PINEY MOUNTAIN AIR FORCE

Box 7304 * Charlottesville * Virginia * 22906-7304

DATA☆LETTER

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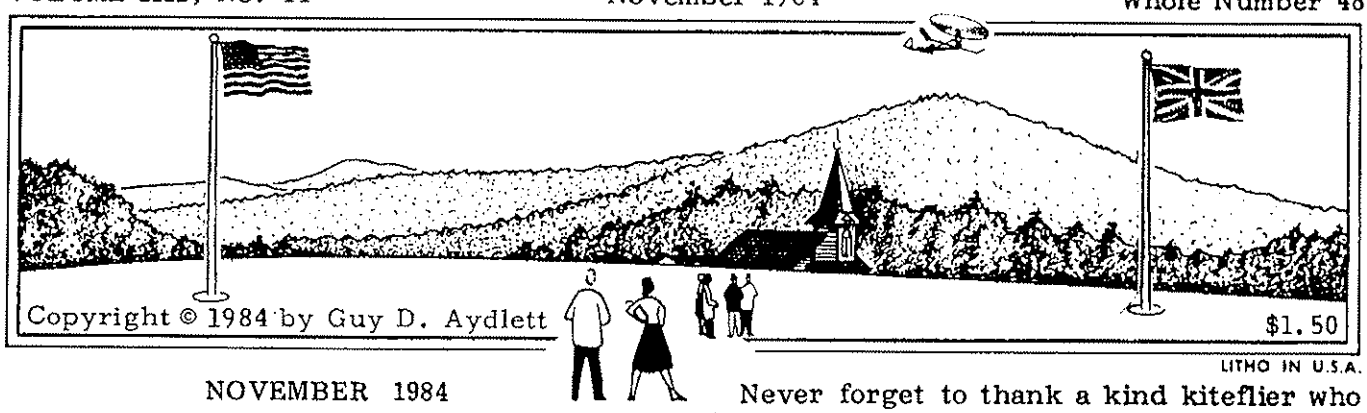

LITHO IN U.S.A.

NOVEMBER 1984

Sun	Mon	Tue	Wed	Thu	Fri	Sat
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

Birthstone: Topaz

1st —All Saints Day
2nd —All Souls Day
5th —Celebrate *Guy Fawkes Day* with Harry A. J. Yeoman: Hoist The Union Jack!
6th —Election Day
8th —Full Moon and Penumbral Eclipse
11th —Veterans Day
22nd —Thanksgiving Day

*

WISDOM GLEANED FROM COMPOSTED MAIL:

If a man has a kite smaller than yours, he's a trifling piddler; but if his is larger, he's a flagrant grandstander.

If you pick another flier's brains and make a brave showing on the flying field because of that act, be gracious and give him credit for his aid, wit, and generosity; later, when you need to lie in earnest, other fliers may believe you.

Never, even in levity, offer to bite a man's dog over a trifling grievance; he'll take you seriously—his spleen will stretch for years, and the final venting may astonish you. Offer instead to bite his wife; he'll be a friend.

Any kiteflier who owns two dictionaries will need them: he will have to explain his folly.

Never forget to thank a kind kiteflier who includes a self-addressed, stamped envelope in his letter of inquiry. He's a rare person.

If you are all alone in the field, you're the best flier on the team.

Never offer free advice: its value is cheaply esteemed by the benefactor, and he is sure to want a reward for practicing your wisdom.

*

SGT. LYCURGUS GROONE of the Dromedary Remount Station, Bumpass, VA, reports his bad-news/good-news dream: ". . .Following last Saturday's roundup, The Blessing of The Still, the possum cook-out, and the free-for-all dance and donnybrook that ensued, I fell asleep and dreamed I was reading an ad that featured a *Hornbeam Mark I* shamefully hoisting aloft two—not one, but *two—tails*. YUK.

"Not far from that nasty ad was flaunted a construction plan for another Hornbeam—*mutilated by evil, trapezoidal holes*. . . .

"The good part of the dream was a retributive finale in which Hornbeam Manglers and their iconoclastic minions were forever doomed to dwell on a bare, windless plain constantly canopied by billions of unhousebroken, parachuting bears—*bloated bears*—all superbly accurate copro-bombers. Gardyloo, below!"

