NUMBER 87

APRIL, 1977

AYRS

KITES and SAILS

"SYDNEY HARBOUR SKIFF AT FULL SPEED"

"BOREAS"

Note–Twist in mainsail of "Sydney Harbour Skiff" (cover plate). Which part of Mainsail is at the correct angle?

Compare with "Boreas" above.

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KITES AND SAILS

CONTENTS

EDITORIAL

by Mike Hardcastle

This publication is what Michael Ellison describes as a "members number."

He means by this that it is a "hodge podge" of letters, sketches, ideas and notions sent in by members. This material is the lifes blood of the Society, without it there would be no A.Y.R.S.

Without the ideas generated by John Morwood and the A.Y.R.S. twenty years age, it is possible that George Chapman would not have been able to write about "Speed Sailing" in the first article.

Even if he had I'm sure the speeds reached would have been less, because nothing is so sure as the fact that no conventional yacht has ever achieved this order of performance.

THE JOHN PLAYER
1976 WORLD SAILING SPEED RECORD ATTEMPTS

by Commander G. C. Chapman, R.N., October, 1976.

The fifth U.K. week of speed trials, generously sponsored by John Player and Son, was held in Portland Harbour from September 25th to October 2nd, and produced the following winners, 3 are now World Speed Sailing Record holders.

Class	*Boat*	*Owner*	*Speed*
Open	**Crossbow II**	Tim Coleman	31.8 knots
C–300 Sq. ft.	**Clifton Flasher**	Flasher Syndicate	20.4 knots
B–235 Sq. ft.	**Icarus**	James Grogono	20.7 knots
A–150 Sq. ft.	**Mayfly**	Ben Wynn	21.0 knots
10 Sq. Metre	**Auster**	Reg Bratt	14.6 knots

In addition, the "Design Prize" was awarded to EXOPLANE, designed, built and sailed by Didier Costes. – 13.2 Knots in "A" Class.

Organisation

The event is run by an R.Y.A. Committee, comprising, Beecher Moore (Chairman), Tim Colman, Michael Ellison, James Grogóno, John Marchment, David Pelly, Bryan Scott, David Way (of Players), John Reed (R.Y.A. Racing Manager) and Pattie Dixon (R.Y.A. Secretary). Clearly the A.Y.R.S. is well represented. They are nobly and ably assisted by the Castle Cove Sailing Club, who host the event, and members of the Yacht Clubs of Weymouth, who staff the course.

The basic course is now well proved. Twelve sinkers placed in a 500 metre circle on the bottom of the harbour hold twelve buoys on extending, spring loaded lines so that the buoys are held above the sinkers. Each channel is delineated by four buoys and is denoted by the number of the buoy on the left on entry. No. 12 buoy is at magnetic N. and so on like a clock face. A flagged buoy marks the centre. The dimensions of the courses are checked each year by Tellurometer.

Competitors book a run, stating which channel they wish to use: the two timing boats are positioned: the competitor released, and he has (I understand) ten minutes to get into position and start. Most boats are able to start much sooner: indeed in the 38 or so hours that the course was open this year, 510 runs were made, averaging one every 4½ minutes.

Unfortunately, the Telstar was not available, but after a couple of days the R.Y.A. 'Nanny Boat" was anchored at one end of the generally-used course (i.e. depending on wind direction), greatly assisting competitors to reach the 'booking office.' Our Chairman, Dr. Reggie Bennett, did the booking on one day, easing the load on the R.Y.A. team.

Competitors are expected to get their boats to and from the start–the R.Y.A. strictly provide only a life saving service. "To and from" includes "up and down the beach," and apart from the mutual help entrants give each other, various A.Y.R.S. members were in constant attendance, helping, in particular Margaret and Shaun Coleman-Malden, who maintained an A.Y.R.S. hut and a continuous supply of coffee. The Michaels, Ellison and Butterfield, also provided motor boats to help with towing and spectators.

Timing is done on the main Committee Boat, under the scrutiny of the day's official observer: and the calculation of speed (to the tenth of a knot) takes into account a periodic measurement of tidal stream and drift.

While it is still the Committee's intention to provide an 'inshore course,' timed by transits ashore, this year the presence of a Bosun Championship event prevented its establishment. The idea being to measure speeds in an area with about 400 yards fetch, compared with the 1,000 yards (minimum)

of the main course. This inshore course could only be used in winds between about 235° and 270°, but they would come cleanly over the Chesil Beach, and possibly enable the smaller, frailer, boats to be measured. The main hazard being the shallow depth inshore, so the limits would need clear buoying. However, this year's outstanding performance–21.0 knots by the 15ft. MAYFLY–was achieved in a 15 knot wind from 265°, on the main course: it is a matter for speculation how much faster she might go on the inshore course. Only one course can be manned at a time, and my feeling is that the inshore should be manned in winds of 10 knots and less, to begin with: but this is something the Committee must decide.

Austin Farrar was again in attendance to measure (and take orders for!) sails. He said he is 'charging' fences at 1% of their measured area. Fine, but I do wish the Committee would spell out to the Competitors **well before the event** the rules which will apply. In an International event of this sort, all the niggling details–particularly on the Sail Area Measurement, which is the only parameter defining Classes, must be accurately defined and fully publicised **before** the event. It is not good enough to make up the rules and apply them retrospectively as one goes along. Equally, the 'Ten Minute Rule' which I only heard of by chance from Michael Ellison, must be published and adhered to.

Players spend around £10,000 to sponsor this event, and we the competitors, and the A.Y.R.S., must be very grateful for this. Their principal representative, David Way, takes a very full part in the running of the event, my only worry is that he might become so keen that he'd become a competitor.

The publicising of entrants, and results, left something to be desired: so, if there are inaccuracies in the following, I apologise.

THE BOATS – BY CLASSES

TEN SQUARE METRE CLASS

Auster (14.6 knots). Designed, built and on the winning run sailed by Reg Bratt, who lives nearer the course than anyone else, so has no excuse for not knowing the local conditions. A 20ft. catamaran, torpedo-shaped hulls with vertically pinched bows, intended to go **through** waves rather than over. The hulls connected by a bridge deck, trampoline, and after beam, the whole supporting one of Reg's distinctive sails, with wing-mast and wishbone boom. Small inclined foils on each hull forward, and inverted T rudder foils aft. This boat is not intended to fly on its foils, more to be stabilised. I think MAYFLY shows that foilborne 'flight' is the way to real speed.

Boreas (13.0 knots), an earlier creation of Reg's, sailed with John Downie at the helm, but seems to have lost its sharp edge of performance.

Hobie Habit (14.4 knots), a stock Hobie 14 with a sail of reduced area i.e. 10 sq. metres, sailed by H. Pauloo from Hyeres. In fact he used the **boat** of

another entrant, in A. Class–Jan Lange, of Katwyk a Zee, Holland, whose boat has KAT painted on one hull and WYK on the other–so port of registry and boat name become confused. This entry demonstrated the ability and speed of the Hobie family of boats.

K-Kitty (14.5 knots). This is a sailing surfboard, appearing either with Clive Colenso solo, with an asymmetrical 10 sq. metre wingsail: or with Clive and Andrew Smith, with two normal 5 sq. metre windsurfer sails: it was this arrangement which achieved 14.5 knots.

Artimede (13.1 knots). A 14 ft. very light, catamaran: beautifully finished in varnished mahogany veneer ply, with a simple sail not dissimilar in shape from AUSTER'S: designed, built and sailed by Orlandini Gismondi of Milan–normally a denizen of Lake Como.

Keek (13.3 knots). Ken May's derivative of KELEK, sailed by himself, Betty and/or Jonan May–but despite strengthened rudders, slower than last year.

Bluey (12.2 knots). My own foiling catamaran, using variously MAYFLY type foils or inverted T foils: again, despite the modifications, slower than last year.

Proa 42 (9.4 knots). Luca Venturi's little proa, made of GRP, rather heavy and under powered.

Grebe (13.4 knots). A standard Hobie 14 entered by B. D. Neve in the 10 sq. metre class, only sailed on the last day, and that with a standard sail of around 11.5 sq. metres.

Tiger purchased at the Southampton Boat Show by Peter Ellison and Mike Butterfield, she made a brief appearance on the second day, and made a passage from Sandsfoot Beach to Castle Cove. I confidently expect that after certain crafty modifications she will sweep the 10 sq. metre board next year.

A CLASS – 150 sq. ft. – 13.94 sq. Metres

Mayfly (21.0 knots). Philip Hansford had sold Mayfly at the end of the 1975 week to James Grogono and David Pelly. This year James drove her to a modest 18.7 on the second day, then sold her to Ben Wynn, who equalled that speed on the fourth day, and proceeded to raise it through 19.9 to 21.0, on the final day. I believe he managed this for several reasons:–

He is new to foil sailing and–presumably–has no preconceived ideas.
He didn't design or build the boat so he has no idea how strong it is.
He is heavier than James, he sits further out, and so the boat remains upright.
The tips of the aluminium foils have become very slightly bent so their effective dihedral is no longer 40^{o}, but more like 36^{o} – so again the boat is better stabilised.

The net result was that he could sail MAYFLY exactly level–or upright–ensuring that both forward foil tips remain covered, and that the sail works at full effect. He was also fortunate that on two occasions the wind was exactly right–15 knots when he did runs, and on the last day, being from 265° with minimum sea, he achieved the remarkable 21 knots.

Rampage (12.1 knots). A standard Unicorn, modified by Mark Simmonds, who was one of the MISS STRAND GLASS team with a Hook-type inverted T Foil on the port hull forward, and an inverted T rudder aft. I regret I did not see this boat perform: there is room for improvement since the Unicorn (FINGERS) did 16.2 knots in 1974.

Topsail. Alan Eckfords second year of entry. A 30ft., very light and narrow hull, intended to be supported on an inverted T/plate amidships, and surface piercing U foils at each end, the after one steering. A cross beam about 10ft. long carries small stabilizing floats. A glider-type parasol wing, carried on a 10ft. mast, was intended to provide lift as well as drive. Sadly, due to structural inadequacy, this boat broke before it ever reached the water. Definitely a candidate for the inshore course, in about 5 knots of wind on the first attempt.

Force Eight. D. R. Pattison's trimaran, with Hook-type foils, and a rigid, symmetrical section, wingsail with a small–10%–flap. This boat went afloat and sailed slowly about, but as far as I know, never lifted off and made no runs.

Idler. P. J. Bromley appears like clockwork on the Friday each year, assembles his latest proa with inclined sail, and goes afloat during the Saturday calm, (there is always a calm spell on the final day). This year he actually got under way, and sailed towards the course, but disaster overtook him and his mast collapsed.

