--	Combination (Stirrup and hanger)	11%
5	Supine	8%
6	Spaghetti	4%
7	All Others	4%

HARNESS BRAND

1	Ultralight	25%
2	Wills/Price	16%
3	Flight Designs	9%
4	Sunbird	8%
5	Eipper	5%
6	Golden	3%
--	Sky Sports	3%
--	Cloudbase	3%
--	Robertson	3%
10	Odyssey	2.6%
--	Raymond	2.6%
11	Seagull	2%
--	Crystal	2%
--	Manta	2%
--	Airborne	2%
	All Others	10%

Among harness brand names, great progress has been made by Flight Designs, Cloudbase, and Robertson. Odssey and Raymond are up somewhat as well. Most other positions were held fairly well, with UP and Wills clutching market share superiority, their percentages only slightly different than our last survey.

Interestingly, most harnesses (62%) were purchased in the first half of the year while vario purchases are spread evenly throughout the year, as measured over the last three year period. A weak concentration of vario purchases was, however, noted in December, near Christmas time.

VARIO TYPE

1	Audio/Visual	50%
2	Pellet	10%
3	Visual only	2%
4	Audio only	1%
	No Vario Owned	37%

VARIO BRAND

1	Litek (Hummingbird)	34%
2	Colver	20%
3	Ball	15%
4	Makiki	14%
5	Theotek	9%
6	Paragon	3%
	All Others	5%

It is interesting to note that the number of pilots owning varios has jumped from 39% (as of 11-1-78) to 48.7% (as of 9-1-79) to 63% by July of 1980. And if you look ahead in this article, you will see that a quarter of all pilots considering new purchases, plan on a new vario next.

Litek has replaced Colver as No. One, and Makiki has caught and passed the now unavailable Theotek in ownership popularity.

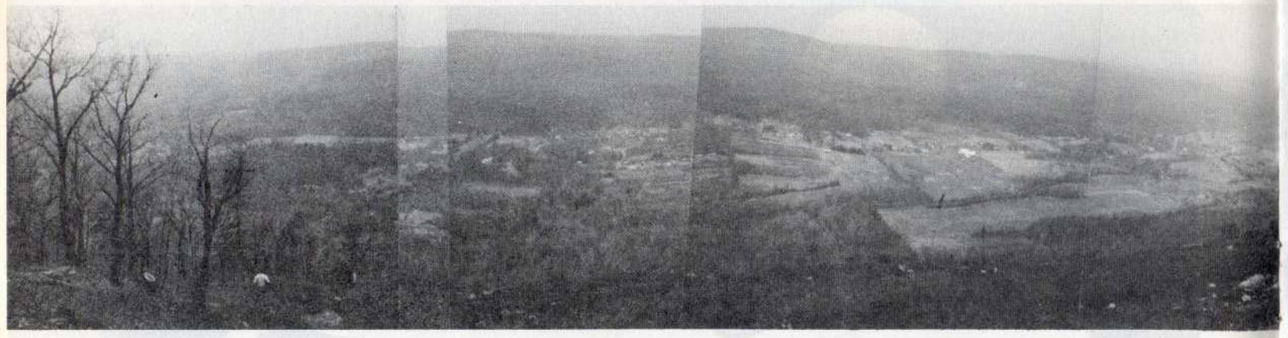
NEW ACCESSORY PURCHASES

As stated, we felt a lot can be learned by asking you what accessories you may purchase in the next year. Anticipating demand correctly is a cornerstone of enterprise's ability to supply what you want, when, how ,etc. A detailed report is available to business, but for the reader, we felt a rundown on the most popular requests would be of interest. You can compare your desires with those of your fellow pilot.

NEXT ACCESSORY!

1	New Variometer
2	Altimeter
3	Parachute
4	Harness
5	Radio
6	Air/Wind Speed Indicator
7	New Glider
8	Motorized or motor pack
9	Helmet
10	Barograph
--	Compass

Next "Statistics" will again concern itself with Injuries, a program of participation/cooperation with the USHGA via Safety Committee Chairman, Doug Hildreath, of Washington. Help us get the best results; use your Reader Response Card!



1980 National Hang Gliding Championships in Ellenville, N.Y.

September 13-23, 1980

by Dan Chapman

The 1980 U.S. National Hang Gliding Championships wishes to invite pilots, officials, and spectators to the village of Ellenville for 10 days of competition Sept. 13-23. This site is one of the best known in the country. Flights of over five hours duration and 36 miles have been made from the 2000 ft. ridge. Take-off is 1000 ft over the two mile wide valley floor on a plateau half way up the ridge. The lift is primarily thermal as one tops out at 1500 ft. over take off in ridge lift alone. There are many knobs and gullies along the ridge that act as thermal generators/collectors. The air here is mainly noted for its choppiness and unpredictability. Those who have flown many other areas across the country or around the world find Ellenville one of the most challenging sites. There is a definite wave action off the mountain peaks 5 - 20 miles upwind of this WNW face. When the wave moves in sync with the ridge lift is strong; but frequently an hour later there is sink everywhere as a dozen or more gliders try to penetrate the landing zone about 4/5 mile from the take-off. This "cycling" of the lift occurs often with no apparent wind velocity change and is the result of the wave sliding out of phase with the ridge and producing strong horizontal air. A "wonder wind" frequently occurs beginning two hours before sunset when the late afternoon sun works on the west face of the valley producing lift and air from the shaded east slope slides into the valley floor. Good conditions occur year round with the passage of cold fronts from the west and north. This combination of ridge/wave/thermal lift produces a wide variety of challenging flying conditions.

The tasks from this year's meet include a pylon task, a minimum/maximum task and cross country task with three fields down wind of take off at 3.5 mi., 5.5 mi., and 7.5 miles. The competition will be one on one, triple elimination. Dennis Pagen will be Meet Director.

The Big News is CBS signing for the TV rights and producing a 30 minute show for their weekend sports program. Coca-Cola is sponsoring the radio promotion, Ford Motor Company is supplying trucks for pilot transportation and the local businesses are donating to a "Pilot Welcome Kit" which includes free gifts, services and discounts worth hundreds of dollars. The County Public Information Office and I Love New York is gearing up their ad machine and expect this event to be one of the biggest of the year with the huge crowds in the 40 acre spectator area. Over two dozen booths have been sold that will sell a variety of food, gifts, souviners, etc.

The Hudson Valley area is beautiful in the early fall with many excellent hiking trails, cliffs, streams, waterfalls, swimming holes, caves, cul-de-sacs, winerys, good bars with all types of music/dancing/entertainment, camping, old houses, Woodstock, sleepy old towns, country roads, and other neat places. But best of all is seeing the countryside beneath gossamer wings at 3000 ft ALG. That's the 1980 Nationals in Ellenville, N.Y. — Don't miss it — See you there.

AN INTERVIEW WITH

pete brock

by Dan Johnson

Since he was 10 years old, he had gasoline in his blood. As a boy growing up in the Bay area, he wanted to be a race car driver. And a career was born in the tradition of whining engines and squealing tires.

Pete Brock is one of the most prominent hang gliding names today in 1980. But in the mid-fifties, no hang gliders flew and Brock's love was concentrated in the design of racing cars.

After attending the prestigious Art Center College of Design, Brock traveled eastward to Detroit, where he was to become General Motors' youngest designer at age 18. At that time (1955) Detroit and GM were heavily involved with racing. Brock spent an educational and enjoyable two and a half years in special project studios, called "Advanced Concepts." His credits included a good deal of design work on Chevy's new Stingray sports car.

However, in 1957 a corporate ban was imposed on racing activities, and though secret rooms kept some research going, Brock departed, returning to California for racing opportunities.

Following a stint in the Air Force, Pete began working for a Southern California legend, Max Balchowsky. Pete learned a lot from Max, especially in practical applications. He also met Carroll Shelby there, a relationship destined to grow.

After temporarily taking over Shelby's race driver school at Riverside, Brock began to work on Shelby's newest project, the AC Cobra. Ford Motor Company was involved in helping Shelby financially, as Ford needed a sports car to compete with Chevy's popular Corvette.

Pete's imaginative mind found a home in the design of a car called the Cobra Coupe. This departure in concept drew uncertain glances and skeptical comments from would-be experts. But in 1965 the auto took the world championship away from the Europeans for the first time.

Brock stayed with Shelby until '67 as an important component in a 300 employee factory busily producing the Shelby/Ford Mustang. Then Brock Racing Enterprises began, an organization which itself grew to a staff of 30.

Building race cars for others was the primary business of BRE until the name Datsun attached itself to Pete Brock. The new Trans Am sports car circuit had commenced and Brock found himself competing against old friend Shelby, who had relations with Toyota.

Here lies a success story so thorough that it spelled its own demise. The Datsun/Brock team was so powerful in their 240Z's that after only a few short years the Trans Am circuit was over, Datsun the winner time after time.

Trans Am ended in 1972. And a new interest had wedged its way into Brock's life. Hang gliding. Pete witnessed Russ Velderrain flying a "bamboo bomber," was invited to give it a go, and became airborne on 12-7-71. It was an 18-20 standard, the 20 being keel length.

After this epic experience, Pete, you were still involved in BRE, what came next?

