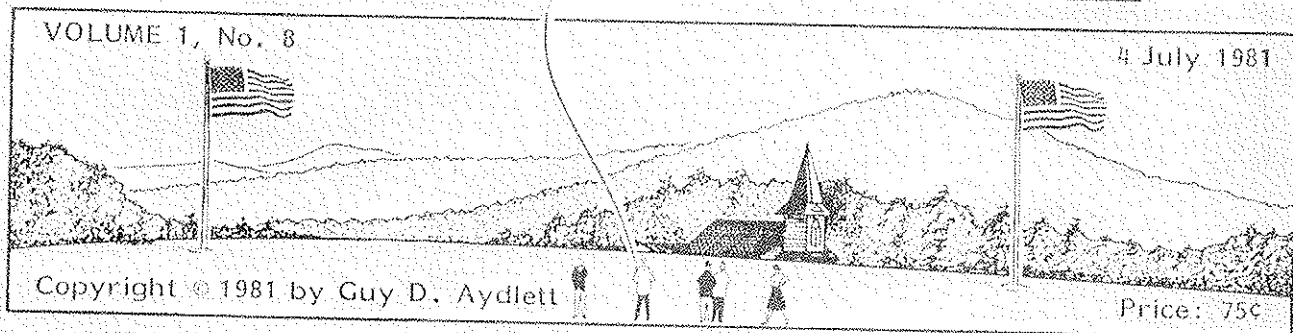


PINEY MOUNTAIN AIR FORCE

DATA © LETTER



HEJ; ANNICA OCH CAROLINA! FÖRLAGGARE SÄNDER SINA HÅLSNINGAR!

Dear Kiteflier:

ANNICA and CAROLINA have flown all the way from Sweden just to dance, to swim, and to fly kites with the Trolls of Piney Mountain.

Please do not feel defensive or aggressive if you cannot translate the poor attempt, above, to phrase a polite greeting in the melodious language of Sweden: "Bar-tender, please mix for me a non-alcoholic drink. . . ."

La Petite MARIE FRANCOIS and MISTER "BLUCE" have already arrived from Goa, India by way of Europe and London. Also, we have had flier-guests from: Bali, Iran, Israel, and even from exotic Baltimore. . . (OLE BILL GRIMM drives over from next door; later, he returns home by a hazardous path that bristles with poison ivy and reefs of signs that warn: "OUR TROLLS DEVOUR ALL TRESPASSERS.")

CHARLES A. SOTICH, of distant Chicago, mildly chides us for employing the entire flattened planform of HORNBEAM MARK I when we calculated and published its aspect ratio in DATA-LETTER Vol. 1, No. 2, January 1981.

Charles writes: ". . . Aspect ratio is defined as $\text{Span}^2 : \text{Area}$. The span should be the effective span for the object (kite) in flight. In the case of

flexible kites such as the Hornbeam Sted-Kite, when the kite is flying, the span is more nearly 2 rather than 5; and the projected flying area would be slightly less than $0.5 H^2$ rather than $0.85 H^2$. The aspect ratio based on the flying layout would be $AR = S^2/A$. . . or about 0.55 rather than 1.88."

[True, true; the key phrase is: "effective span," and we consider the HORNBEAM extended planform to be nearly totally effective. We have lofted a "Hairy Hornbeam" whose escutcheon of white was sullied by many, many evil-looking black threads as indicator streamers; we have studied their flux patterns in flight and have observed that the lateral divergences of the airflow close to the canopy skin indicated that almost the entire area was behaving as an efficient, curved airfoil, and not at all like a rigid boxkite. Because it is mighty difficult to estimate closely the projected area of a flexible kite in flight, we think the near cop-out of using extended spans and their related areas is a justifiable means of comparing flexible kites with each other.]

Charles says further: "Increasing the aspect ratio is used by airplane designers to reduce induced drag (the drag that comes because lift is developed). The coefficient of induced drag = $C_{di} = C_L^2 / \pi AR$ where C_L is the lift coefficient and

$n = 3.14159\dots$ It can be seen that for a given lift coefficient, C_L , that increasing AR decreases C_{di} .