B CLASS – 235 sq. ft. – 21.84 sq. Metres

Icarus (20.7) won this class, easily. Nevertheless, ICARUS has gone much faster, and it is odd that she does not seem able to repeat her earlier speeds. On the Friday, James and his team moved the main foils about 8 inches aft–i.e. from their earlier position well forward of the main cross beam, nearer the beam, presumably in an attempt to bring the stern up. They said this was no help on the course, but improved the handling off the course! ICARUS still sailed around with her sterns dragging in the water, and I suggest they must be much bolder and:

Move the foils right aft to the cross beam.

Place the crew further forward (helmsman is right by the after cross beam).

Raise the incidence of the rudder foil,

and then ICARUS might sail more like upright, as do MAYFLY, BLUEY and ORLANDO. And they could usefully reduce the main foil dihedral from 45° to 40° or less.

Icarus. It is very easy, actually, to forget how a hydrofoiler works or even, not to appreciate it all. I found I was making mistakes that I had corrected (I thought) a year ago: it is the years' of monohull sailing that have conditioned our reflexes, wrongly when it comes to foil sailing.

Red-White-Blue (17.6 knots). R. Heilbrons Hobiecat 16.

Eros (15.7) H. Pohlmann's Hobiecat 16.

Two standard Hobiecats, whose speeds can now be reported in the advertisements.

Cheribi Bi (16.1 knots). Roland Turcelin's experimental, simply yet well made 20ft. catamaran, with a mast and una sail on each hull–a sort of mini–CROSSBOW II. Each hull carried a pair of small, 45° inclined inwards, plates or keels, which appeared to give some lift as well as to resist leeway.

Exoplane (13.2 knots). At his third year's attempt, Didier Costes improved his parasol type sail, spars, and general arrangements of his pacific-proa sufficiently to do at least two runs, and to demonstrate convincingly that his particular, and unique, configuration, can go exceedingly fast. He still has to perfect the method of controlling the sail, and the foils, but his concept is excellent, and his perseverance "magnifique." He well deserved his 'Design Prize' for both these qualities.

Orlando (10.7 knots). Grant Ward has continued to work away at getting ORLANDO – a B Class Manta Cat – properly up on her MAYFLY type foils, but I think his power / weight ratio is against him, as is BLUEYS!

C CLASS – 300 sq. ft. – 27.88 sq. Metres
Clifton Flasher (20.4 knots) sailed by Nigel Irens, was another boat which despite modifications–stripped off after a couple of days, but to no effect–has not gone faster this year.

Smoothy (13.7 knots). Owned by John Vigurs, and helmed by Bob Fisher, the U.K.'s hope for the next Little Americas' Cup, appeared on one day with a nice una-rig conventional main, and travelled as fast as the wind, but no more. With Austin Farrars latest sail–not dissimilar to an earlier Anderson Aerosail, with a D section mast and two fabric sides–she is to challenge the U.S.A.

OPEN CLASS
Crossbow II (31.8 knots). Tim Coleman's successor to CROSSBOW, which set up the 31.6 knot record in 1975, her fourth year. This boat embodies the lessons learnt so far, and comprises two 60 ft. hulls set about 30 ft. apart, the port hull some 20 ft. **forward** of the starboard. Each hull carries a mast with a 625 sq. ft. una-main, the staggering of the hulls ensuring that on starboard tack, the port sail is not blanketed by the starboard sail. She is intended to perform best on starboard tack, but can also (unlike CROSSBOW),

safely tack, gybe and sail on port tack. The sails have a semi-wishbone rig: a vast aluminium pole supported two thirds the way up the mast, on the starboard side of the sail, pushes the clew down and aft, so that sheeting only has to control sail incidence and not try at the same time to reduce twist. Even so, sheeting in soon enough is still a problem, one solution proposed is to tow a drogue which does the work and is then cut adrift. CROSSBOW II was launched for the first time on the first day, so the first few days were spent sorting things out. By the Thursday, she was up to 31.8 knots (now ratified) in around 18 knots of wind. This augurs well for her future performance, but I would not like to predict at this stage that she is capable of 40 knots.

Stampede of Cowes (16.9 knots). Sailed by Jim Pritchard. See AIRS, No. 11, pages 10 and 11. A very handsome 8 metre cruising catamaran, sail area 43.2 sq. metres, which handles and performs delightfully.

Sponsor Needed (14.1 knots) and Otis (13.1 knots). A pair of Sydney Harbour 18ft. skiffs, entered respectively by Ray Alderman and P. C. H. Legrove. They sailed with only 3 crew each, instead of the normal Sydney crew of 6– or is it more? Spinnakers apparently did not make them go any faster. The names on the sails excited some attention from the Committee, whose rules disallow advertising on sails. It was ruled that SPONSOR NEEDED did not advertise a Commercial product, and was allowable: but OTIS had to become TIS to be legal.

Conclusions

This event continues happily–and we were told by David Way, will be repeated in 1977. MAYFLY demonstrated the speed advantage of foils–and for myself, I am sold on them for stability and comfort, even if speed is not actually increased.

The lesson to be learned from her, and comparison with the other foilers, is that the power/weight ratio must be adequate. So it should be easy enough to design and build B and C Class foilers. 10 sq. metre foilers are more difficult, as are giant ones: but the latter may not be necessary if C Class go fast enough. I just hope this years unsuccessful foilers are not discouraged.

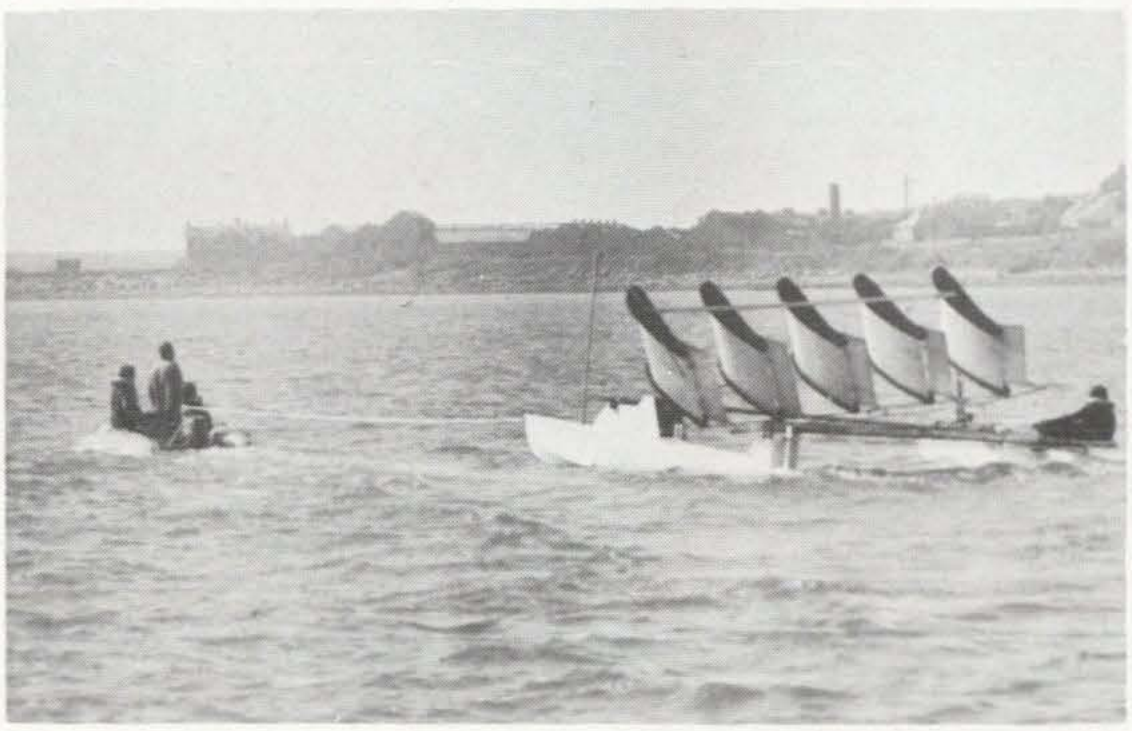
John Player's 20 minute film "The Speed Sailors," made during the 1975 contest, is going on general release soon – well worth seeing, it was shown during the week and highly acclaimed.

G. C. Chapman

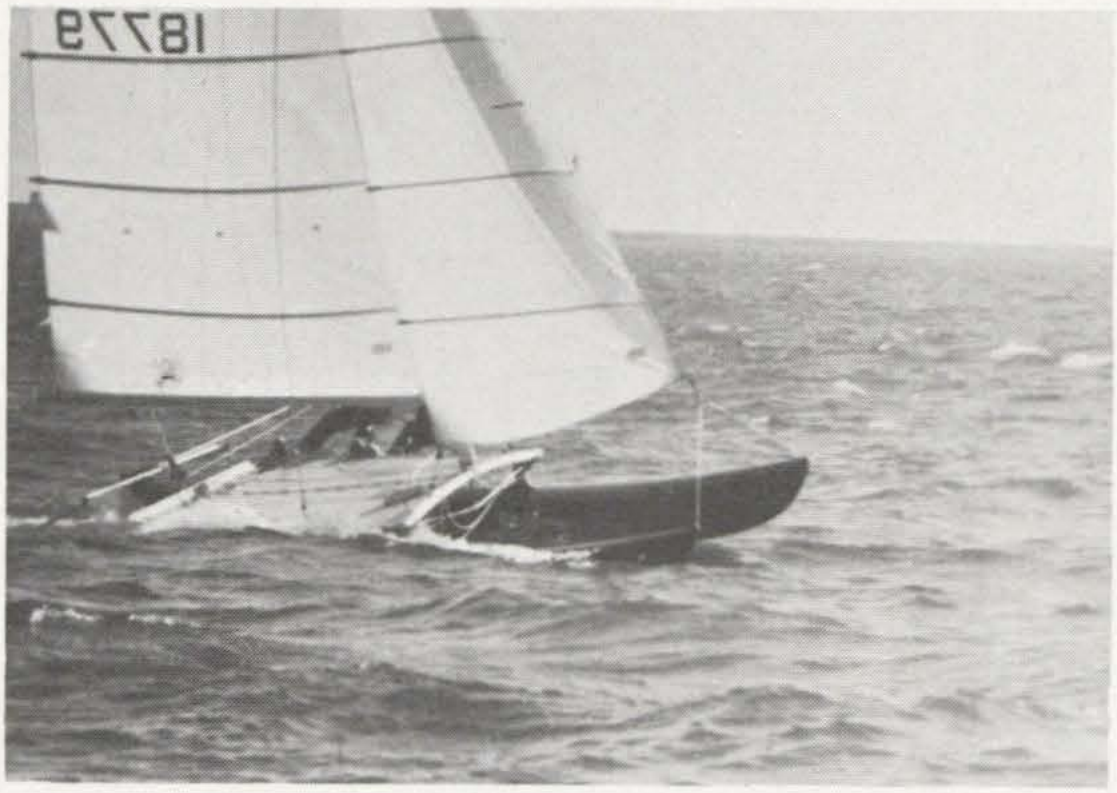
October, 1976.