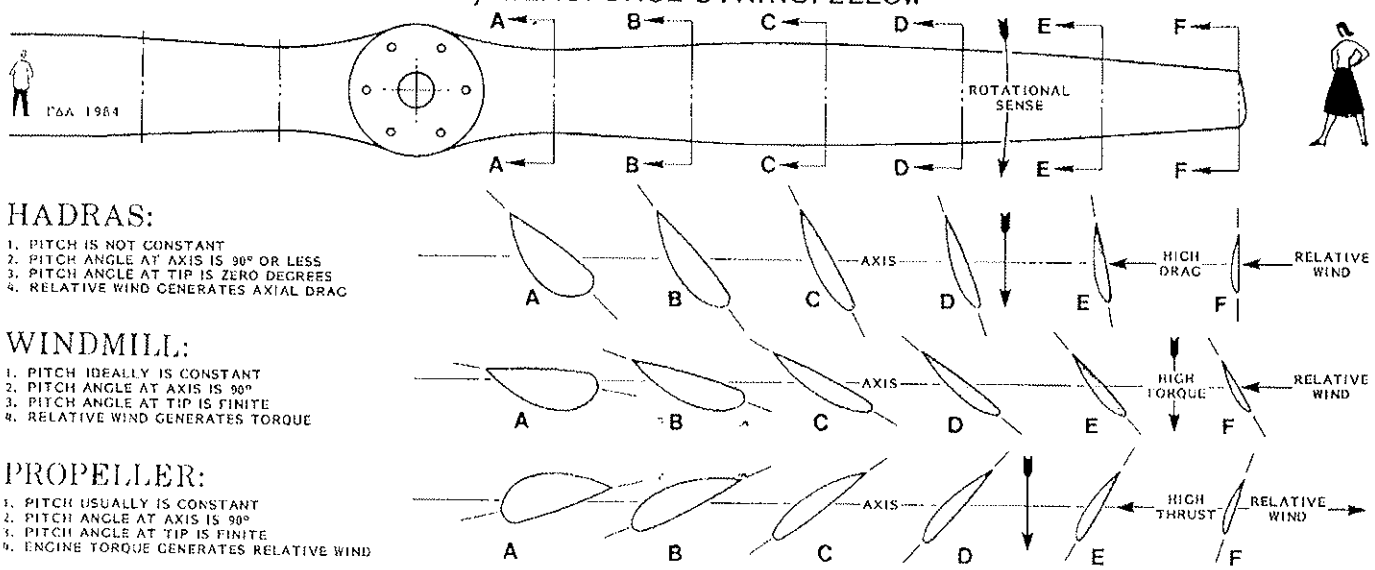
*

NAME WITHHELD of Annapolis, MD vents in enviable style: ". . .I've had enough posturing, enough bombast, enough self-aggrandizement, enough cheap shots. I wish not to receive your paper anymore. . . ."
[N.W. gets not our paper anymore: he gets a refund. Did we ever offer to bite his dog?]

HADRAS

(High Axial Drag Rotating Airfoil System)

by BEAUFORCE STRINGFELLOW



HADRAS, invented and reduced to practice in Upstate New York during the '70's, offered a system for retrieving payloads from space or, in the atmosphere, delivering food, supplies, or violent surprises in a vehicle much less visible than a parachute or glider.

In heavily wooded areas, the risk that the payload might lodge in high trees was diminished. Rotors are smaller in area than parachutes, have no shrouds or risers, and may be ingeniously fabricated to permit a rotating package—urged by its angular momentum—to *unscrew* itself from a tree-captured rotor and drop to the surface and be available to those on the ground destined to enjoy its contents.

The unscrewing release is not the only way the rotor express package may winkle a path through foliage: articulated rotors, held in deployment by centrifugal force, readily fold upward when their rotations are terminated.

The limits of space and the lack of desire to belabor multiple details and applications of HADRAS, particularly as a weapons system, permit me to discuss the invention only as a source of inspiration for experimenting with improving vertical axis rotor kite efficiencies.

The hemispherical parachute (too often miscalled *conical*) is, in its simple form, readily visualized as a nearly pure drag device that can lower a dense mass with considerably less velocity than it would experience in free-fall.

The high-drag hemispherical parachute can be converted into a passable lifting kite, but a designer might have a few nightmares while making it into a good vertical axis rotor kite.

Propellers and windmill rotors are designed with intended low-drag characteristics.

An ordinary airplane propeller is a torque converter: torque—rotational work—is converted into *thrust*. The blade elements, the chords, are arrayed as a true air-screw, or a helix (constant pitch). Similarly, the rotor of a windmill usually is of helical form, too; but the windmill is a *thrust* converter: it is designed to convert the thrust of the wind to torque, or useful work.

Although the two converters can resemble one another very closely, neither works well if it is interchanged with the other. As the wag said: "A windmill rotor's a propeller that got twisted the wrong way." (See the schematic drawings, above.)