I decided to build a glider for my son and I. I only dabbled in it for a while. But by late '73, I had built several ships, all standards, and the first fuel crisis hit. The race industry looked bleak.

Who else was active during those formative years?

Well, Bennett preceeded everyone. Eipper had just begun (circa 1971), Wills also opened within days, and Mike Riggs had begun a company called Seagull, using strangely curved leading edges.

Did you immediately concentrate on glider manufacture?

Not right away. I got into component hardware, for those others — Bennett, Seagull, Eipper, Wills. But they weren't as interested as I expected. I had a reputation then for deluxe workmanship and evidently cost of such finished items was the problem.

So then what, your own ships?

That's it. I got Eipper to do the sails at first. Later on, because of slow acceptance to their curved spars, Seagull was able to take over this function. The whole idea seemed sound. This was new, and the auto companies were receeding due to the fuel crunch. We had won a lot in the last arena, and I decided to "go for it."

What about all that machinery used to tool-up race cars?

I began to sell it off. Used other machines to tool the necessary parts, really deluxe hardware; many small companies began to buy these. Companies like Manta and Seagull, especially were interested due to the quality we produced.

That brings up an interesting thought. Which companies existed at that time, in the very early 70's?

At first, Bennett, Eipper, Wills Wing, Seagull, Manta, and us, as Ultralight Products, or UP.

That's it Just six?

Yes, at first. Joe Faust, who used to produce *Low and Slow* (magazine) and *Hang Glider Weekly,* recorded the entrance of over 300 manufacturers, one of which was your FireCraft, who like many, bought components from us. But few survived. Some grew fantastically, like Free Flight and Chandelle, only to die. Sky Sports, from back East, came and stayed, though less visibly than West Coast manufacturers. The only real new company which emerged and remained was Larry Newman's Electra Flyer.

Why is it that so few lived?

The depth of personnel and the knowledge to build better and finer

The Comet: Latest in a long line of winners from Ultralight Products.

aircraft. The designers who became affiliated with each company were a vital cog.

In your opinion, who are or were the important designers?

Dave Cronk (Eipper), Mike Riggs (Seagull), Bob Wills (Wills Wing), Roy Haggard (UP), and the only Easterner, Tom Peghiny (then Sky Sports). Oh, and Bill Moyes, who contributed more than anyone else in the sport. He is followed by Bob Wills and Roy Haggard, in this regard.

While we're on contributions, give us your rendition of the important events in hang gliding, as seen from your position, now in 1980.

First, it would have to be Bill Bennett, who traveled from Australia to show us what it was all about. He led us like a Pied Piper. Secondly, Eipper emerging as a real company. Thirdly, Mike Riggs and his (then) advanced Seagull III (*Editor's Note: see next question.)* Fourthly, it was Roy Haggard's Dragonfly which followed on the heels of Bob Wills' remarkable Swallowtail.

You said earlier that acceptance was very slow to Riggs' Seagulls, yet you place it very high in industry development. Why?

Nobody had flown very long flights in those days. Then Pat Conniry came from Northern California. Conniry learned to fly in three days and on learning bought a Seagull, which he thought looked the best. He didn't know about the stigma attached to it by Southern Californians. Shortly afterwards he got a three hour flight on the Seagull and just blew everyone away, also doing great things for Riggs' and company.

Pete, as we close this interview, why don't you recapitulate the important events in hang gliding in the 70's, as you see it from your perspective. Don't worry about the chronological order.

Bob Wills was doing some great things in the early days, flying off Saddleback (4200 ft.) He was an incredible driving force, always innovative.

UP went to the European Alpine Championships and won great, in Dragonflys, which Europeans began copying like crazy. Bill Moyes bought one, too.

Then at the Telluride Manufacturer's Meet, Moyes bought the design. But he fully battened them and returned to blow everyone away.

Next, roach and battens came from Tom Peghiny and his new Kestrel, another landmark. Though, with this development, Moyes keel pocket was the single biggest step to the hang gliding industry.

Higher aspect and washout came from Haggard, and his Dragonfly. These too, played a vital role. Roy is very important to Ultralight Products. Haggard *is* 'UP.'

Thank you for your viewpoints, Pete.
Thank you, Dan.

PILOT REPORT: Sierra by Seagull

by Dan Johnson

Photos by Don Whitmore

The first new Seagull since the Meter series is in production. This does not include the highly refined and re-certified 79 and 80 Meters and Seahawks, but, in fact, heralds a whole new breed of Seagull. The Sierra is as contemporary as tomorrow while retaining the smooth curved lines traditional with the Carpinteria manufacturer.

At the invitation of president, Don Whitmore, Seagull flew me out to the factory for three days to have an intensive look at the new craft, its production, and many hours of discussion with designer Tom Peghiny. This method was a more enlightening experience than is usually available for a Pilot Report. It could even become the standard for such efforts.

The TV news reporter claimed it was the first rain in July for Santa Barbara in some sixty years. While he may have exaggerated, I'm told rain is most unusual and I hoped the precipitation which greeted me would not make a farce of the voyage.

Fog (more common) followed the rain, but by afternoon on Wednesday, Rincon Mt. was fully visible, so we packed up two Sierras and drove to the fourteen hundred foot launch, which serves as Seagull's test flying site. It must be all of twenty minutes away.

I began to set up my Sierra 180, assisted by Peghiny. The gentle slope of Rincon worried me somewhat, as I am more comfortable on the cliffs which are universal in Chattanooga. I generally fly larger sizes than 180 ft^2, and thereby attain take-off velocity at lower speeds. The two factors had me wondering.

Set up was a breeze, rather un-Seagull like, possibly illustrating the influence of "new" personnel like Peghiny, Michel Katzman (co-designer), Tom Hadden, and Whitmore. In fact, as I looked at a small container, I could suppose it was anything but a Seagull — no control bar was visible. Yes, production models now feature a modern triangular bar with all straight tubes styled like the UP bars of 1980. The bagged Sierra is a mere 16½ feet long, tho thick, and really belies its weight of 60 pounds (180 model).

Erecting the glider is pretty much like all the new deflexorless ships, that is those *not* using keel sliders. With the glider sitting on the assembled bar, you pull each wing out separately, finally pushing the crossbar halves back to a heart bolt junction. Anyone familiar with the Lazor will have no difficulties here. Pop in the tips — they're bungie drawn like the Mega — push in the battens, pre-flight, and you're done.

So there I was, still looking at that shallow slope. Hook in, helmet on, a deep breath, and off I went into still air. A few steps later I rode smoothly into the air; it took off surprisingly slow.

The Sierra is aimed at the Atlas market, tho it is quite unorthodox, and definitely original. I knew it was to have decent handling qualities, but all double surfaced, tight sail, low twist gliders are "stiff." Not the Sierra! A shifting crossbar, deep keel pocket, and anhedralized frame give the Sierra a fast roll at very light pressures. The 132 degree nose, short span, and flat sail produce fast pitch and equally light bar pressures, tho roll is not quite so light as the Raven, and pitch not quite so light as the Lazor.

It is not a glider for all pilots. The Sierra is aimed at those seeking high performance, perhaps a contest ship. A novice or uncertain flyer will be all over the sky. If your pleasure is muscling the bar, forget the Sierra.

In marginally light conditions, several other designs could out-sink the Sierra. In fact, the Sierra sink rate is not its strongest quality. This craft optimizes a higher speed much more efficiently.

Some others may accelerate faster but few can out-speed the Sierra, and the new Seagull may offer the best high end glide available, comparable to the Mosquito and no others with which I have any familiarity.

Several manufacturers are now offering Atlas-like designs or construction — Flight Designs/ LaMouette, Moyes Mega, UP Comet, and now the Seagull Sierra all join the Seedwing Sensor. Only the latter has a proven heritage having been around several years. The Sierra probably has the edge in handling.

Designer Peghiny has long been an advocate of "real air" design. Whether it be Owen's Valley or Torrey Pines, the Sierra offers a range of speed and handling to keep you comfortable. It has passed 1980 certification standards easily.

Product differentation is noted in several ways. Of course, the curved spars set the Sierra apart from all other brands. It helps provide the strength for which Seagulls have long been known. The sail conforms beautifully to its compound curve frame, and two features assist. First, the highly worked sail uses 5.3 ounce cloth throughout. Further, a pocket inside the leading edge holds a .015 mylar stiffener. This interfers somewhat when rolling the sail, but assures a wrinkle-free fit to the leading edge spars. There is no billow. The crossbar is a fully shifting one, employing handsome black anodized hardware, and, incidentally, a completely new trim bracket with more adjustability. And lastly, the battens are a new concept. Besides metal front portions which help define the far forward maximum camber, the ribs have metal trailing edges, connected with a stiff, but flexible Lexan tube. The aluminum ribs sleeve inside the Lexan and the combination offers surer reflex capabilities in the instance of sail blowdown, plus protecting rib shape while the glider sits nose down into a strong wind. All ribs are held in place firmly by the ball-on-bungie-cord method also seen on tip battens of a Raven. For tuning, a swiveling leading edge tip is pre-drilled with sail tensioning holes.