A Hobie Cat at speed. The lee bow does NOT submerge, the headsail is fully battened but overlaps the mast.

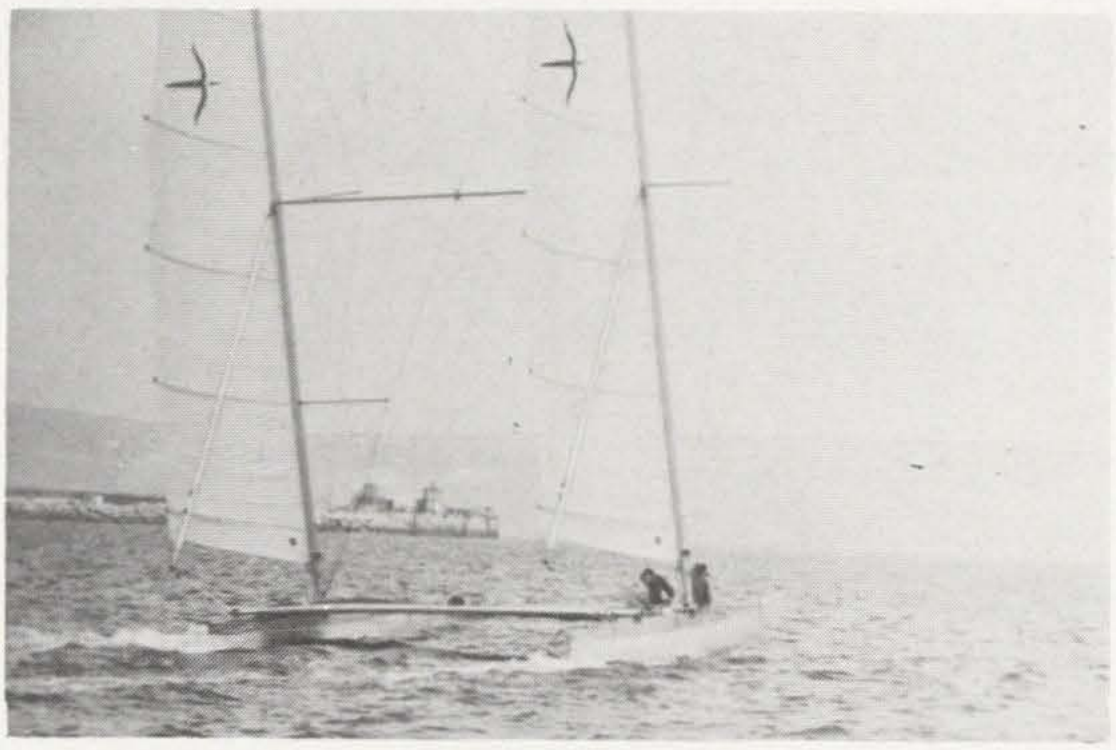
Cdr. George Chapman adjusting aft foil for 'Bluey' before launching



'Clifton Flasher' towing out, the Spray Rail along the bow was removed during the week

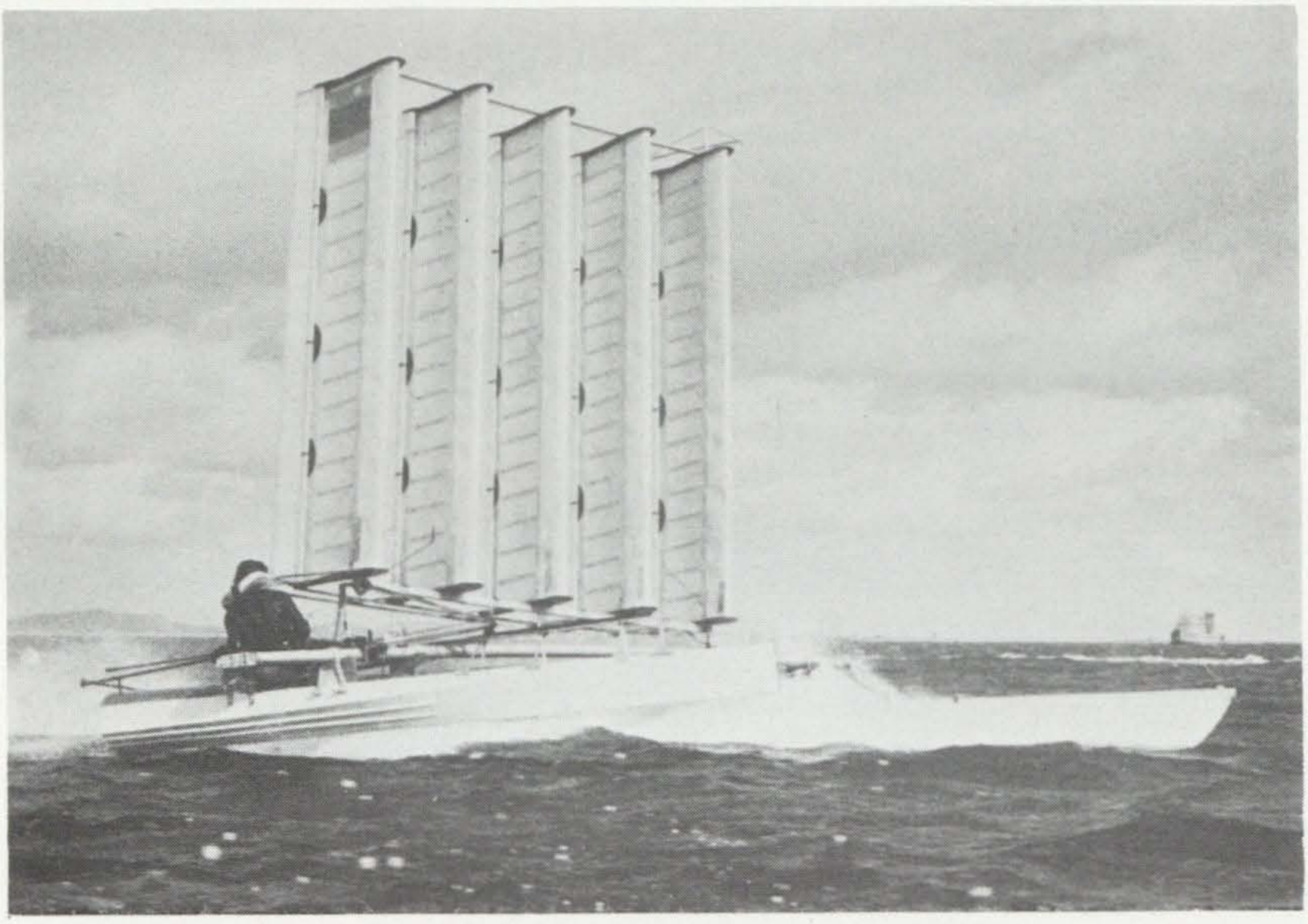


'Hobie Cat'

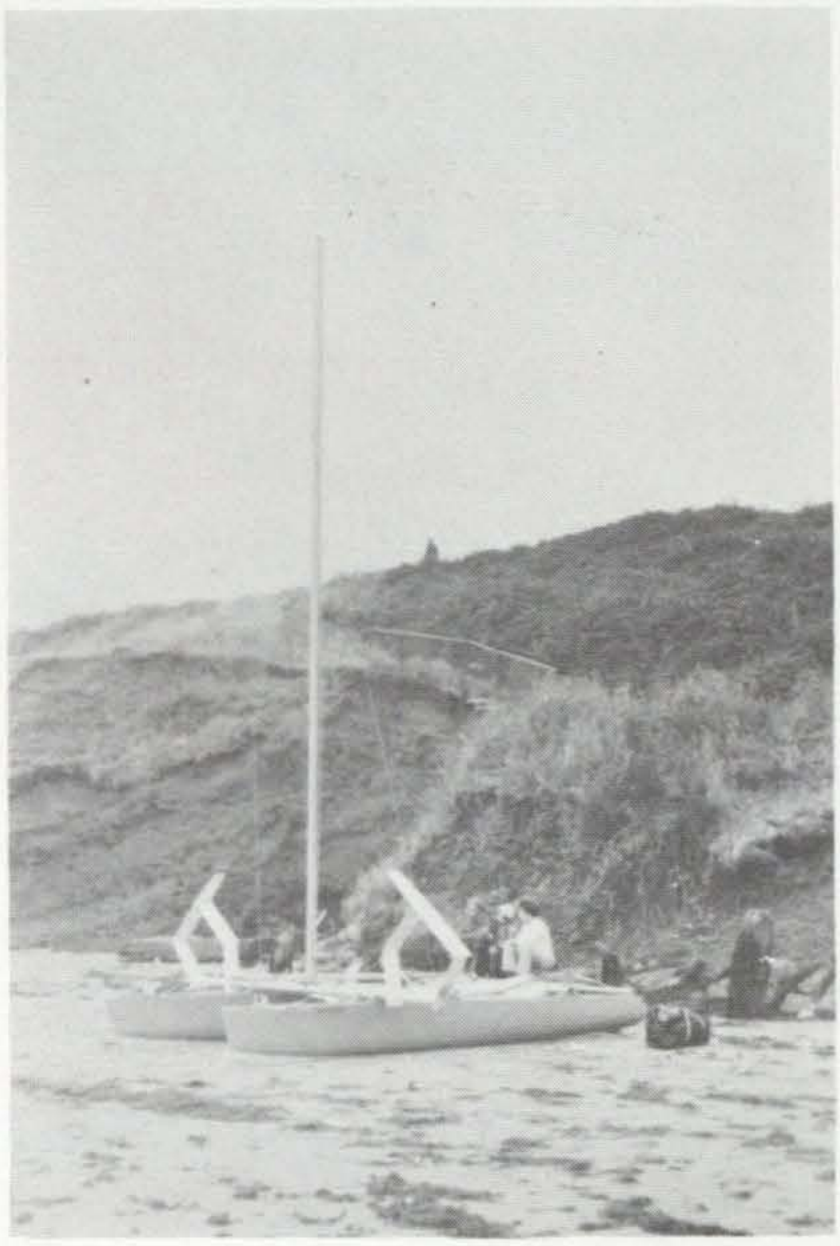


'Crossbow II'

Auster



'Clifton Flasher'