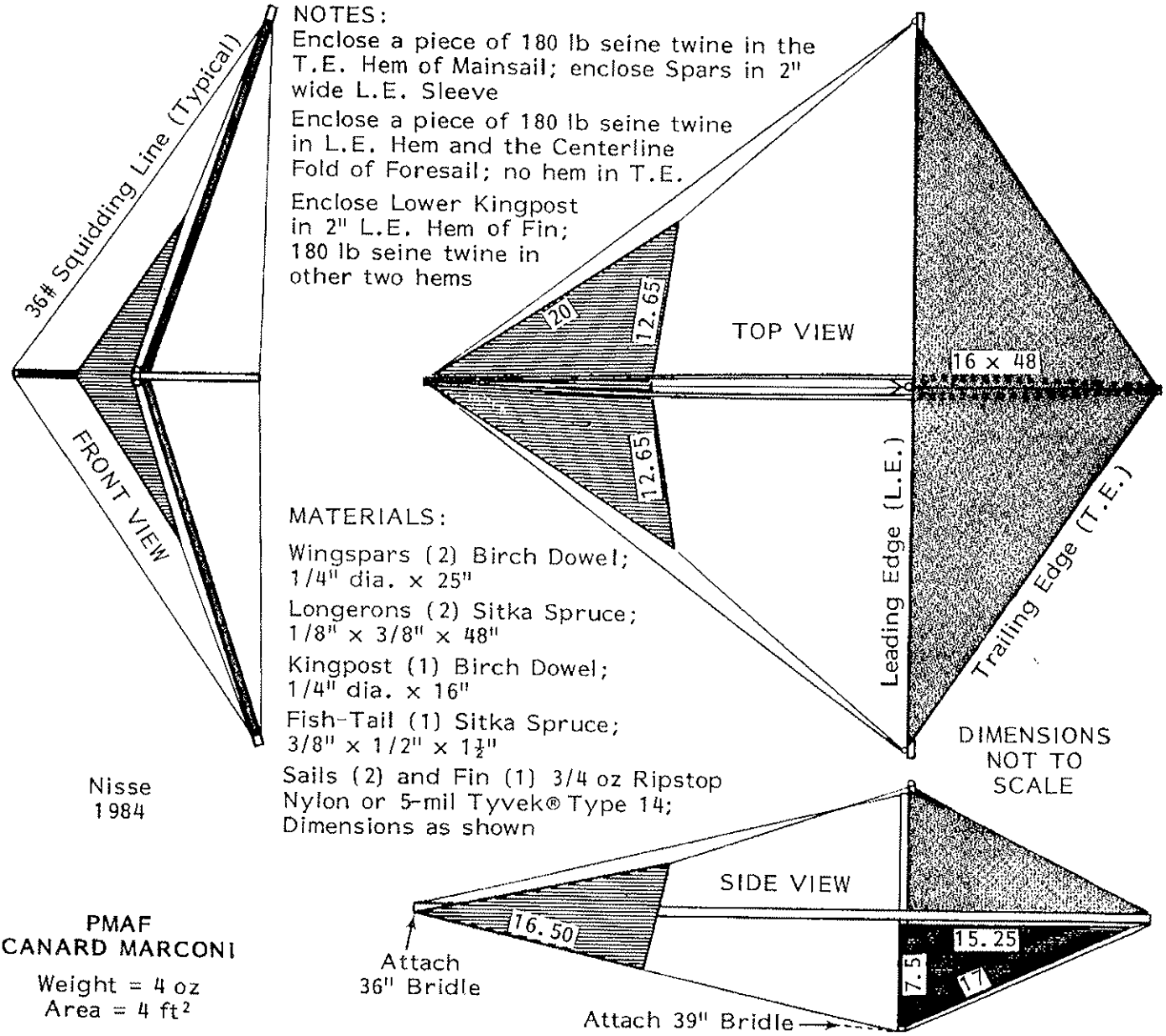
HADRAS is more nearly like the rotor of a windmill, but its mission is to convert thrust into *drag*; and its blade chord elements have to be skewed away from a pure helical envelope. In a pure helix, the central blade chord coincides exactly with the axis of rotation—for example, a propeller shaft—and at an infinitely great distance from the axis, a chord would be contained in a plane 90° to the axis.

According to load/drag demands, HADRAS skews the helix by hastening the changes of chord angles with respect to the rotor radius.

HADRAS, as a high-drag descender, simply has a low sink rate, and it consequently experiences a vertical wind (relative) of low velocity; but if a HADRAS skew modification were applied to the slightly tilted rotor of an autogiro kite, efficient flights might happen.

A CANARD MARCONI KITE

by Gar De Lou



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1984

PMAF
CANARD MARCONI

Weight = 4 oz
Area = 4 ft²

CANARD: An aircraft whose main supporting plane is aft of the horizontal stabilizer. It is believed the name was derived from *canard*, French for "duck," because of the similarity of their in-flight planforms. The original 1903 Wright airplane was a canard with two pusher propellers chain-driven by a single engine. "MARCONI" refers to a kite whose surfaces are jib-headed sails set in the manner of the sails seen on modern sailing vessels that employ "Marconi rigging," so-called because the masts were rigged with stays, shrouds, and spreaders like early wireless antenna masts.