"It should be noted that when we get to small aspect ratios, perhaps 3, the maximum lift coefficient of a wing or lifting surface can develop increases. This means you can get more lift per unit area, but also more drag since C_{di} will also go up. The shape of the tip affects the C_{di} and adds to the confusion.

[Hear, hear!]

"If you can, get hold of the book 'Shape

and Flow' by Ascher H. Shapiro. It is a paperback published by Doubleday Anchor in 1961 as part of a science series. It gives some of the best explanations of Reynolds Numbers and fluid flow, drag and related items in well illustrated, non mathematical terms. Back in 1961 this book only cost 95 cents. Dr. Shapiro was (is) a professor of engineering at M.I.T.

"Keep up the good work with your Data Letter. It's making me do some more technical thinking about kites. Yours truly, Charlie Sotich."

Letters like yours make all of us do more technical thinking; keep them coming, Charlie!

*

Our gratitude goes to ROBERT T. ESKRIDGE for sending S.O. Jenko's 2ND GENERATION ULTRALIGHT SAILPLANES. More will be said about the paper when its content has been properly assimilated. Robert reports: ". . . My double curved sled is an extreme disappointment—she simply will not settle down to predictable flight. Back to the drawing board, when time allows! . . . I should add—I enjoy your data letter. —Bob Eskridge"

BOB ESKRIDGE is a Miami architect who'll keep going back to the drawing board until he gets that compound sled just right. The Hornbeast Trolls look forward to the fly-off. . . .

*

STEPHEN B. BLODGETT of Fairhaven Massachusetts sends us this: ". . . A suggestion for the future: Why not follow through on the table in the March issue (relating kite weight in ounces per square foot to the minimum wind speed required for flying)? A table giving the weight in ounces per square foot for various covering materials and in ounces per foot of length for various spar materials would allow a person to quickly add up the total weights involved in an actual or planned kite. Next, a simple calculation to get the working area, plus the division step, and then one could determine where the kite stood relative to others and the necessary wind to loft it.

"I've taken the liberty to enclose some basic work I've gotten together in case you can use it." [We can use it, Steve. Below, is the BLODGETT TABLE for birch and fiberglass spars. We'll try to publish more Blodgett materials specifications in later issues.]

BLODGETT'S TABLE

MATERIAL	DIAMETER (inch)	CROSS SECTION (inch) ²	PER RUNNING FOOT OF LENGTH:			
			(inch) ³	(gram)	(ounce)	(pound)
Birchwood dowel; base: 11.5 g/in ³	1/8	0.0123	0.1476	1.6974	0.0599	0.0037
	3/16	0.0276	0.3312	3.8088	0.1343	0.0084
	1/4	0.0491	0.5892	6.7758	0.2390	0.0149
	5/16	0.0767	0.9204	10.5846	0.3734	0.0233
	3/8	0.1104	1.3248	15.2352	0.5374	0.0336
	7/16	0.1503	1.8036	20.7414	0.7316	0.0457
	1/2	0.1964	2.3568	27.1032	0.9560	0.0598
Fiberglass; base: 30.8 g/in ³	9/16	0.2485	2.9820	34.2930	1.2096	0.0756
	5/8	0.3068	3.6816	42.3384	1.4934	0.0933
	1/8	0.0123	0.1476	4.5461	0.1604	0.0100
	3/16	0.0276	0.3312	10.2010	0.3598	0.0225
	1/4	0.0491	0.5892	18.1474	0.6401	0.0400
	5/16	0.0767	0.9204	28.3483	0.9999	0.0625