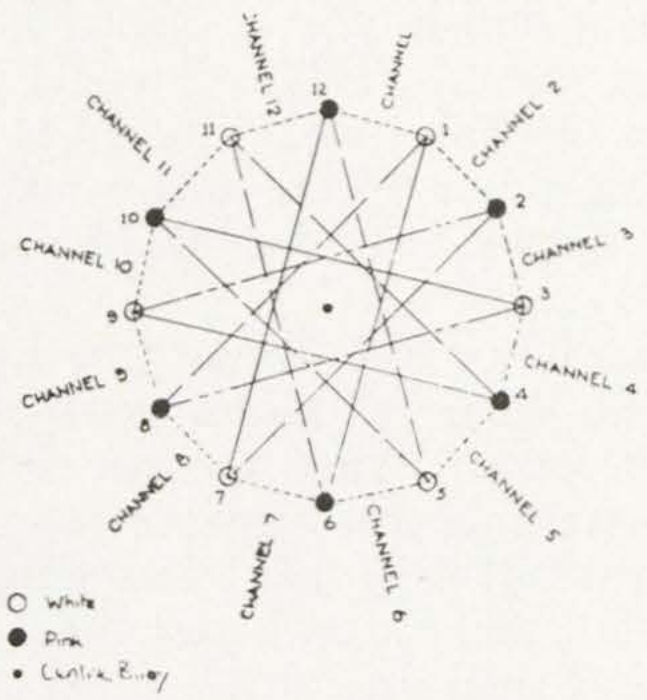
'Mayfly'

THE JOHN PLAYER WORLD SAILING SPEED RECORD

Observations by Michael Ellison

In order to beat or raise a world sailing speed record, it is not necessary to take part in the John Player week at Weymouth or use the course in Portland harbour but because the very accurately measured courses are available and the official timekeepers, observers and sail measurer are all on hand, it is by far the least difficult and least expensive way to make an attempt.

The distance to be covered is established at half a kilometer and although this seems short, it takes a great deal of concentration to keep any craft going at absolutely her fastest over the course.



The rules require only that a craft must be propelled by the wind alone and that she must start from rest without outside assistance. Naturally, more rules are printed to cover the use of powered winches and other details, but there are no restrictions on hull size or sail shapes, nothing to limit movable ballast or the use of hydrofoils–the object is to record the fastest possible speed.

A number of entrants in the early events could only sail in one direction, "Crossbow" and "Clifton Flasher" were the most successful, both using the port tack run and being towed back by an attendant craft. It is interesting to note that there was a lot of discussion about making the rules require runs in opposite directions for the record using the mean of the two speeds. This was to prevent the development of 'useless' boats which can only sail in one direction. Considerable heat was generated suggesting that skiers should also be timed while they climb up the mountain before their runs and the present rules are generally accepted as reasonable for sailing craft. In fact, due to the time it takes to collect a one-way-only boat after a run and tow her back to the start, it is difficult to tune these craft for maximum performance and as the records now established require a very high degree of tune the advantage seems to be with the craft that can sail in either direction although they can be set up, for example with the mast set to one side, to be faster with the wind on one side than on the other.

For the small boats the fastest speeds have been obtained with a wind speed between 14 and 16 miles per hour. Below this wind speed, there is not enough drive from the sail and above 16 mph. the waves, even in the harbour, are too high and slow the yachts even when flying on hydrofoils. There is a brief spell as the wind increases when the sea remains clam and if this happens just as any of the present record holders make a run there could be a new record for any of the smaller classes.

The outstanding small boat for a number of years now has been the 16 foot "Mayfly." She is a catamaran with hydrofoils and she weighs less than 200lbs. complete with rigging and sails. She has achieved speeds of over 18 knots with quite a number of different helmsmen and while not detracting from the ability of her helmsman, this does confirm that her consistent performance is due to excellent design. Her designer Philip Hansford has pointed out that to double the size of "Mayfly" would not necessarily improve the speed. The effect of the waves would be less at the same wind speed but due to the laws of scaling either the sail area would have to be increased by four times or four times the wind speed would be needed with the present sail.

The problems are increased by weight because the 3 mm. plywood skin which has lasted five years with "Mayfly" might not mean that 6 mm. plywood could be strong enough for a 32 foot version. Although problems increase with size it is still a general rule that bigger is faster and anyone contemplating a new boat for an attempt must take a long hard look at "Mayfly" as the boat to beat – 21.1 knots, and 6 runs better than 19 knots during the week with 113 square feet of sail area.

"Mayfly" uses three hydrofoils which are swung down and secured by the crew when she is in deep water. The two main foils project out on each side from the tube that supports the mast, these are angled to give lift and resist leeway although on windward courses it will almost certainly be found that the weather foil will be exerting a downward pull to maintain level 'flight.' The action of these foils is automatic as the angle of attack is determined by the leeway angle and the amount of immersed foil decreases as speed increases. By using an "inverted 'T' foil" aft level 'flight' is maintained: as speed increases the main foils lift and the aft 'T' presents an angle to the water and therefore lifts the stern, as speed decreases the bow lowers, lift aft is decreased and the stern drops to maintain a constant horizontal angle without the crew having to attend to the foils although adjustments can be made while at rest to find the best settings.

With all the class leaders able to exceed the speed of the wind, it is natural that careful attention to sails has resulted in some good new ideas. In the 'open' class where there is no restriction at all on the amount of sail or the number of sails it is interesting to note that another problem has to be solved. When the boat speed exceeds wind speed the apparent wind passing the sails is always from ahead. As the boat comes up to start her run and is gaining speed the sheets must be pulled in very quickly and if during the run they

have to be eased to prevent capsize they must be pulled in again smartly. With a normal bermudian mainsail, a tackle is necessary on the sheet to pull the clew down in order to remove the twist from the top of the sail and keep the sail flat. To maintain the sail at the correct angle to the wind which changes direction quickly a single rope is necessary; it can be done by adjusting the traveller on a track on the deck as with racing catamarans. The new "Crossbow" uses a boom which comes down to the clew from a point quite high on the mast thus keeping the leech of the sail in tension. Others have tried different ideas and "Boreas," owned and sailed by Reg Bratt, the worlds fastest using 10 square metres has a tripod aft and the single sail has a high cut clew with the sheet leading straight aft. The speed to beat in this class is 15.0 knots but a number of boats have bettered 14 knots so this record is not likely to last long.

The week at Weymouth is truly international with entries from Denmark, France, Germany, Holland and Italy attending past meetings and separate attempts have been held in Australia and California. The 'B' class record was held in U.S.A. until last October when the elderly Tornado class "Icarus" raised it to 20.7 knots, using hydrofoils.

KITE DESIGN

by John Morwood

Enormous congratulations are due to Gordon Gillett for having shown in practice that kites can tow a boat to windward. Harry Stover's article was extremely useful in adding ideas of principles while that of Roger Glencross extended the concept in an interesting way into a completely new sport.

The Lift to Drag Ratio
There is no doubt that this must be increased. The most efficient mainplane is as follows:-

For windspeeds below 14 knots, a thin, highly arched sail gives the best performance as proved by Aquarius V, the "Microfilm gliders" and many other instances. High aspect ratio is desirable at least up to a $span^2/Area$ of 6.0. We must also have extreme lightness and this can be simply achieved from leading edge spars and a middle strut. The result is like two mainsails joined to a common foot with a boom which extends aft and a bit forward.

Twist must be abolished and this can be done by using curved leading edge spars with the concavity downwards, as shown by General Parham. Dihedral is also necessary.

Sweepback or sweepforward increases the angle of attack at which the stall takes place but decreases the maximum lift. Lift above the stall is increased but this feature would not be wanted. No sweepback is present when the

peaks of the sails are cross wind of a point about 40% of the root chord from the leading edge.

Full length battens and roach with a shortening of the wing root 'amidships' to make the sail a quarter ellipse are ideal refinements but not primarily necessary.

There is no doubt that the above is the optimum shape for a mainplane of a kite. Fig 1. (on page 52), shows the layout.

Control

In my experiments (about 70), I tried kites with tailplanes only. The best "Swing" on either side of dead downwind was only about 45^{o} with stability. A large tailplane gave higher swings but stability was poor at extreme swing.

I tried pendulums to steer the rudder and used various devices to give longitudinal dihedral when the kite was flying on its side. Recently, I have conjectured other ways of rudder control. Now, Harry Stover's "Yoke" control would seem to make all this conjecture obsolete.

The Tail Plane

All the kites of A.Y.R.S. 85 A seem to be of low aspect ratio delta wings which are notorious for small lift/drag ratios. I must confess that I cannot work out their system of control. For the mainplane which I have put forward to give the greatest lift/drag ratio and therefore the greatest swing, a tailplane and rudder of more or less othodox design must be used, though the tailplane can be similar in construction to the mainplane. Marked dihedral might, however, be able to avoid the rudder, as with some gliders.

The tailplane has to be set to give a longitudinal angle of dihedral to the kite when flying downwind to give a positive angle of attack to the mainplane. The best lift/drag ratio is usually obtained when the mainplane angle of attack is 5^{o}. Such a small angle would need battens in the sail and these could be used. Slightly greater angles of attack would not reduce the lift/drag ratio much, would increase the pull force and avoid full strength battens.

According to the aeromodellers, when the mainplane has a highly cambered section, the centre of effort moves fore and aft more than with flatter sections. They therefore recommend a tailplane of 25% of the area of the mainplane. This area can be reduced by having a longer "Fuselage" or longitudinal spar.

The Centre of Gravity

This has to be aft of the string attachment position by enough to load the tail plane downwards when flying downwind. It also has to load the rudder downwards when the kite is flying at maximum swing to give slight longitudinal dihedral in that position.

Control
Harry Stover's "Yoke" system seems to me to be a complete answer for control. The yoke consists of a short pole on the boat at the ends of which two strings pass to the kite where they are attached at the same distance apart as the length of the yoke. Sensitivity is increased if they are attached at just a slightly shorter distance apart, however. At all attitudes, therefore, the wing of the kite will be parallel to the yoke.

Flying downwind, the kite will fly steadily but tend to move from one side to the other. Pantographing, such a sideways movement will send the kite again 'to the top'. Exactly the same holds if the kite is flying on its side at maximum swing and the yoke is vertical. If the strings are attached at the kite at a slightly shorter distance apart than they are at the yoke, the upper string will be pulled in more than the lower if the kite drops below horizontal and restoration will be more positive.

Getting the Kite aloft
If the yoke were to be put at the end of a very light alloy pole, the boat would not be cluttered up with it. In drifting conditions, the kite could be held at the end of the pole on the yoke. I once tried this out at full scale with about 60 sq. ft. of sail on a 30 foot pole and beat to windward quite well but slowly as the boat was a 27 foot whaler. In stronger winds, the kite could be loosened out into the higher winds up aloft.

A Train of Kites
As Gordon Gillett so rightly points out, a train of kites can be made much more lightly than a single large one. What I have so far written cannot be used for a train of kites, even though A.Y.R.S. members are so ingenious that it appears that anything can be invented.