Sierra

Controllability

The Sierra is a very positive handling ship when lined up against other low twist designs. Some adverse yaw tendency is evident at low speeds, though this is common on all low twist crafts. I believe the Sierra to be a superior ridge scratcher as it has a very mild stall and very fast roll rate. Of course, you will still have to be careful to maintain adequate airspeed when scratching close due to the adverse yaw.

Ease of Turning

All pressures, roll and pitch, are very light, pleasantly so on a double surfaced, tight sail glider. Peghiny describes his design as "yaw dominant," by which he means that when roll is initiated, coordinated yaw follows quickly and easily. This makes the Sierra a top thermalling glider as you will not have to force it to do a yawed, climbing turn.

Control Predictability

At all speeds above minimum sink, the Sierra is very certain, including high speeds, where the craft tracks so straight and true as to make you wonder how its turning pressures can also be so light.

But near incipient stall, the Sierra illustrates a narrow angle of attack range. This results in a sensation of resistance, of "bumping into the wind," if you will. I noticed this same quality on the Mega and feel somewhat bothered by it, as I fly at low speeds quite commonly. I consulted Peghiny on this to have him explain that most low profile, tight sail designs have a narrow enough range for attack angles, that when pushed out excessively, you stall a portion of the wing. I also feel there may be a connection between high angles of attack and the far forward camber which accentuates the feeling.

Sink Rate

I loaded my test Sierra at 1.328 lbs/ft². Loading is important, and for the Sierra, that is a bit on the heavy side. At a comparable wing loading, the Sierra will not produce quite as good a sink rate as an Atlas.

But, you can fly the Sierra at lighter wing loadings than preferable on an Atlas or Mega, due to the ease of control. I did not get to fly the 200 model (196 ft²) to verify this, but see that control stiffness would be much less than on an oversized Atlas. Some months ago I was encouraged not to fly a 190 Atlas for this reason exactly.

The left photo shows Peghiny in a normal bar position. On the right is high speed.

When I asked Tom if Seagull would produce a Sierra larger than the 200, he immediately answered, "No." But he had just been through an intense week of certifying two sizes. Later, he mellowed and said, "perhaps, if demand is sufficient."

Speed Range

Peghiny feels the Sierra has a broader effective speed range than its competitors. This is because the Sierra is capable of higher useful top end speeds. The Mega and Atlas have noticeably improved the glide angle at medium speeds (25-35), but near the high end, the Sierra will hold a glide still better. Slow speed glide angles on all three designs are about the same, with all experiencing handling losses at the very bottom end.

Top Speed

The Sierra is very fast. Tom claimed he could maintain over 50 mph, and my experience substantiated a positive ability in this area. However, I had no opportunity to measure this as I prefer.

When pulling in, the Sierra rotates swiftly and then builds airspeed smoothly, not abruptly accelerating. As stated, its exhibits no wandering tendencies at higher speeds.

Parachuteability

The Sierra is not strong in this area, as you might expect. The wide nose and flat sail are not so forgiving as a floater or other full sail design.

As this quality relates to landings, however, I had no difficulties at all in flare timing, and following Peghiny's advice, left the bar full out, once flared, to prevent nose-over. The Sierra shares a low sweep design with the Lazor II, and yet I had no trouble with dropping the nose on either. This probably is the case as I always use full arm extension till touchdown. Peghiny indicated nose-over could be a problem to some.

Stall Characteristics

The Sierra shows a mild stall with a definite break point. I executed the maneuver slowly, quickly, with speed, at low speed, and in mild turns. In each case I got only the mildest nose down. Recovery was quick when permitting back movement on the bar. Peghiny stated that in accelerated stalls or when aggravated by turn control at stall, you could expect tip stall simultaneously. Even so, light roll pressure should easily correct this problem.

Ground Handling

Very acceptable static balance is a Sierra characteristic, and a welcome one in these days of common tail-heaviness. The wide nose angle is responsible, so you could also correctly guess it is quite pitch responsive on the ground. On your take-off run, use a filled sail technique anyway, and the pitch "slipperiness" quickly goes away.

The 180 model weighs 60 pounds. But this is not excessive, nor a problem due to adequate staic balance.

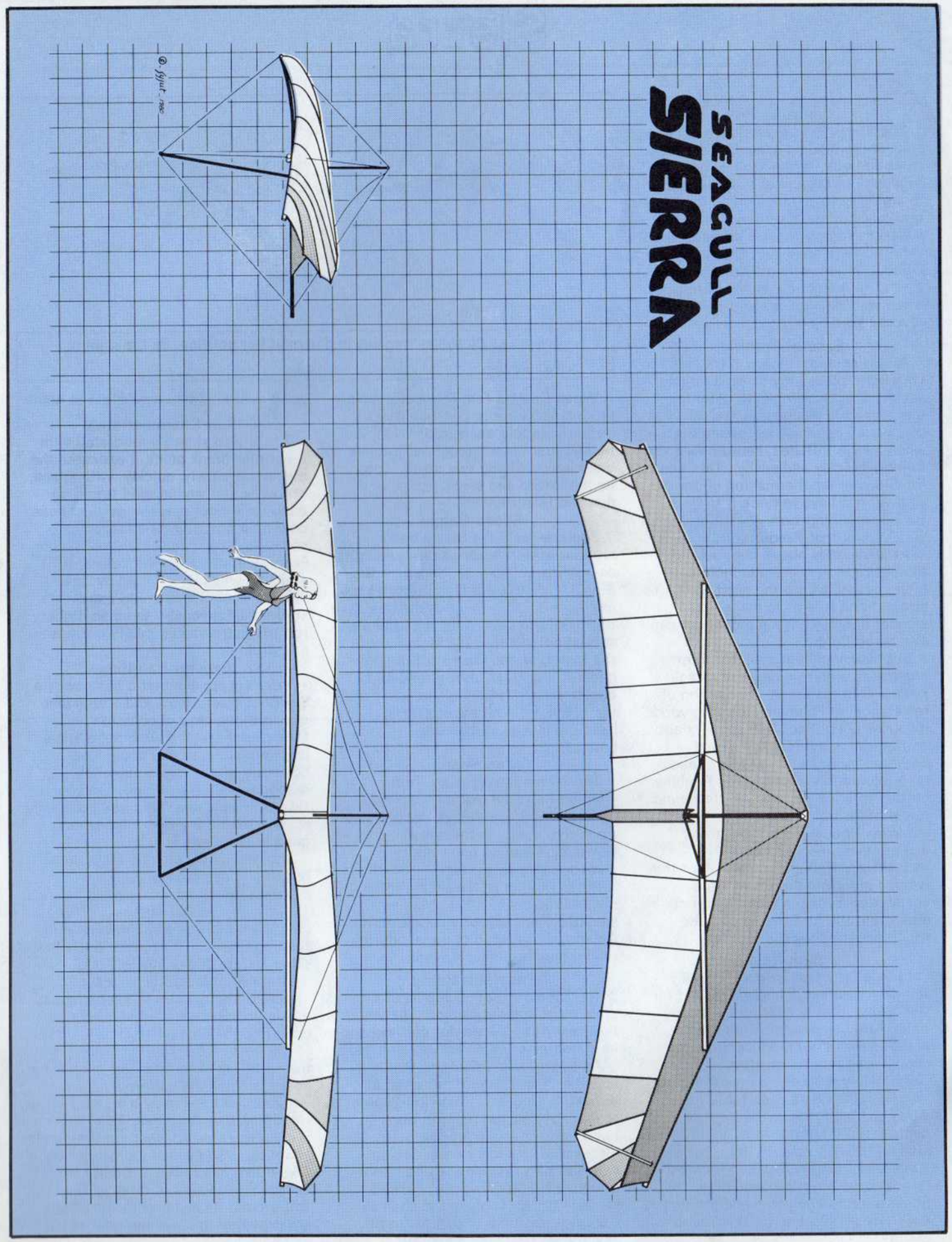
Set Up

I gave this area some coverage in the beginning of the report, but a few other points can be made.

The bridle (leech) lines stay attached, the defined tips plug in, and easily so, using an elestic inside the tube, like the Mega.

The control bar sets up quickly and the wires need be attached only at the nose, once on the bottom by the wingnut, and on top by a small carabiner, like the Atlas. The rear tensioner stays attached on both ends.

Set up is somewhat more brief than take down due to the difficulty encountered when folding up the sail around its mylar stiffener. Bags are provided to cover the control bar and battens.