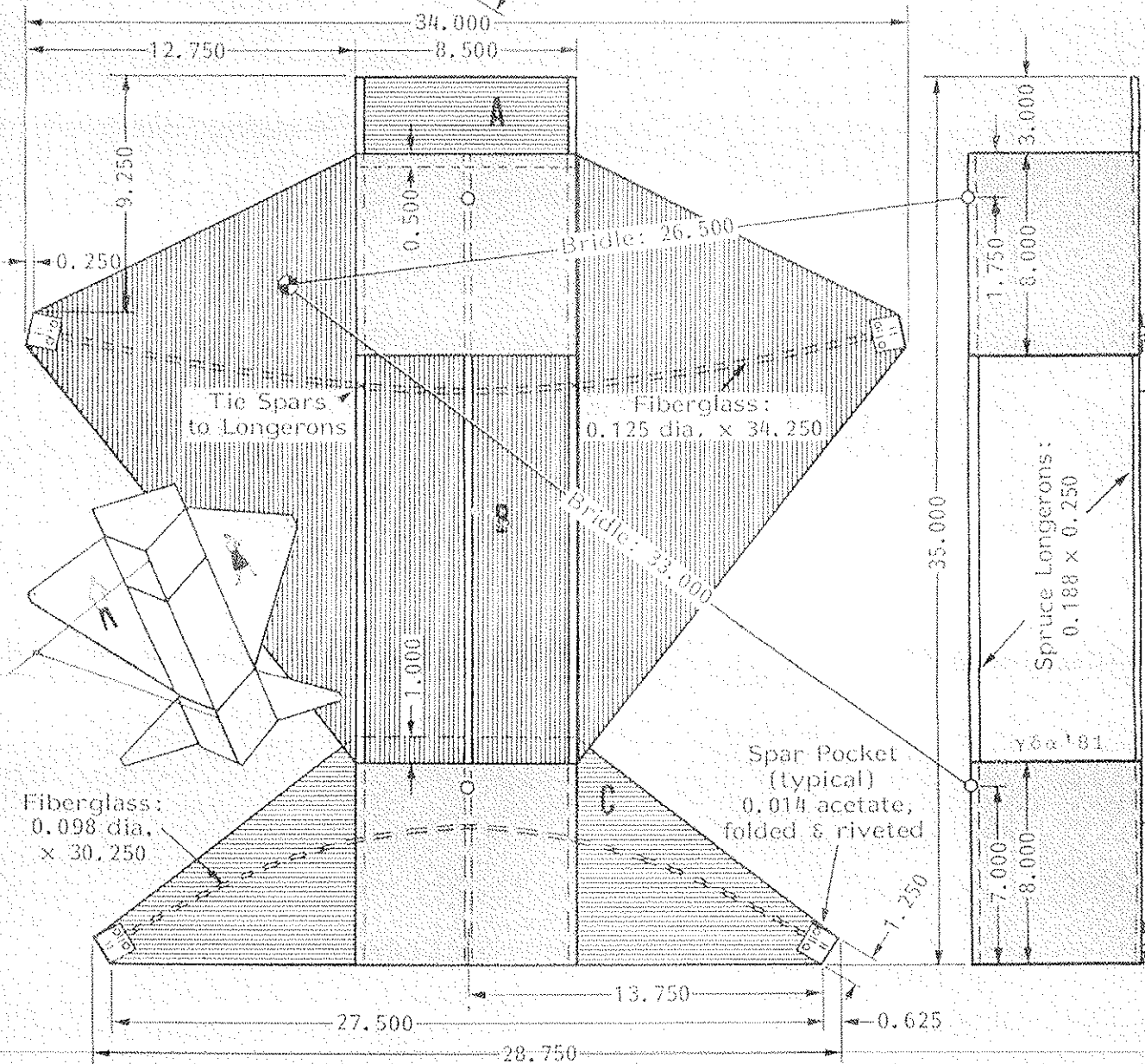
WALTER LEUZINGER'S SUN BIRD

SUN BIRD thrives in a steady, brisk breeze of about 10 m.p.h.; it's strong—will fly well in winds up to 20 m.p.h. In fickle air, SUN BIRD has the same sinking characteristic that bothers traditional boxkites; but the bird flies at a higher angle in steady winds than any boxkite we have flown, and it soars well on thermal currents. —From ULTRA KITE, 904 Century Building, Pittsburgh, Pennsylvania 15222. Price: \$11.95 plus \$1.00 postage.