My only idea for making a multiplane kite system is to use a triplane, quadriplane or even a sexiplane main plane system. Each wing would be separated by about twice the chord. Separation by 1.25 or even 1.5 of the chord produces "Blockage effects" according to my wind tunnel tests of this. The few triplane aeroplanes which have been built have had poor lift/drag ratios. A single tailplane and rudder would, however, be able to control the lot. I would think to place it in the 'clean wind' behind the top wing.

Summary
Kites which fly downwind can be easily made and have been made for thousands of years. What we should aim for is a kite which flies with the string or strings horizontal and nearly at right angles to the direction of the wind. The eddies and turbulence of the natural wind might prevent this from being possible, though it would be possible in a wind tunnel or towed from a car in a calm. If, however, the kite had a lift/drag ratio of 20 and thus flew at a drag angle of 4^{o}, when flying at an angle of 30^{o} from the vertical, the driving force on the boat might be reduced by half but the drag angle would remain at 4^{o}.

Letter from Gordon Gillet to John Morwood

200 Avenue, K.S.E., Regency 324, Winter Haven, Fl. 33880.

Dear Mr. Morwood,

Thanks for the nice comments in your upcoming article. Coming from you, I consider it a real compliment.

I read your article with great interest and I feel you are moving in the right direction. In fact, I built two kites last month with 18 inch cords and ten foot wing spans. They both incorporate a leading edge spar. I was very impressed with their power to weight ratio. They seem to leap into the air even in a modest breeze.

I am now experimenting with control systems for them including a V tail, connard wing (tail in front) and a drogue. The later two were effective enough to perform loops but they need refinement.

I am also trying stiff ribs in the wing. A highly cambered soft wing such as you describe in your article will not climb above 50 degrees because it cannot withstand any pressure on its upper side without luffing near the leading edge. The only two alternatives are (1) to build flat kites (no camber) or (2) install ribs. I agree that camber is important. I feel the improved angle of attack and the increased lift will justify the added weight and expense of the ribs in moderate to heavy winds. My concern is that the light wind performance (so essential when running down wind) may be lost.

I would be interested in more information on your experiments with multi-planes. You may be right that they should be spaced at least twice the cord. I did an experiment using two 10 ft. delta kites on one hundred feet of line. I rigged them so I could vary the spacing from zero to twenty feet while in flight. I used a spring scale to measure the combined pull. They appeared to pull stronger as they were brought closer together up to a point. When they were too close together the pull dropped off sharply. It appeared that when spaced properly, they pull harder and flew at a higher angle than when flown separately.

My method of measuring the spacing was not very adequate however, and it's possible that they were further apart than it seemed.

I wish to congratulate Harry Stover on his fine contributions to A.Y.R.S. on the subject of Kite Sailing. I hope he pursues his yoke steering system. I have tried this several times but was never able to keep a kite air-borne in a sideways position for more than five minutes. The problem seems to be (1) a kite is unstable when flown on its side and (2) the wind is not steady.

Normally a kite's stability comes from the fact that its centre of gravity can pull either right or left to steer it back towards the vertical. When a kite is flying off to the side of the wind, this static righting tendency must be over ridden by dynamic forces. These dynamic forces vary so widely with changes in wind conditions that the kite is unstable. Remember that dynamic forces increase with the square of the wind speed. It is not uncommon for the wind to gust from 4 to 12 miles per hour in less than one second.

I have also tried static control systems which move the centre of gravity to one side or the other. These had two drawbacks. (1) It involved increased weight and therfore reduced the light wind capabilities and (2) the weight was inadequate for effective steering in high winds. In a 25 m.p.h. wind, a ten foot wide delta will pull more than one hundred pounds. Considering that the kite weighs less than one pound, it is not reasonable to expect much control from moving the centre of gravity.

I also tried radio control but it involved considerable extra weight and the servo movements were too slow and small to be effective in the speed range of a kite.

I think Harrys' "yoke" system holds the most promise for automatic steering.

Incidentally, it is essential to use nylon lines for kite sailing. The 30% stretch factor is very effective in absorbing gusts and in pulling the kites through patches of dead air before the lines go slack. Also–I recommend using at least 150 ft. of line, for the same reason.

You may wish to print the following as a separate article in A.Y.R.S. I am in hopes it will stimulate interest in kite sailing.

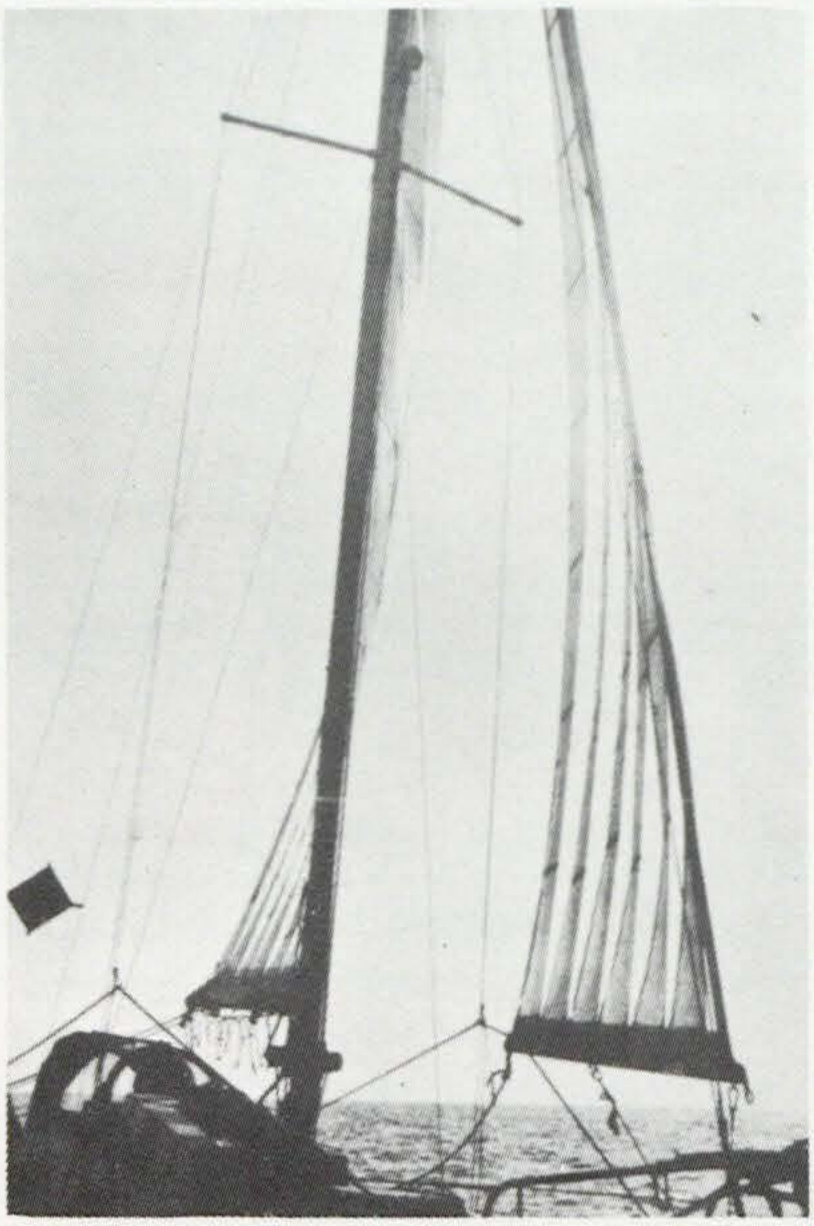
Why I use Kites instead of Sails.

Since I first successfully tacked against the wind using kites instead of sails 6-11-75, the question I have most frequently been asked is: "Why use Kites?"

There are three good reasons. (1) All sailboats not using the kite principle to support the sail are inherently unstable. A kite boat does not heel and therefore can carry far more sail and can keep it up in much stronger winds. You simply can not blow a kite over. (2) The wind at 50–100 feet is a far superior source of power. It is both stronger and steadier than surface wind. (3) Kites tend to lift the boat, making it more bouyant. Sails actually press the craft down into the water.

When we consider these three factors working together, it becomes apparent that a kite boat has much greater speed potential than a sail boat, at least in most wind conditions, (moderate to heavy).

Happy Holidays, Gordon Gillett.



VENETIAN RIG

Inventor, Dott. Inge. Glauco Corbellini

This sail rig was mentioned in "Sail Rigs, 1976" (publication Number 81). The following details are taken from the brochure issued by the Medina Yacht Co. Ltd., Cowes, PO31 8BL, Isle of Wight.

The characteristics of "Venetian Rig"
This system provides a mainsail and jib which consist of parallel strips or segments instead of a continuous fabric. The segments run parallel to the leech of the sail.

The sail has been made up in such a way that it is able to replace a traditional sail without modification to existing equipment. It also makes it possible to reduce sail area very simply, if wind force increases, by removing the segments one after another. This operation can be carried out rapidly, and each reduction in the sail surface area is made, the area still provides an aerodynamically perfect sail; this is possible due to the manner in which the segments are fixed. A system of expansion buttons fixes the segments to strips integral with the luff and foot ropes and thus the segments can be released by simply extracting the buttons working forward from the leach of the sail area.

A segmental sail provides the following advantages:

* The sail can be hoisted or removed even in strong winds.

* Aerodynamic efficiency increases in ratio to the increase in wind pressure.

* With this system whereby reduction in the surface area can be effected easily, it is possible to maintain better balance in mainsail and jib.

* The segmental system provides greater efficiency than can be obtained by larger areas of traditional sails, which means that boats which would require two suits of mainsails and several jibs can be sailed with one.

* The angle between the wind and the sails is no longer a highly critical factor, as in the case of traditional sails, and this means that one can navigate at moderate speed with the sails literally centred, enabling compass auto-pilot-control downwind.

* Many of the difficulties of control of traditional sails in bad weather and disturbed sea are almost eliminated so that the manoeuvrability of a boat is very much better, even under difficult conditions, in which traditional sails would have to be drastically shortened.

In other words, the use of segmental sails eliminates many of the disadvantages of traditional sails and manoeuvrability generally is greatly improved by this system, in some manoeuvres which would be quite impossible under traditional sail.

The stability of the boat is better maintained, which in itself increases safety, and a boat using this system needs less hands to sail her.