The Piney Mountain Canard is designed in the cruciform structural configuration that is popular in strong, lightweight hang gliders and in some of the powered ultralight craft.

The wooden structure of our kite consists of a longitudinal spine, compounded of a pair of longerons and a fish-tailed spreader block; two wing spars joined at the center with a 2" length of ¼" bore vinyl tubing; and a mast, or kingpost, that is glued in a hole drilled in the fish-tailed spreader block. The wooden pieces are stiffened with 36 lb braided nylon squidding line and the hems of the surfaces.

KITEFLYING ON THE SOLAR WIND

THE SPACE SHUTTLE arrives at a 100-odd mile orbit altitude, stabilizes, and deploys, among other experiments, a slowly spinning cylindrical package that projects itself to an an altitude of 1,000 miles or more above the surface of the earth.

At that height, solar kiteflying is about to commence. Few molecules of earth gasses are to be encountered 1,000 miles away, and their collective momentum becomes small enough in magnitude to make it safe to unfurl an enormous kite or sail that has millions of square feet of area, but is negligible in thickness.

The sail unwinds in two extensions of the cylindrical chrysalis, each 180° from its fellow. No significant area is apparent as yet, for the spectacular part of the unfurling is in the next step—the step that converts the two long, thin radial extensions into a viable solar sail. Pleated like an accordion bellows—pleats parallel to the radials—the sail extends until it becomes a square perhaps more than one mile on a side. Remaining in the center of the sail is a control package that extends a telescopic mast, shrouds, steering vanes, and some sheets (lines) to effect control of the enormous "bird."

The sail is set; the argosy requires direction from The Sailing Master—the on-board computer. The eye of the computer scans the heavens, takes fixes on the Earth, Sol, Canopus; maybe on Sirius, too. From the fixes, the vehicular brain finds its position, and it makes attitude corrections, adjusts the sail, and the solar sailer eases its way into space—perhaps its destination is Mars or Jupiter.

The hypothetical journey projected above is not a figment from the fanciful imagination of the PMAF Non-editor; possibilities of such travels seriously are being considered by engineers and scientists in many countries, according to John Noble Wilford, columnist for *The New York Times*, 17 May 1983, in his article titled: "They Dream Of Racing On Sunbeams." (Your librarian can find that issue.)

ROBERT L. STAEHLE'S prominence in the *Times* story was a source of pride and pleasure for his Piney Mountain friends. Robert, son of the late Dr. Henry Staehle, Renaissance Man of the Kodak Research Labs, is an engineer in the employ of Jet Propulsion Lab, home of state-of-art space exploration.

Besides being enthusiastic about solar sailing, Robert is interested in ultralights; but he's wolf-wise: keeps his toes firmly clenched in the turf while his mind roams over parsecs.

Meanwhile, back here on earth, we cellar=scientist kitefliers may wonder a bit about the mechanics of flying on the solar wind.

There *is* a solar wind: particles of Sun radiation—sunlight—called *photons* constantly emerge from the sun at a velocity of 186,000 miles per second. Photons may have no mass—only energy and velocity—but they are capable of exerting subtle pressures in their directions of propagation. Therefore, kites with vast solar sail areas may be expected to move and accelerate ponderous masses up to the high velocities desired for useful interplanetary missions.

The solar pressure on a sail is small, but it is persistent: It cannot accelerate a substantial mass in a hurry; but given enough time, the photons can push a payload to a velocity of *thousands of miles per hour*.

It is reported that French enthusiasts are about to challenge all comers to a race from the earth to the moon and return. Who'll go?

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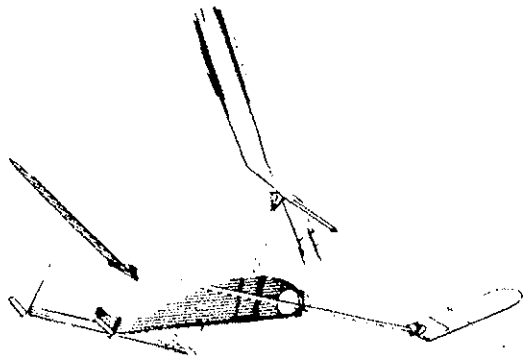

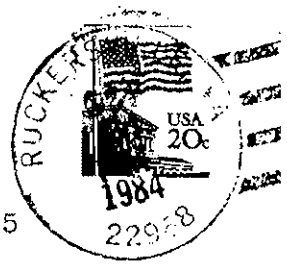

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