Sierra

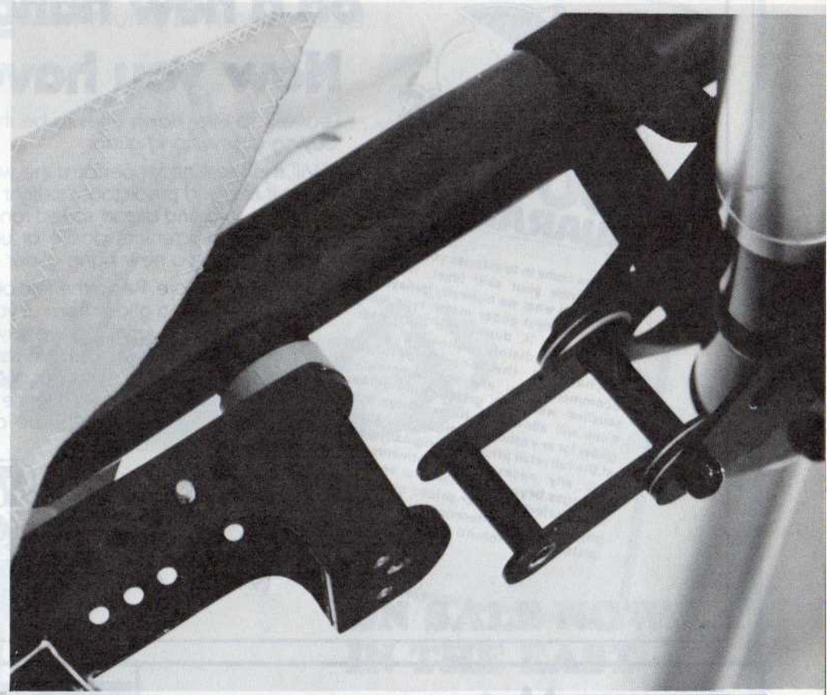
Purchase Cost, Longevity and Resaleability

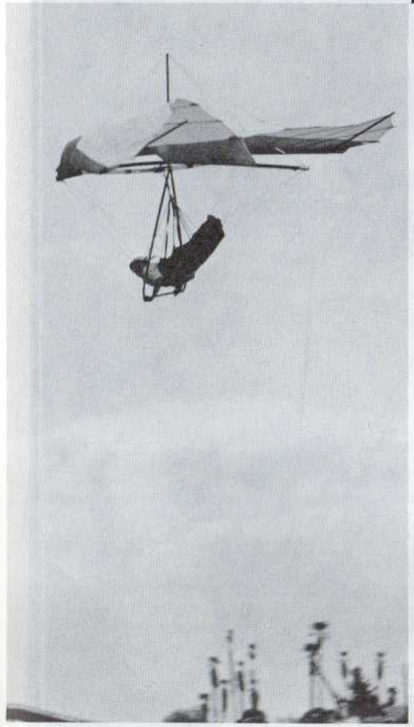
The Sierra goes on the market for $1885. This is $110 less than a Mega or Sensor, and over $200 less than the imported Atlas. There are no options, as the price is complete.

As the Sierra is a contest ship, its resale market will be to other experienced pilots. As with all high performance gliders, this means you can take a beating if you wish to sell fast. Resaleability is an unknown as the glider is new, but its pleasant handling, strong construction, and smooth flowing lines make it an attractive purchase. It is likely a buyer won't be too hard to find.

The Sierra was definitely in production as of early July, yet delivery times are not being stated. Consult your local dealer.

In closing, I'd like to offer thanks to Seagull for their generous provision of time and airfare enabling me to report on their newest entry. It was also my pleasure to be able to spend such productive time with an old friend, Tom Peghiny.





SIERRA	200	180
Area	196 ft²	177 ft²
Span	33 ft.	31.5 ft.
Nose Angle	132°	132°
Billow	Not Applicable	
Aspect Ratio	5.5	5.6
	64 lbs.	60 lbs.
Leading Edge	17.5 ft.	16.5 ft.
front and rear	1¾" x .049 — 6061T6 with 6 ft. Internal Sleeve 1⅝" x .035 18 in. External Sleeve 1⅞" x .058	
Keel (at sail)	9.5 ft.	8.33 ft.
tube length	12 ft.	11.5 ft.
	1¾" x .049 — 6061T6	
Cross Spar	2" x .049 — 6061T6	
Control Bar		
height	64 in.	64 in.
width	60 in.	60 in.
base	1⅛" x .058 — 6061T6 with 1" x .028 — 6061T6	
leg	1⅛" x .058 6061T6	
Wires	3/32" x ⅛" PVC Stainless Steel 7 x 7 (plans include) ⅛" x 3/16" PVC Side Wires	
Pilot Weight Range	160-215 lbs.	130-188 lbs.
Batten/Ribs	½" x .028 with Lexan composite	
Sail Cloth	5.3 oz. Howe and Bainbridge with .015 Mylar Stiffener	
Deflexors	None	None
Defined Tip	⅞" x .049 x 4 ft. with bungie retainer	

THE minibat

One good way to hold down the rising cost of getting high.

by Dan Johnson

"What's a Minibat?" One of those homebuilt aircraft? Probably takes two or three years several nights a week in order to get one built. All kinds of special tools, painting equipment.

"Then what do you have?" A sailplane in rough form, still needing aircraft instruments, tow planes to get it up, airports at which to land, licenses, FAA inspectors, and a trailer.

"Plus, don't you have to get a pilot's license?" Let's see, at forty dollars an hour, forty hours minimum, fifty more like it, plus books and ground schools . . . pretty expensive.

The Minibat costs $3500.

This price includes basic instruments. Its 105 pounds can easily be carried on a car top rack. It takes 40-60 hours to build, no fancy tools needed. It comes in 25 high technology main pieces which you glue together along idiot-proof joints, and the finish is so smooth, paint is not necessary. You can flight train yourself and accumulate all the needed experience to take your Private Glider Pilot's flight test. A license can be yours for under $100. An auto tow is all a Minibat needs with 25+:1 and 180 fpm performance.

I toured northward to Muskegon, Michigan where resides an old friend, GLA Marketing man, Doug Alexander. Down the street is the heartbeat of GLA and their great little airplane, the Minibat. It is the home of Designer Larry Haig. Many of you know that name from the powered sail-plane kit, American Eaglet, among other projects.

The ship intrigues me as much as did the interesting designer and his team. The Minibat is really mini — 105 pounds, 65 square feet, 25 foot span. Tailless, forward sweep, glass and foam construction, roof-top-able, and humm, "Where's the divebrakes; no spoilers?"

The entire concept is very thoroughly considered, and well executed. The design phase is over. The FAA had given official blessing to the kit the day before I arrived. The team was very happy, as were the excited recipients of the first eight crafts off the line.

Three primary reasons brought about the Minibat. Firstly, the rising cost of everything is even moreso reflected by aviation prices for training and aircraft. If we wished to continue to be able to buy and fly, something had to be done about the cost. To most hang glider pilots looking to up-grade their performance, a sailplane purchase is far out of the question.

Secondly, if your desire is to widen your flying experience, a pilot's license is needed. But the cost is easily two thousand plus, another unpalatable expense for the "privilege" of flying, not including the actual cost of remaining airborne.

Lastly, we are all proponents of powerless flight, even if we also pursue powered ultralights. With our current fuel problem only expected to get worse, the prospects for sport aviation receiving sufficient, if any, fuel seems dim and fading. The Minibat addresses powerless flight beautifully both when airborne and for launching.

An engine is in the plans, however. Call it flap capability, a three horsepower engine is an option, affording the Minibat zero sink flight. Using two quarts an hour, the little engine is easily in-air restarted and the prop can be neatly hidden in a minor fuselage gap.

If that's still not enough, you can add on extra wing extensions increasing performance to a theoretical 36:1 and 120 fpm. The basic craft is so super-strong that it can handle this span growth still remaining well within acceptable limits.

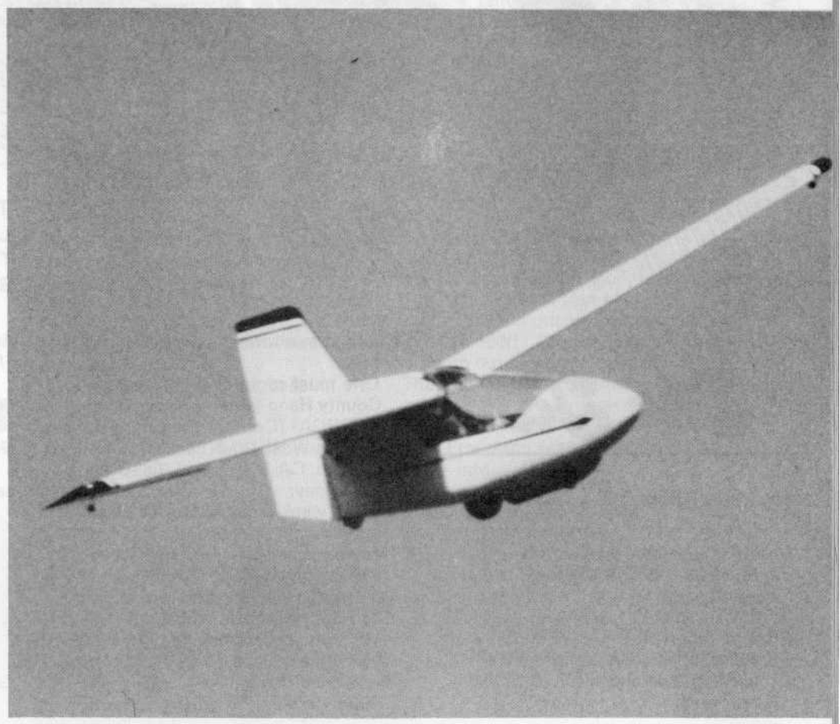
It does not seem that hang glider pilots need a lecture on tailless stability. So I'll suffice it to simplify Haig's argument to this: If a wing is properly constructed (reflex, washout, dihedral, etc.), is it not *more* stable if it can recover itself without needing a tail or canard to get the job done?