SAIL RIG FOR BRUCE FOIL DAYSAILER

by Mike Hardcastle

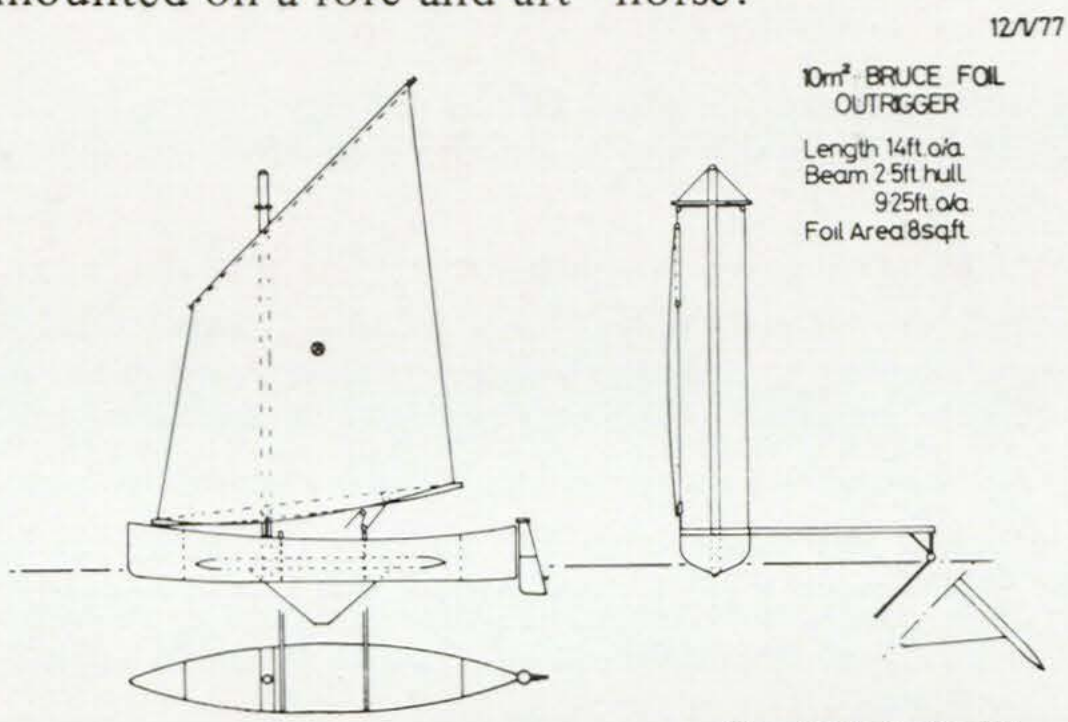
5 Oakwood Close, Grendon, Atherstone, Warks. CV9 2BU.

The problems of beam associated with "Bruce Foil" stabilised craft are not easy to solve if one thinks too conventionally.

The beam relates directly to the centre of effort of the sail rig so high aspect ratio rigs mean excessive beam.

The dipping lug rig is generally supposed to be the most close winded low aspect ratio rig, but it is also the hardest to handle. However, if the sail is

rigged away from the mast the lug sail should be even closer winded and need not be dipped. A side benefit is that the beam is reduced still further by rigging the sail on the gunwale opposite to the foil. With the dimensions shown, the mast will not interfere with the sail except when running. In addition, sail/foil balance may be obtained by pivoting the mast if the boom purchase is mounted on a fore and aft "horse."



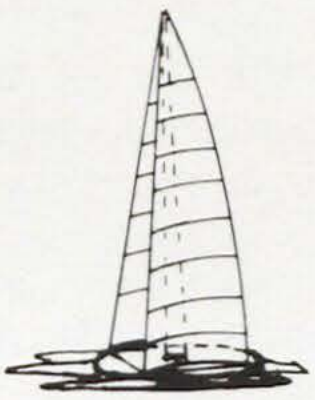
PYRAMID RIG

by Eero Kuoppamaki,

Tapala 16350 Niinikoski, Finland.

How about a pyramid rig turning on a circular track on deck, supported by air foilish mast.

Cleaner? (Mast would also drive).



Extract from letter from David Boothroyd to Michael Ellison.

33 Gipton Wood Avenue, Leeds, LS8 2TA., 26th October, 1976.

Dear Mr. Ellison,

Further to the mention of my models by Ken May in the report of last years Poole Meeting, I eventually decided that the nondescript hull with float foils which I was using had too many unknowns to make any worthwhile experimental work useful. I have therefore built a Marblehead, (M.Y.A.), the formula for which is 50 in. W/L and a basic 800 sq. in sail area.

I am now thoroughly familiar with the performance and handling of this boat and will be able to make an accurate assessment of any further develop-

ments. One thing which I **have** tried, is a version of Ken Mays "Boomsprit Rig," using sails with which the model already sails well, when using traditional rigging. This was a suit with an unusually large jib (ratio Main to Jib areas being 6 to 5). The "Boomsprit Rig" demands that the jib must be slightly higher (deck to sail foot) than normal which must increase its power a little, but otherwise it is a straight comparison. Downwind and with a quartering wind it was noticeably faster. On a reach the large jib area made it completely unstable, until I moved the mainsheet to the jib end of the "Boomsprit". Under these conditions, it proved to be a powerful rig which showed that a hitherto adequate mast tube was too weak. I then substituted my "Storm Suit" jib, a small, but well cut and powerful sail and retrimmed the mast position to suit.

This gave a good combination with the boat very manageable and predictable and almost as fast as before, in fact, faster round a triangular course.

My conclusion from this, is that the best application of Ken's rig would be a high aspect ratio "Unirig" type of mainsail with a pocket luff, battened all the way up and a small jib to give close-winded sailing and good reaching and running.

Just to digress, has anyone else noticed that the mainsail of "Aquarius V" shown on the cover of A.Y.R.S. number 31 goes very close to the semi-elliptical mainsail ideal, except that it is mounted on one of its edges instead of centrally, which removes any problem about failing-safe when "let-go." A further interesting fact about "Aquarius" is that the ratio:

$$\frac{\sqrt{\text{Sail Area}}}{\sqrt[3]{\text{Displacement}}}$$

scaling off approximate dimensions from the photo, gives a ridiculously low value of about 0.8, which is at odds with the known performance. The discrepancy disappears, however, if one remembers that the "displacement" (weight in lbs.) is a measure of drag due to wetted area. As "Aquarius" habitually "flies" one hull apparently, ½D seems to be more appropriate, bringing the ratio to around 1.6 which suggests the sort of performance actually available.

I recently bought a book called "Improved Keelboat Performance" by Fox Geen, published by Hollis and Carter, which has a lot of useful information. He quotes an index **P** (Power to carry sail) which seems to me to shed light on a normally obscure subject.

The formula is:

$$P = \frac{W \times GM}{SA \times D}$$

W = displacement weight in pounds
GM = distance between C/Gravity and metacentre (units not quoted, but must be feet).
SA = Sail area in square feet.
D = Distance between CE and CLR in feet (This must mean **vertical** distance).

He quotes limits of below 3.75 (too tender) above 7.5 (too stiff).

Yours sincerely, David Boothroyd.

Letter from Peter McPherson to Michael Ellison.

19 Abbey Drive, Jordanhill, Glasgow, G14 9JZ. 16th November, 1976.

High Efficiency Mast

Dear Mr. Ellison,

Further to correspondence, we had in 1973 and to your letter of 23rd Nov., 1973, I enclose a copy of British Patent No. 1, 399 421 aerofoil masts which finally came through in 1975. Yachting Monthly commented on the mast in their August edition after studying all the information available.

I would be only too pleased to supply further data to any of your members with the capability to build an alloy prototype for their own use if this would help to speed development of the concept.

Yours sincerely, Peter McPherson.

EXCERPT FROM PATENT SPECIFICATION

(54) Masts for Sailing Vessels

From theoretical considerations of the design of the mast, it is predicted that the mast will have the following advantages compared with conventional masts:

A mast according to the invention when trimmed or feathered into the wind will have less windage than a conventional mast of equal length and strength.

A mast according to the invention will provide a positive drive when a sailing vessel is reaching or close hauled when a conventional mast would be subject to wind resistance.

A Bermudian main-sail attached to the jackstay of a mast according to the

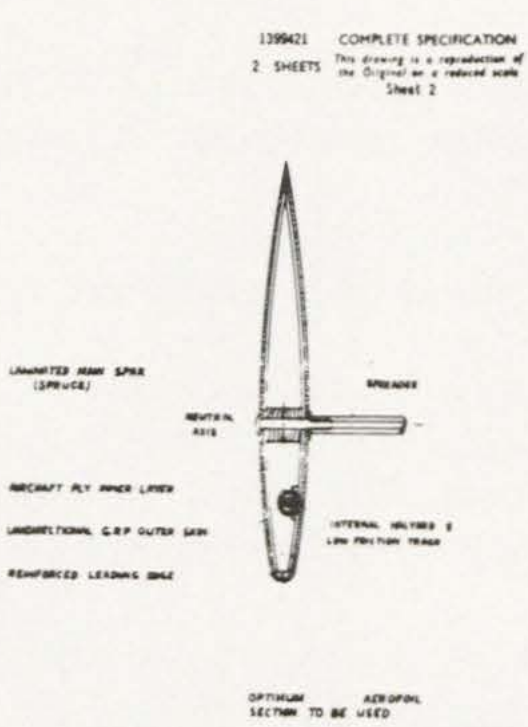
invention will have improved aerodynamic efficiency due to the airflow to the luff of the sail being unobstructed by the body of the mast with the luff of the sail trimmed to the same angle of attack as the aerofoil-shaped sections of the mast, the efficiency should be a maximum.

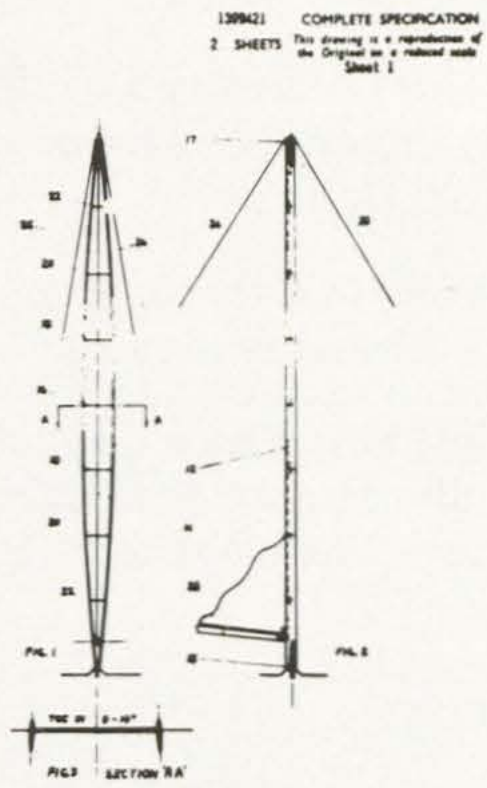
What I claim is:–

1. A mast for sailing vessels consisting of two longitudinal members of streamlined cross-section fastened together at the heel and mast-head and bowed outwards from the longitudinal centre line to a designed curvature, the curvature of said longitudinal members being maintained by a number of transverse spreaders spaced at intervals along the length of the mast and a longitudinal jackstay, in tension, connecting the masthead and heel.