SUN BIRD
Designed by Walter M. Leuzinger
(Drawing By Cama del Talfa)

ALL DIMENSIONS ARE IN INCHES

Cover all shaded areas with
5-mil Tyvek® Type 10.
Areas A & C overlap Area B on backside.
Do not glue the overlaps,



Weight = 3.5 ounces; Projected Area (not incl. Keels) = 5.0 ft.²; Area Load = 0.7 oz./ft.²
Aspect Ratio = 1.61

REYNOLDS' NUMBER

by Gama del Talfa

(Continued from the June 1981 DATA-LETTER)

THE STABILITY of the small kite would suffer if its five-times-greater companion's design were dominantly gravity-dependent. Logically it would weigh 1/125 as much, but its area would be 1/25 that of its larger fellow; it would have an *area dominance*. Moreover, since sizes of airflow turbulences would be common to both kites, the little fellow would be unable to bridge the disturbances as well as Big Brother:

The conclusions to be entertained are these: If the scaled-down kite does not perform as well as desired, it may have to be weighted judiciously; it may have to have different pocketing or airfoil shape (probably deeper); its planform may have to be changed. In short, an entirely new design may have to be undertaken. As an example, consider this:

THE BENSON CYROGLIDER, a man-carrying "kite," caught our attention in 1975 and an effort was made to scale its rotor down to one-fourth size for a reasonably managed model. Despite the great care that went into fabricating the two-blade rotor (mahogany and white pine—furniture finish—and exquisite ball-bearings for the vertical axis), the model would hardly rotate at all in a five to ten m.p.h. wind; lift was feeble. Obviously, a design change was called for. The next model was scaled up in span to seven feet, or about one-third that of the original Gyroglider; but the blade chord, 3-1/4", was about one-half that of the prototype, and the airfoil thickness of 1/2" was about two-thirds. It hardly seemed worthwhile to try the new model in a fitful, zero to three m.p.h. breeze that was available on the day when it was ready for trial; but scientific curiosity prevailed, and a trial was made with instant success: The rotor had to be hand-started before any kind of auto-rotation commenced; but once started, the contraption revved up, the tip velocities caused respectable swooshing noises, and high lift was evident. All who held that wand with the overhead rotor were reminded of Mary Poppins and her lift-loft umbrella.

Later, in ten m.p.h. winds, we found that the rotor would easily loft a chunk of 3/4" by 3 feet long steel rod. . . . In fact, the rotor was such an evident potential skull-buster that we went to successively smaller and smaller versions in hopes of preserving the top-knots of inquisitive but imprudent bystanders. The last model we tried had a rotor span of 36", a blade chord of 3", and an airfoil thickness of 5/8". It, too, was a splendid performer; but its attenuated head-cracking propensities were still vigorous enough to raise lumps capable of exciting dedicated attention from phrenologist-freaks or The Bertillon Boys. And you've not even witnessed pandemonium until you have seen a rotor kite at work at a kite festival; yards and yards of varied and motley strings become woven. . . .)

*

C. HADLEY WHEELER: PMAF thanks you for finding Gama del Talfa; we need all the help we can get. But can Auld Pappy av Sour-r-berri gie awa' a bonnie t-r-oll wha can write?

*

SCOTT SPENCER: Are you running short? The last we heard was that your long-tailed kite (1031' 5") was a cubit shorter than The Great Schwanz lofted by Western Upstarts.

*

HENRY ARTHUR JOHN YEOMAN: Piney Mountain Air Force thanks you for sending the splendid Admiralty-quality British Union Jack, 4' x 8'. We shall certainly hoist the colors on Guy Fawkes Day in honor of The Bournemouth Fugitive (we might even hoist a beaker). [Whenever possible, PMAF tries to honor guests or special events by flying appropriate national, state, city, or corporate flags on the guests' flagpole. Have you a Lower Slobbovian flag you'd like to swap? We'll consider anything between 4' x 6' and 5' x 9.5'.]

PINEY MOUNTAIN AIR FORCE DATA-LETTER

By First Class Mail in the U. S. A. + \$7.50 per year, or 75¢ per copy

Send check or money order (no cash) to:

Guy D. Aydiatt

Post Office Box 7584

Charlottesville, VA 22906