But how do you get such a slick

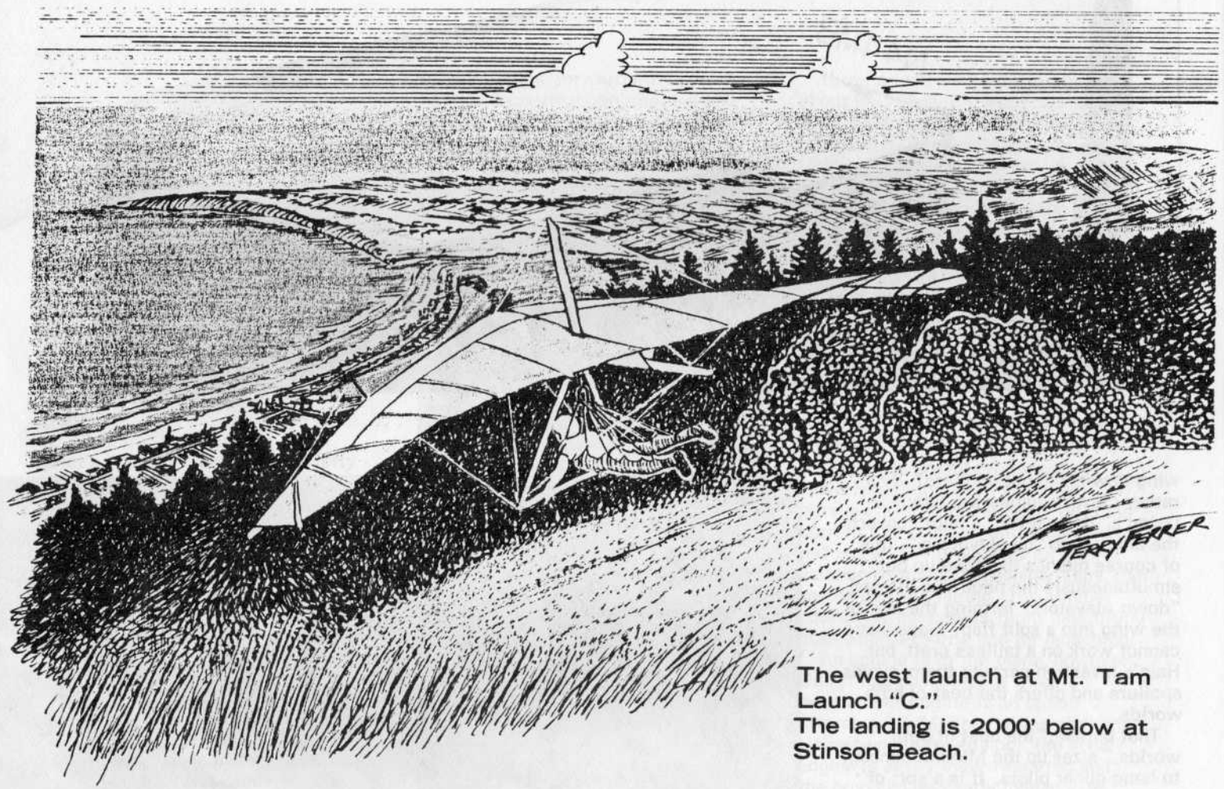
wing down, without spoilers? By a rather clever engineering gimmick. Using a "down lever" a pilot converts the ailerons to "up elevators." This, of course pitches the nose up but simultaneously the pilot also effects "down elevators" forming the rear of the wing into a split flap. Flaps alone cannot work on a tailless craft, but Haig's invention permits them, avoids spoilers and offers the best of both worlds.

That phrase, "the best of both worlds," sizes up the Minibat concept to hang glider pilots. It is a sort of "have your cake and eat it too" proposition for $3500.

Information can be obtained by writing GLA directly at:
841 Winslow Court
Muskegon, MI 49441
616/780-4680



BAY AREA S-I-T-E-S



**The west launch at Mt. Tam Launch "C."
The landing is 2000' below at Stinson Beach.**

Mt. Tam

by Terry Ferrer

Site:
Mt. Tam — Mt. Tamalpais
Direction:
SW to NW
Rating required:
Hang III (USHGA Intermediate) with altitude check-off. Strictly enforced
Clubs, organizations, or persons to contact:
One must register with the Marin County Hang Gliding Association (MCHGA) (Contact them thru Hang Gliders West, 20-A Pameron, Ignacio, CA 94947, 415/883-3494
Fees to pay:
A $5/week (renewable for one extra week) is charged. This fee covers a special insurance above and beyond the USHGA insurance. It entitles you to a Mt. Tam sticker and the right to launch from Mt. Tam. Locals pay $7. But they use it more.
Flying conditions:
Mostly a sled-run with a fantastic view. Occasionally soarable!
Flying season:
Spring thru Fall
Transportation necessary:
Drivable to the top of the mountain
Glider set-up area capacity:
Unlimited
Landing field:
2000 ft. below on Stinson Beach. It's *illegal* to fly over the town. Fly to the North of the town and land to the north on the beach, where there are less people. There are flags on some of the residences on the beach to help you guage wind direction and velocity
Launch elevations:
Three launch sites on Mt. Tam
Special notes on site:
Mt. Tamalpais (Mt. Tam) is off the coast highway 1 in Marin County. Overlooking the Pacific Ocean, it is one of the most easily accessible places to fly in Marin County. One doesn't know whether to search for lift or just glide and take in all the beauty of the site. The landing area is the north section of Stinson Beach away from the crowds. There are miles and miles of white, sandy beach to set up an approach and land. It is *illegal* to fly over the town of Stinson Beach and you *must* register with the Marin County Hang Gliding Association (MCHGA), and sign in with the Park Rangers at their headquarters on top. Contact Hang Gliders West for the details. We almost lost Mt. Tam as a flying site last year because of pilots failure to cooperate with the regulations. It wasn't until just recently that we were allowed to fly there on weekends because of the crowds and traffic jams that occured.

So, be cool and fly safely. The MCHGA has gone thru enormous efforts to keep this site open. Let's keep it that way!

Ft. Funston

Site:
Ft. Funston
Direction:
350° cliff facing SW to WNW
Rating required:
a) soaring:
USHGA Intermediate (Hang III)
b) gliding:
USHGA Novice (Hang II)
c) tandem:
Primary Pilot must have Advanced (IV) rating. Passenger must have Beginner (I) rating
Clubs, organizations, or persons to contact:
You must show your USHGA rating card, local Funston rating, or foreign equivalent
Fees to pay:
None
Flying conditions:
15 mph or less — max. 5 gliders
15 - 25 mph — max. 10 gliders
Over 25 mph — max. 13 gliders
Shear conditions — no limit
Variation within each range is at the discretion of the site monitor.
Time limit:
Six or more pilots waiting to launch — 20 minutes. With soaring room for four or less gliders — 10 minutes
Flying season:
Spring thru Fall, but the best soaring is Summertime.
Transportation necessary:
Adjacent to the Great Highway on the coast just West of Daly City.
Glider set-up area capacity:
Unlimited
Landing field:
Possible beach landings (watch out for the wuffos and horses. Landing back on top is where it's at when it's soarable.
Launch elevation:
350 ft. cliffs overlooking the Pacific Ocean.
Special notes on site:
Funston is the favorite site of many of the Bay area pilots because of its location close to "the City," San Francisco. Not only is it a meeting and partying place for pilots and friends, but it is one of the only sites I know of that has a special section set up for the wuffos. The National Park Service has erected a viewing platform above the cliffs specifically for watching the gliders soar by. It's almost as if you can reach out and touch the gliders they seem so close. The only negative aspects of Funston is the close proximity of other gliders when marginally soarable and the arduous hike back up the cliff if you lose the lift and have to land on the beach instead of back on top! There is a training area just south of Funston on small sand dunes that range from 25 ft to 100ft. The lift is usually smooth but can get rowdy at times. The site is regulated and monitored by the local San Francisco club, Fellow Feathers. Contact Chandelle, San Francisco (415/756-0650) for more info.

So there are the details on two of the three regulated sites in the Bay area. One must ask the locals for the location and particulars on the other sites like Westlake, Shelter Cove, Drakes' Bay, Lexington, Waddell Creek, Mission Ridge, McClure's Beach, Elk Mountain, Windy Hill, etc., etc.

TOWING SECTION

the tow winch

This is the second in a four-part series about the tow winch from the Tow Winch Manual *by Harry Robb, U.S.H.G.A. Director at Large. In this installment we'll take a look at the procedures used for launching and towing. Although the manual refers to certain procedures as they apply to a tow boat application they're equally important for land towing. One should keep in mind that this is not the last word in technique and I invite the readers to share their experiences with us.*

Experience of the tow Crew and the Pilot in towing with the winch over water is mandatory before any attempt at land vehicle towing. Any errors committed over water do not normally cause any damage to the glider or injuries to the Pilot. The same safety cannot be claimed over land. There have been a few reports of attempts to short cut the boat tow launch training where water is not readily available, but there have also been some reports of unnecessary injuries by trying land tow first.