2. A mast as claimed in claim 1., including swivel fittings at masthead and heel to allow rotation in either direction.

P. H. McPherson.





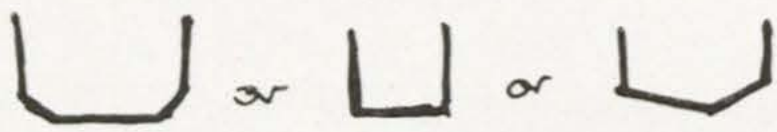
Letter from Peter Steward to John Morwood.

"Meadowview," Fengate, Marsham, Norwich, Norfolk. NR10 5PT, 27-10-76.

Dear John,

I have at long last decided to return to the fold.

I am going to stray away from cats and want to try a double-outrigger foil craft, say 14 – 16 ft. long, light ply (3–4mm. thick) of section:–



With either Bruce or Clark Foils.

Now the rig: my old favourite the Junk, but too many strings; perhaps a standard sloop, but I don't like the long masts "standard" rigs; so how about your semi-elliptical square sail as per pp. 108-9 in Sailing Hydrofoils, but the issue it's described in is out of print, but do you have any ideas on it? How exactly does it work? Does it work? Can it be used single handed? Are there many bits of string? What sort of rigging, etc. does it require?

Regards Peter D. Steward.

Letter from John Morwood to Peter D. Steward.

Woodacres, Hythe, Kent. 6-11-76.

Dear Peter,

I am told that the easiest boat-building method is the 'tortured ply' one. One simply cuts out two sheets of ply of the right length (?16 ft.), sews them with wire along the keel and up the stem. They are then forced into a catamaran hull. Deck and transom are added and there you are. The Tornado is made thus. Try a model for shape.

On the other hand, a simple box section also goes well if not too beamy– Dave Keiper's ocean voyaging hydrofoil was made thus and did not pound when I sailed in her.

The cross beams can be light alloy ladders, preferably of I section side pieces. They should be wrapped to reduce wind resistance. About 12 foot long for a 16 ft. boat.

The foils can be as Bruce and, if the hull is box sectioned, and fairly wide, floats are **not** needed.

Semi-Elliptical Sail
Full ellipse area = π ab where a and b are the major and minor semi "diameters". Note that this becomes πr^2 when the ellipse is a circle.

$$\frac{\text{SPAN}^2}{\text{AREA}}$$ Should be 3

Select your semi-ellipse area, find a and b and draw out your plan. Sew up the cloth and add pockets for the yards.

The yards are laminated to an arc of a circle with a rise of 1 in 8 or 1 in 10.

Put wire or line spans across the yards, making holes in the cloth.

The mast is a light alloy round pole cantilevered into the hull which should be strengthened to receive it. A Laser mast would do. A block at the top with halliard.

Sailing
Hoist the sail, apply sheets to both clews. Allow the sail to drift back on whichever tack you want to set off on and hold the appropriate sheet. You should sail now.

Putting about
Being chicken hearted, I would drop the sail when putting about, push it forward and swing it around to set it for the opposite tack and re-hoist.

Regards, John Morwood.

Letter from Michael Richey to John Morwood

The Royal Institute of Navigation at The Geographical Society, 1 Kensington Gore, London SW7 2AT. Tel. 01-589 5021, 30th October, 1976.

Dear Mr. Morwood,

Thank you for your letter about the semi-elliptical sail. It was kind of you to write.

I find it difficult to comment on the 'coefficients of efficiency' you give for different rigs because I have no idea how you have derived them. Nor am I sure that I know what you mean. (A spinnaker must, I imagine, be inefficient in terms of sail area, but that does not mean that it is a useless sail).

I must have sailed Jester about 20,000 miles under her present rig and my impression is that it is highly efficient except in light airs when the weight of the battens makes them slat and spill what wind there is out of the sail, and going to windward in anything of a lop. With a smaller sail area than conventionally rigged folkboats my impression is that she is consistently faster.

You may indeed be right about the semi-elliptical rig in terms of aerodynamics, but I have yet to be convinced that aerodynamics has any direct application to sailing. I can think of no advance that has come from the application of aerodynamic principles to sailing boats.

That being said, I naturally remain interested in the idea, even though I should not want to try it out on Jester, whose rig, to my mind suits her admirably.

I was interested in Mike Ellison's article on the Chinese rig, and may write disagreeing with one or two points, and perhaps adding a few of my own. The points of disagreement are minor: An unstayed mast seems to me an advantage not a disadvantage in that it is much kinder on the hull (Jester has not been recaulked for 23 years); and I fail to see why he thinks an engine should be necessary: I have never regretted not having one.

The other points I would make are that, against all theory, I can detect no loss of performance to windward when the sail is against the mast; and I fail to see that the length of the halliard introduces a stowage problem!

Yours sincerely, M. W. Richey.

Reply from John Morwood

Woodacres, Hythe, Kent, 6-11-76.

Dear Mr. Richey,

It was nice of you to reply to my letter about the semi-elliptical sail.

As you have so rightly guessed, a coefficient is a force relative to sail area, wind speed, etc.

It is interesting that you find your smaller sail area in the junk rig gives you greater speed than that of conventionally rigged Folkboats. I know that it is indeed a great rig and its absence of twist is a great value factor. Though I have never sailed with it, I have been told that it tends to be too flat in light winds and too full in strong ones. One of the semi-elliptical sails which I conjectured in my article would have the flow 'built-in' and thus give flow in light winds. That would be its only advantage.

Any fault of the junk rig, such as that you quote of the battens slatting about in light airs in a lop, would equally apply to my semi-elliptical sails.

I know enough of aerodynamics and sailing to agree with you fully that aerodynamical data do not always apply to sailing. There is a critical wind-speed of about 14 knots when all changes. Wingsails seem better at higher windspeeds. Thin, well curved sails are better at windspeeds of less than 14 knots.

Mike Ellison is biassed against the junk rig because it let him down when the mast broke. If it had held, he might have been one of its strongest advocates. Have found other cases of mast failure, he tends to exaggerate them.

As you say, an unstayed mast is much more kindly to the hull than the over-stressed modern rigs. It also has less wind resistance. Its material, however, is most important. I would guess that wood is the best. Light alloy is 'work hardening,' I believe, and thus might tend to fatigue after a time. I have no opinion on other materials.

The A.Y.R.S. lives on controversy. We would be very happy to have a letter from you on the lines you suggest writing in favour of the junk rig. I myself would like to have your opinion of the mast material and construction you think best.

Yours sincerely, John Morwood.

Letter from Peter Aleff to John Morwood

H. Peter Aleff, Old Sneech Pond Road, Pole 188, R.D. 2, Cumberland, RI 02864 (401 333-2729, October 26th, 1976.

Dear John,

Thank you very much for your kind letter of September 9th, and please accept my apologies for not having replied earlier.

I appreciate your comments about the semi-elliptical sail, and having done some reading about aerodynamics and gotten my head filled with vortices and induced angles of attack and infinite span of wings and downwash velocity, the semi-elliptical shape of a wing or a sail does make a lot of sense– so much that I will build a semi-elliptical sail this winter.

However, as I gather from your descriptions, this sail is essentially flat, like the junksail, and becomes full only if the wind bends it and gives it camber. So, instead of using flat or bent battens, I intend to make each batten with a rigid section forward that is shaped like the forward part of an airfoil, and is hollow so the mast can be inside this batten. The aft end of the batten would be flat but bendable, so that it can be made to conform to the end of an airfoil shape.

Sketch 1. shows such a batten – A at rest, B and C bent to windward by pulling a line that bends the flexible batten like a bow. B and C show different ways of constructing the batten so it bends differently, and I still have to determine which one will give me the better airfoil characteristics.

The two sailplans sketched, try both to be semi-elliptical if area of unit span is plotted against total span, but lift per unit span will be different for equal areas of unit span, because the shape of the airfoil section varies– the length of the flat, bendable tail of each batten is different, because I want to make each one of the front ends of the battens identical, for easy replacement if broken, and so I have to build only one mould for laminating them. On both sailplan sketches, the area with the closely spaced horizontal lines is the area corresponding to the laminated, rigid front end of the battens, with the mast on the inside of these two-dimensional front end airfoil sections.

The whole thing should hoist and reef like a junksail, and I intend to rig it very much like a junksail. I do not yet know if I really need the stays I sketched in–I prefer to do without them. Anyway, I could have only fore-and-aft staying, no side-stays, because the sail should be able to revolve freely around the mast. The mast will be hollow to accommodate the main halliard.

The question that I have not yet solved is how to determine the optimum

shape for the airfoil-batten, and how elastic the aft end of the batten should be to give the best shape. I am building a model, but this will mainly determine the rigging lines, not the shape of the battens.

How should I go about choosing this airfoil section? I need the front thick enough so I can hide the mast inside, but otherwise I have relative design freedom.

The main goal is that I want to point closer into the wind than with a junk-sail or slooprig, and I hope that this semi-elliptical sail with airfoil sections will help me to achieve this goal.

I would very much appreciate your comments on the above, and also if the true elliptical shape is important, or just the elliptical distribution of lift per unit span versus span.

Thank you in advance for your kind help.

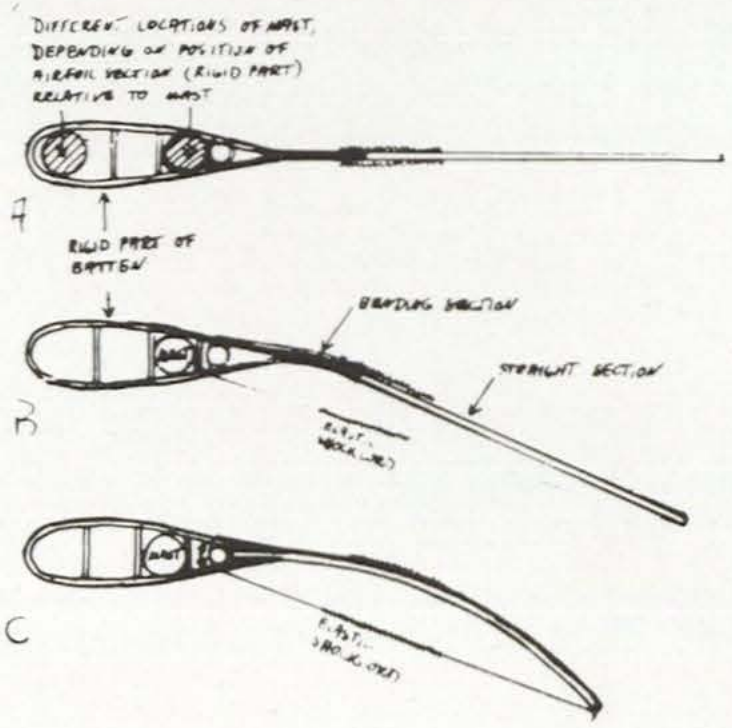
Sincerely Yours, Peter Aleff.