Two of the three persons involved in winch towing must be experienced. If a new tow Driver is being trained by an experienced Driver, both the Winch Operator and the Pilot must have experience in towing. If a new Winch Operator is being trained by an experienced Operator, both the tow Driver and the Pilot must have experience in towing with the Winch. If a Pilot new to winch operation is being indoctrinated, both the tow Driver and the Winch Operator must be experienced. Thus, any mistakes committed by the new person can more easily and quickly be overcome by the other two members of this Team.

Slightly different methods of launch can be used:

BOAT STANDING START

The tow boat delivers the glider end of the tow line to the Ground Crew on the shore and proceeds to unreel approximately 300 feet (90 meters) of tow line in the direction of launch take-off before stopping to wait for the Ground Crew operation. To place the tow line, the Winch Operator will leave the Tow Control Handle in the rear limit Release Position where it is always placed when not used for towing. The drum-reel will free-wheel and the friction of the line in the water should provide enough pressure to avoid any backlash on the reel. If any slack should start to develop, the Tow Control Handle can be moved forward slightly to provide a small amount of pressure to slow the drum-reel to prevent any backlash. At the same time, it is necessary to avoid too much pressure to pull the tow line away from the Ground Crew. For this run, the speed of the tow boat can be sufficient to put the boat on a plane. However, if the Pilot is not quite ready and there is no hurry, the tow boat can idle out which will slow the rotation of the drum-reel and reduce the possibility of a backlash. In windblown or tidal waters, the tow line should not be extended any sooner than needed for launch so that it will not be distorted from a straight line from the glider to the tow boat. The tow line should not be attached to the V-Pull of the glider during this phase to avoid any accidental towing before the Pilot is ready.

When the wind in the launch area is 6 mph or less, it is customary for the Ground Crew to pull in about 40-50 feet of line and arrange in a loose "S" pattern on the ground directly in front of the Pilot and glider. This slack allows the boat time to gain the proper speed needed to provide the glider adequate flying speed in light winds immediately after launch, and also allows the Pilot to know exactly when to expect the launch take-off pull.

When the Pilot has hooked his harness to the glider, the Ground Crew can attach the end of the tow line to the end of the V-Pull of the glider. After all connections have been tested and the Pilot is ready for launch, the Ground Crew can signal the tow boat with a flag, or the Pilot can signal by shaking the glider and/or kicking one foot and leg to one side.

The Winch Operator will then push the Tow Control Handle forward from the rear Release Position where it is placed when not used for towing, to the front limit Snub Position which will prevent the tow line from unreeling from the drum-reel during the increased drag of the Pilot on launch. He can then inform the Driver who can advance the throttle to accelerate positively and smoothly to a speed meter reading of about 30 mph with no headwind to provide flying speed for take-off. For each 1 mph of headwind, reduce the tow boat speed by 1 mph to provide only the required speed to lift the glider gently into the air with no severe yank or jerk. If the speed is a slight bit slow, the glider may seem to hang in the air or settle a bit. It is easy enough to add a small amount of throttle to increase the flying speed for a gentle climb while the Pilot is getting into his harness. It will help to have an airspeed meter for fixed line tow.

Any speed greater than needed for minimum flying speed may cause a take-off violent enough to result in lack of contact with the control bar and loss of flight control. Excess boat speed will also cause the glider to climb excessively at higher headwind speeds, even with the V-Pull, which can cause dangerous stress on the hang glider airframe and on the tow line. Overriding the control of the Pilot at this critical phase of flight immediately after take-off will also contribute to a lock-out which is more serious at low altitude because of the lack of control and time to maneuver the glider to a safe landing if released from the tow line.

When the wind in the launch area is more than 6 mph up to about 12-14 mph, which normally is about the maximum limit of smooth air without gusts for safe launch take-off, the slack in the tow line can gradually be reduced to almost none. With the greater headwinds, the tow boat can easily accelerate to the lower boat speeds with the added headwind that will provide adequate flying speed in the time the Pilot takes one or two steps before becoming airborne very gently as described before.

BOAT MOVING START

When all three elements of the towing Team are experienced in use of the tow winch, a slight variation of the previous launch may be used, with some slight added degree of risk.

When the Water is deep enough near the shore for the tow boat to come in close and wait for the Ground Crew and Pilot to get ready for launch, the tow boat may start its run with a minimum length of tow line extended from the drum-reel to the glider so that any desired exchange of information is easy, and no signals will be misinterpreted.

When the Ground Crew of the Pilot signals that he is ready, the Ground Crew can hold the tow line with only a few feet of slack. The Winch Operator will leave the Tow Control Handle in the rear limit Release Position. The Driver will advance the throttle to accelerate to the planing speed of the tow boat for adequate steering control while extending the tow line from the drum-reel. Some slight brake pressure may be needed as explained before. During this operation, the Pilot and the Ground Crew member holding the tow line must remain alert for any seizure of the tow line to drop the tow line and activate the glider Safety Release so that the glider will not be jerked forward at less than safe launch speed.

When the tow line is extended about 300 feet or more, the signal for launch can be given. The Ground Crew member should drop the tow line, the Winch Operator will push the Tow Control Handle forward from the rear Release Position to the front limit Snub Position and inform the Driver so that he can advance the throttle to the proper take-off speed, based on the headwind. Once again, when everything is coordinated properly, the Pilot should experience no severe yank or jerk and be lifted gently into the air for a smooth climb.

CRYSTAL accessoaries

ORDER FORM

REQUIRED ORDER INFORMATION

Name _____

Address _____

_____ Zip _____

Qty.	Description

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 _____

Merchandise total _____

Tennessee residents,
add 6.25% sales tax _____

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

(extra packaging charge, $1.50 on Supergrip and Helmets)

TOTAL _____

Amount Enclosed _____

COD _____

(COD orders will involve COD charges)

MAKE SURE FUNDS WILL NOT FALL OUT!

CRYSTAL
Box 144
Lookout Mtn., TN 37350

LOOKOUT MTN LEAGUE

It started with the Southern California League. Actually, it began with the BHGA League contests in England. Now, it works in the Southeast.

An organization of Chattanooga pilots, in cooperation with Matt Tabor and his Lookout Mountain Flight Park, has initiated League Competition in Tennessee-Georgia.

The second contest was July 19 and 20. Pilots from North Carolina, Maryland, and Michigan joined "locals" from Tennessee, Georgia, and Alabama in what Les King (Sport Flight of Maryland) described as ". . . a tough contest; no one gave away anything!"

Using the same system employed here at the 1980 Regionals, pilots acted as judges to assist two paid officials, Chuck Toth and Buzz Chalmers. This method, originated in Canada, works very well to reduce costs and get the job done fairly and efficiently.

Both days of the first League competitions were held at Lookout. Saturday of the more recent meet was held there, as well, but downwind conditions on Sunday brought the field of fourteen pilots to Crystal Flight Resort.

Why fly League competitions? Tabor has several persuasive arguments, including: one, it's good fun; two, it sharpens your skills, whether for other contests or recreational flying; and three, a place has been secured for the most successful pilot to compete in the coveted Masters at Grandfather Mountain. So, if you have been dismayed over not being invited to such meets, here is a way in for a good pilot. Current front runners are Bruce Short and Ray Schaal.

Costs are reasonable (contact Lookout Mountain Flight Park; address in Directory), and some teams have been formed, one from Lookout, one from Crystal, to help defray expenses to pilots. More participation is invited throughout the East.

WAM DIRECTORY

We still wish to invite all dealerships who realize the value of advertising to send in their names and information, for the Directory to place in front of our thousands of readers. Many of these pilots have told us that they didn't know such and so dealership sold a brand in which they were interested. Others found a place to take lessons much closer to home than they thought possible. All in all, the **WAM** Directory is a top reference source, and none others like it exist.

The reader will also have a source list for where the **Whole Air Magazine** can be bought, as all our dealers become retailers of the new 1980 magazine. We encourage all readers to patronize these shops. They are serious places of business, interested in serving the needs of the pilot.

EASTERN

ECO-FLIGHT HANG GLIDERS
626 Michigan Ave.
Benzonia, MI 49616
616/882-5070

Visit our shop in the Frankfort area, Hang Gliding Capital of Michigan. USHGA Certified instruction. Wills Wing, Seagull, Bennett, Moyes, UFM, with other brands available.

BLUE RIDGE MOUNTAINEERING CO.
211 Draper Road
Blacksburg, VA 24060
703/552-9012

Located in the mountains of beautiful southwest Virginia. Dealers for Wills Wing, Sunbird, Bennett, and others. Distributors for Gischard Altimeters. Professional certified instructors.

AERIAL TECHNIQUES
Route 209
Ellenville, NY 12428
914/647-3344

Distributors for: Seagull, Moyes and Highster. Dealers for most other major manufacturers. USHGA instruction from beginner through advanced. Complete inventory of gliders, instruments, accessories and replacement parts.

SOUTHEAST MICHIGAN
HANG GLIDERS
24851 Murray Drive
Mt. Clemens, MI 48045
313/791-0614

Factory trained dealer for the revolutionary Eagle. Most other major brands also available. Gliders in stock and trades are accepted.

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

Authorized Dealer for Wills, Seagull, Sky Sports, Flight Designs, and Moyes. Parts and Repairs. Sub-Dealerships available. Complete Flight training — Basic to Mountains. Ratings. Large Accessory Stock. Bankcards OK.

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

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

SPORT FLIGHT
9041 B. Comprint Ct.
Gaithersburg, MD 20760
301/840-9284

We are the pros in the mid-Atlantic area. Representing Eipper, Delta Wing, Seagull, and Sky Sports. Beginner, intermediate, and advanced instruction. Good things in stock.

CRYSTAL AIR SPORT MOTEL
4328 Cummings Hwy.
Chattanooga, TN 37409
615/821-2546

Quiet and comfortable lodging. Water beds, pool, weather reports. Shari's "Sky Gear" Gifts T-Shirts, Jewelry and Famous Munchies — Eipper dealership at the 'Center of Lift.' Visa and Mastercharge.

SCOTT'S MARINE, INC.
908 Lexington Ave.
Charlotte, NC 28203
704/376-7348

Beginning to advanced tow and winch lessons. Learn to fly by towing. Motorized lessons. Parts, Repairs, Service. Dealing Manta, Moyes, Wills, Seagull, Soarmaster, Pterodactyl, UFM and Odyssey. Catalog — $2.00

SUNFLIGHT HANG GLIDERS OF
CENTRAL FLORIDA
11049 Blackwell Way
Orlando, FL 32809
305/859-5292

Sales, service, instruction, and promotions. We offer complete tow instruction, with USGHA ratings, and carry most major brands of gliders and accessories.

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

For the Detroit Metropolitan area, visit our shop in Milan. Dealer for major glider manufacturers, parts and accessories. Certified instructors. Tow systems and motorized equipment.

JOHN LUBON
LaVista Apts. # 348
Hillandale Rd.
Greenville, SC 29609
803/242-1969

Representing Mosquito, Condor, and Firefly 2B as well as Cloud, Price and Raymond harnesses. Plus all other UP parts and accessories. Contact John evenings.

SWEET SKY
752 Norwood Road
Downington, PA 19335
215/269-5109

Personalized, careful instruction using radios on several different mellow grassy slopes. All major glider brands represented. Parts in stock. Repairs, 'chutes, harnesses, wheels, and more available.

MIDWEST SCHOOL OF HANG GLIDING
11522 Red Arrow Hwy.
Bridgman, MI 49106
616/426-3100

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

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

Distributors for Moyes gliders, tow systems, and builder of the Emerson winch. Instructions, service and accessories available. DEALERS: write for information on our quality winch.

AERO FLOAT
260 N. 30th St.
Battle Creek, MI 49015

CGS AVIATION
4252 Pearl Rd.
Cleveland, OH 44109

ODYSSEY, INC.
P.O. Box 60
Wilton, NH 03086

SOUTHERN AIR TIME
P.O. Box 93701 Martech Station
Atlanta, GA 30318

LOOKOUT MOUNTAIN FLIGHT PARK
Rt. 2 Box 215
Rising Fawn, GA 30738

CENTRAL

TRUE FLIGHT
3043 Given Ave.
Memphis, TN 38112
901/324-9121

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

ILLINOIS GLIDERS
305 S. McCoy St.
Granville, IL 61326
815/339-2282

We offer professional instruction on top quality equipment. Beginning, intermediate, advanced and motorized lessons. Complete line of gliders, parts and, accessories.

FOUR WINDS OUTDOOR SPORTS
2708 Mt. Vernon Road S.E.
Cedar Rapids, IA 52403
319/363-0189

All major brands of flex and rigid wing gliders, new and used. Power units, landing gear, accessories, in stock. Certified instruction. "Come see us. It'll be love at first flight!"

J. FORBURGER HANG GLIDERS
600 East Avenue G
Heavener, OK 74937
918/653-2112

Proudly featuring Wills Wing gliders and accessories — what more need be said? Contact Jerry Forburger.

NORTHERN SUN HANG GLIDERS
628 W. Larpenteur Ave.
St. Paul, MN 55113

LONESTAR HANG GLIDERS
2200 "C" S. Smithbarry Rd.
Arlington, TX 76013

ARMADILLO AVIATION
703 N. Henderson
Ft. Worth, TX 76107

ULTRALIGHT POWER GLIDERS, INC.
2010 Sarah Street
Houston, TX 77054

MOUNTAIN

MOUNTAIN AIR HANG GLIDERS
9786 Kristin Drive
Sandy, UT 84070
801/572-0678

Featuring Sunbird, Lancer, Highster, Stratus, and Atlas. USHGA Certified instructors — beginner through advanced. Complete accessory line. Only 15 minutes from Point of the Mountain.

LEADING EDGE AIR FOILS
331 S. 14th St.
Colorado Springs, CO 80904

FREE AIR SPORTS
40 S. Wells
Reno, NV 89512

GOLDEN SKY SAILS
572 Orchard St.
Golden, CO 80401
303/278-9566

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

WASATCH WINGS, INC.
700 E. 12300 South
Draper, UT 84020
801/571-4044

Utah's largest hang gliding center. Located minutes from the Point of the Mountain. "Everything for the hang glider pilot." Lessons, Repairs, Accessories, and Glider Sales.

INFINITY FLIGHT SYSTEMS
898 South 900 E
Salt Lake City, UT 84102
801/359-7913

With five years and thousands of lessons experience, we can safely teach you on one of the nation's best hills. Soaring, thermalling and tandem instruction, too.

GET HIGH HANG GLIDING SCHOOL
Box 7115
Aspen, CO 81611
303/963-1504

We have been in business for seven years, and have taught over 6000 students. USHGA certified instructors, wheel equipped Seahawks along with radio communication

SKY HIGH, INC.
2340 Britt NE
Albuquerque, NM 87112

PACIFIC

HANG GLIDER REFERRAL SERVICE
619 Cerrites Ave.
Long Beach, CA 90802
213/436-4891

Our used glider multiple listing service assists pilots nationwide in finding the glider they want and/or someone to buy their old wing.

SUPERFLY HANG GLIDERS
853 NE 8th
Grants Pass, OR 97526
503/479-0826

Specializing in Ultralight Products with most most major brands available. Over 4 years of Certified Instruction. Expert repair and service as well as your favorite accessories.

BEAVER HOLLOW
INTERNATIONAL AIRPORT
4524 SE Naef Road
Milwaukie, OR 97222
503/653-5103 or 761-3200

Factory dealer for Manta Fledge II, Electra Flyer, Sunbird, Moyes, Stratus V; All accessories. Qualified service, repair, and assistance. USHGA Certified Instruction.

BONNEVILLE AVIATION
Route 1
Inkom, ID 83245
208/775-3400

Specializing in Pterodactyls and Fledglings. Powered accessories and parts. Large hardware inventory. Re-rigging and repairs. Eight years experience. Contact Tom Simko.

PACIFIC GULL HANG GLIDER SUPPLY
28700 S.W. Laddhill Rd.
Sherwood, OR 97140
503/625-7650

Dealing Wills Wing, Alpine, Ball. All necessary parts and service. Flight School, USHGA certified instruction and ratings. Used gliders. Contact Jim Boscale.

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

We sell and service all major brands, parts, accessories. USHGA certified instructors, observers. Free lessons with purchase of a wing. After the sale, its the SERVICE that counts. Hrs: 10:00 - 5:30.

ULTRASPORT, INC.
P.O. Box 3700
Simi Valley, CA 93063
805/581-3395

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

FLIGHT DESIGNS
PO Box 1503
Salinas, CA 93902

MAUI SOARING SUPPLIES
RR 2 Box 780
Kula Maui, HI 96790

HIGHSTER AIRCRAFT
1508 Sixth Street
Burkeley, CA 94710

SEAGULL AIRCRAFT
1160 Mark Ave.
Carpinteria, CA 93013

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

FLIGHT REALITIES
1945 Adams Ave.
San Diego, CA 92116

WILLS WING, INC.
1208-H E. Walnut St.
Santa Ana, CA 92701

BENNETT DELTA WING
13620 Saticoy
Van Nuys, CA 91408

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

CHANNEL ISLANDS
HANG GLIDING EMPORIUM
613 N. Milpas St.
Santa Barbara, CA 93103

CANADA

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

Classified Advertising

WAM Classifieds offer the lowest cost per word in the industry. And they do bring results. In the very first two issues of **WAM Classifieds,** ten gliders were sold! Since about 19 were listed, this represents over 50 percent sales in just two issues!

Just for an example, a longer reading ad costs about $7-9. If you wish to keep it short $4-6 may sell your glider or equipment. Also, here's a way you can find something you need that another pilot wants to sell. Give **WAM Classifieds** a try.

- ✓ 20¢ per word.
- ✓ First order pre-paid. If multiple runs desired, indicate number of times; you will be billed for all insertions after the first.
- ✓ P.O. Boxes, phone numbers, prices, make and model, and each line of a mailing address considered one word.
- ✓ Zip codes free, minimum order $3.00.
- ✓ Deadline is last day of month preceeding cover date (Example: May/June **WAM** equals April 30th).
- ✓ Send to: **WAM Classifieds**
  Box 144
  Lookout Mountain, TN 37350

Seagull 10M. 1979 hardware/1978 sail. Excellent condition. Great handling. Must sell. White sail, blue edges and "10"s. $900. (213)347-7664

1979 Wills Wing Omni 187. Superb handling. Great performance. Split panels. New condition, $1025. Call Denny at 404/820-9738.

'80 179 Raven - Multi-colored sail. (615)526-9551 Ext. 423 - $1,300.

1980 Ultralight Products Firefly 2B -- 175 sq. ft. for pilot 125-170 lbs. Beginner/Intermediate Floater. Beautiful glider in a blue, purple sail. Quick set-up, impeccable hardware. Never flown except test-flight. $1075. with bag. 615/825-1995, ask for Dan.

Electra Flyer Floater 205 -- Completely re-tuned by owner for better-than-factory performance. Excellent choice for pilot 150-195 pounds. All white sail with purple tip shading. Quick set up, no deflexors. Bargain at $975. 29 hrs. airtime. Call 615/825-1995 -- Crystal.

Wills Wing Alpha 155 w/wheels - pilot weight to 150 lbs.
Wills Wing Omni 194 - Advanced pilot weight to 200 lbs.
Both excellent condition, each $950. Box 131, Lookout Mtn., TN 37350 (404)398-3147 Michael Smith

Used hang glider multiple listing service. In search of a used glider or with one to sell, contact HANG GLIDER REFERRAL SERVICE (213)436-4891. 619 Corritos Ave., Long Beach, CA 90802

1978 Crosstubed Stratus 5 - 164 SQ FT. Clean sail. Black leading edges with rainbows. $500. Call Denny Haldeman (404)820-9738

The ultimate fun flying machine - WEED-HOPPER. Kit or ready to fly. Send $5 for information package to: Ultralight Flying Objects, 195 North Main St., Jasper, GA 30143. (404)692-5611 Ext. 218

MITCHELL SUPER U-2 - Complete kit costs $2,795 plus freight. Will sell for best offer over $2,400. Save money and order time. Call George (904)357-9243

1977 Colver Audio-Visual Variometer. Good condition. Never been pegged down. $95. Call Denny at 404/820-9738.

BEGINNER MOYES
1980 Moyes Stingray -- Brand new Moyes for beginner/intermediate pilots. Replaces the Midi in excellent floater performance with light handling. For pilots 125-200. Colorful sail. Never flown except testing and dealer demo. List $1275. plus freight. Special at $1095., complete. 615/825-1995 -- Crystal.

Cloudbase Spaghetti harness. Total comfort for flight or sleep. For pilot 6 ft. + or - 2" and 160 lbs. + or - 10 lbs. $95. Call Denny at 404/820-9738

WANTED!!!
Used Gemini Power Systems. Must be willing to ship at your expense for pre-purchase inspection. Returned at your expense if abused or heavily worn. Shipping cost returned if in good, usable shape. Here's a top chance to get out of that system you decided not to use. Call Crystal at 615/825-1995.

WANTED -- USED
Got an SST sail (100U or 100B or 90) in good shape. No frame parts wanted. Will pay for sail, regardless of colors if usable. Contact Tom at 615/825-1995 days from 9 till 2 (EDT).

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

POSITIONS AVAILABLE NOW
Sales Person (Clothing, jewelry); Office Clerk; Lifeguard (seasonal); Chamber Maid; Gardener/Groundskeeper. All at Crystal Air Sport Motel.

DEMO MAXI - Quick set up. Gold sail, black tips and keel pocket. Low air time. List for $1,595 plus freight. $1,300. Call Mark at (615)825-1995

Wills Wing SST 100B - Very good condition, very colorful sail has painted tips. Flown at Warren Dunes, MI. Call Scott Woycheese at (312)479-9102 after 2 p.m. $650. Split panels from center out blue, green, yellow, orange, red, purple and painted tips of clouds.

SUB-DEALERSHIPS
Crystal Air Sports is now accepting inquiries for sub-dealerships in the states of Tennessee, Alabama, Georgia, and Kentucky. Call 615/825-1995, and ask for Dan Johnson, if you are serious about selling Wills Wing, Seagull, Sky Sports, and accessories from many companies including Crystal and Flight Designs. We will be offering group advertising as part of the sub-dealership program. Standard factory discounts and in-stock merchandise available. Genuine inquiries only, please.

PRODUCT LINES

Chattanooga, TN — Most parts of the country are trying to survive sweltering heat. Heat makes thermals alright, but also makes it pretty uncomfortable to move much at all. Cool while you soar, sweat while you breakdown, I guess. A few new gliders have been released or announced since our last issue. New entries are available from **Seagull** and **Ultralight,** as well as the **Minibat** from GLA. Also, some folks trying out a "new" form of flight park, the airport. Let's start there. General aviation is a phrase describing most light plane activity in the aviation establishment. And right now, that arena of flight is going thru some changing pains. The big culprits are fuel (cost and availability) and inflation, driving the cost of plane ownership sky high. So what's that got to do with us? Well, it means some of the 13,000 plus airports around the country are experiencing slowdowns, or outright closings. In two cases, those aerodromes have been taken over by ultralight activity. Last issue in this column, we reported **Chuck Slusarczyk** had his eye on an airport in Ohio. Since then, the lease has been signed and the ultralights are movin' in. CGS Aviation and Aircraft plan powered and non-powered training, flying, and services. As the arrangements are worked out we'll let you know. Another such enterprise is operated by **John Farnan,** formerly with Sky Sports, and **Paul Yarnall** of **YTI, Inc.** These two innovators in the ultralight industry have managed the purchase of Canadaigua airport, and are calling their new business Finger Lakes Airsports. They too, will be offering ground-up training, a place for microlights to fly, plus expanded manufacturing and R&D in the hangar facilities located there. As an airplane pilot for fourteen years, I find this development fascinating. Both places, as well as all other airports, will be great places to use a **Minibat,** the new sailplane kit available now from GLA, Inc. See the write-up on pages 36 and 37 of this issue for more info. The fine folks at Aerial are participating in the Minibat program. In addition **Aerial Techniques** hosts a fun fly-in on August 16 and 17 with cash prizes for spot landing and duration events. They are also having an Ultralight powered fly-in the same weekend at the Ellenville airport. Other new ships recently presented are **Seagull's Sierra** and **UP's Comet.** The Sierra is pretty well explained in this issue, starting on page 28. Ultralight Products' Comet will get similar treatment in our November/December **WAM.** The Comet is still 30-60 days away from delivery, but all design prototyping and testing are completed. The new streaker is an entry to the Atlas/Mega/Sierra/Sensor group and looks ready to give a mighty chase. Details have not fully made their way to **WAM** yet, but one characteristic includes an enclosed crossbar, hidden in the double surface portion of the sail. The tight sail machine is said to deliver great top end, and according to chief factory pilot Gene Blythe, handling is very, very good. Sounds pretty exciting . . . better line up now as UP offers this glider for only $1795 (first 100 units only). **Odyssey, Inc.** is looking at prospects for becoming the exclusive distributor for **Steve Pawter's Bandit.** I met this Australian designer, owner of the Sky Trek company, while visiting Seagull in Santa Barbara. His ship flew very well, with clean sail, and simple set up for a reasonable price. The name Bandit comes from the way it "holds you up" he says. **Wills Wing,** finally catching up somewhat on endless Raven orders, has rented more space and is expanding the production line for their accessories. They've also been pleased with some recent contest victories on Ravens as George Whitehill won the Southern Cal Regionals on one and company prez' Rob Kells took fourth in the X-C Meet. **Cypress Gardens** is approaching and some Ravens will compete there in a contest traditionally won by Maxi's. **Crystal Air Sports** will sponsor a Raven flown by Bob Ekstrand of Chattanooga. Speaking of Maxi's, we hear the **Moyes** boys will be in attendance at Cypress with large Megas a-plenty. That should be interesting. **Bennett's Delta Wing** has announced a sweeping new program of fractory trade-ins, direct and through dealers. See their ad on page 45 to consider an attractive way to turn your old whatever into a new Lazor II or Phoenix 6D. Also news at Delta Wing is the addition of **Keith Nichols,** formerly with Electra Flyer for three years. Keith is a veteran of the industry and Bennett is fortunate to have gained his services. **Sky Sports** has the production line humming on their **Humbug** ultralight. Company prez' Ed Vickery is transporting one to Chattanooga in July for a write-up that will appear in September/October **WAM.** Watch for it! Last word is on Chattanooga sites. The **Tennessee Tree Toppers** have announced acquisition of their fourth soaring site in and around the Scenic City. The new location is on Lookout Mountain near where Air Space (now Lookout Mountain Flight Park) operates the former TTT launch. Permits will only be available to TTT-4 rated pilots and a small extra fee makes it necessary to see a clearance official before flying. Please don't neglect this! **LAST MINUTE FLASH** — Pete Brock called to report a repeat sweep of the prestigious **XC Classic.** UP's new **Comet** captured 1st, 2nd and 4th of the top five. Rich Pfieffer again won with Grigsby, Burnette (Sensor), Tudor, and Barber-Starkey (Mega) following. Got news or opinions? Send 'em to Product Lines, Box 144, Lookout Mountain, TN 37350.