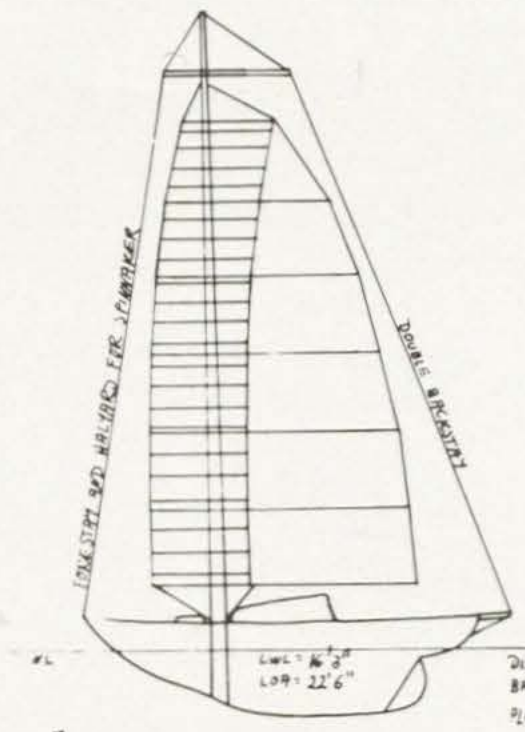
P.S.: How do I determine the centre of effort of a sail that does not generate the same lift for every square foot, but has different lift configurations for each part of its area, depending on the profile. A good airfoil will give me more lift near the leading edge than close to the tail, I assume. I have only a business computer available to me, and it can only add and subtract, multiply and divide, but not go into any higher functions. Also, I do not know how to programme the thing for a given airfoil profile, and for each angle of attack, and camber and windspeed.

So where do I place the mast if I want just some weatherhelm?

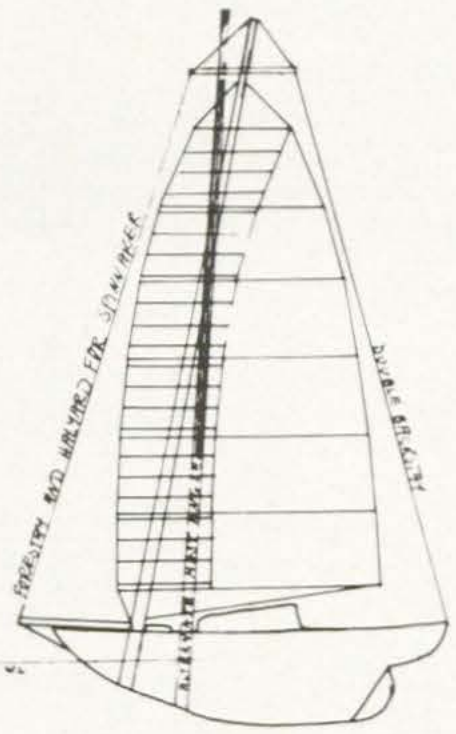
Help !

AIRFOIL SECTIONS OF WINGSAIL - SHAPE OF BATTENS





SAILPLAN A DISTORTED SEMI-ELLIPSE
EACH HORIZONTAL IS AS LONG AS IT WOULD BE IN A TRUE SEMI-ELLIPSE
LIFT IS NOT THE SAME FOR EACH PANEL -
BOTTOM CAN BE GIVEN MORE CAMBER IN THIS VERSION WITH IDENTICAL FRONT OF BATTEN SHAPE



SAILPLAN B TRUE SEMI-ELLIPSE, BUT LIFT DISTRIBUTION IS NOT SEMI-ELLIPTICAL BECAUSE OF DIFFERENT AIRFOIL SECTION IN EACH PANEL
RAKE OF MAST WILL PREVENT LONG END OF LOWER BATTEN FROM DIPPING INTO WAVES WHEN RUNNING

Reply from John Morwood to Peter Aleff.

Woodacres, Hythe, Kent, 6.11.76.

Dear Peter,

A semi-elliptical sail on its own does not give much more than 10% improvement. A good curvature of the sail is far more valuable than that.

All my thoughts on semi-elliptical sails set the sail on rigid battens which give the sections up the sail. As such, the sail is very hard to get from one tack to the other and the best way I have thought of is to lower it completely when putting about.

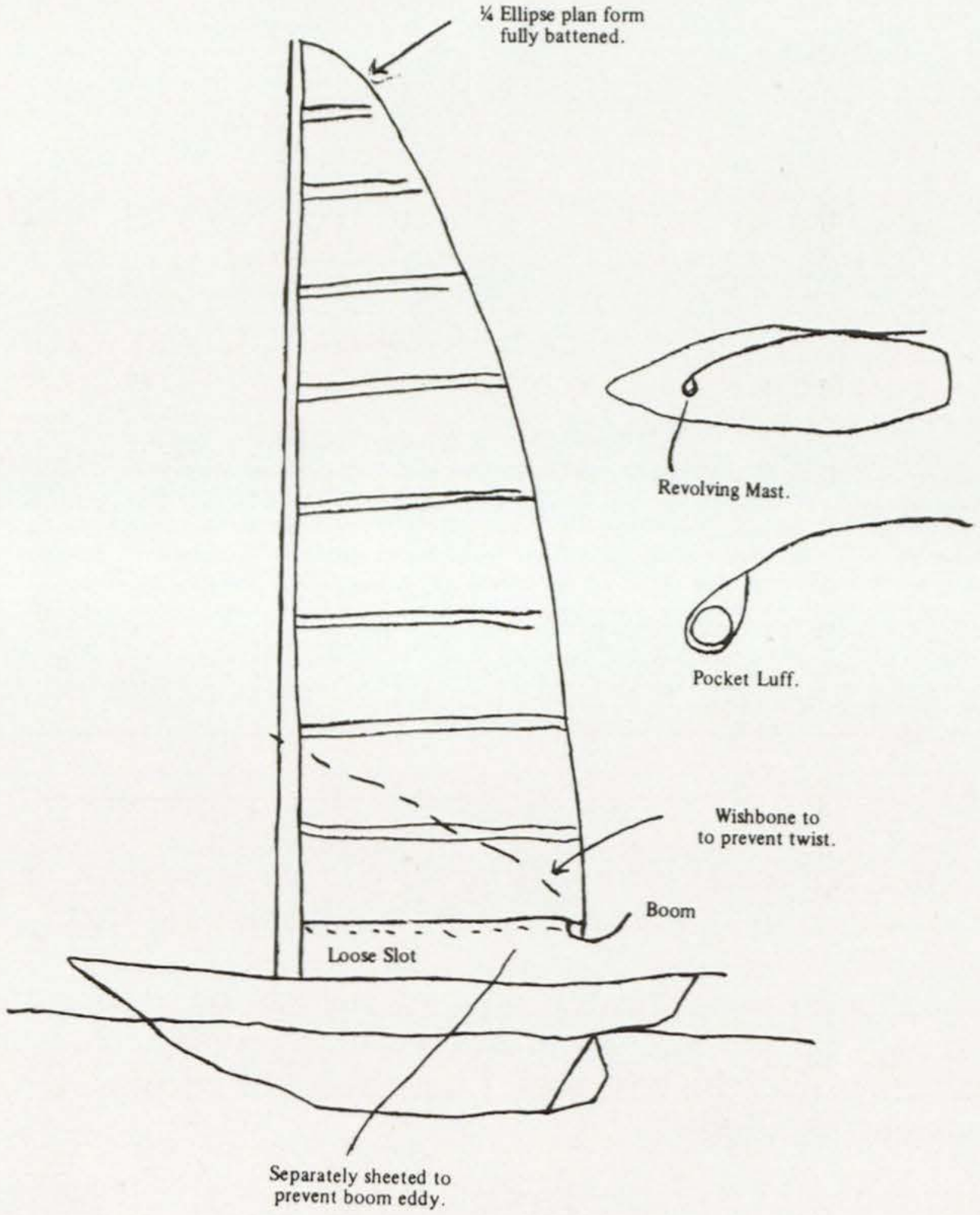
By contrast, the sail you have invented is easy to handle, reef and furl. I would however, advise you to read up the account of a very similar sail invented by George Chapman. George's sail was beautifully made and set perfectly without lines in the sail to bend the battens. Mike Ellison will send the appropriate number of the A.Y.R.S.

Actually, though George Chapman's sail was an undoubted success, he no longer uses it, preferring the cheaper, lighter single mast and sail.

In actual fact, the simple "Cat rig" with a revolving mast or 'Pocket luff' is the best rig to windward—and also the cheapest. You are correct, too. A quarter-elliptical sail is just as good as a semi-ellipse because it is, as you say, the span-wise distribution of force which must be in a semi-ellipse.

I am not sure where George Chapman placed in centre of area in relation to the C.L.R. of his boat. Mike Ellison will send you his present address and you can ask him. I think he gave a normal 'lead' and it worked out well.

Sincerely, John Morwood.



Letter from Bertram Carter to John Morwood

18A, Boyne Park, Tunbridge Wells, Kent. Tun. Wells 33257. 18.8.76.

Dear Sir,

I have been advised by the Editor of "Yachting Monthly," via an acquaintance to send the enclosed drawings for your interest, and please, your recommendations upon future procedure. It is felt that your Society would be aware of any design, or invention similar to my own. Apart from 'Lady Helmsman' at Greenwich, apparently she does not. Before embarking upon further expense in renewing my provisional patent, your knowledge would be of great assistance to me. May I please draw upon it?

Yours sincerely, Betram Carter.

Reply from John Morwood

Woodacres, Hythe, Kent, 26.8.76.

Dear Mr. Carter,

I have looked carefully at your design for an oscillating mast which I find ingenious and excellent in concept.

In essence, however, it has to be compared with other turning masts like that of the Shearwater, Tornado and similar catamarans. These, though crude from an engineering point of view, work and are lighter and cheaper than yours could be. Even the C Class "Aquarius V" which won the Little Americas Cup races in Australia used a similar mechanism.

Your other originality of streamlining the mast with sail cloth also looks good at first sight. Only the C Class catamarans use such a system and the present fashion with them is for building an aerofoil shape–which is a fashion they are not likely to change in the forseeable future.

All sail innovation is at present taking place either in one design dinghies (which have to be very cheap) or in the C Class catamarans. There is no hope of even a consideration of sail improvement in the R.O.R.C. or similar orthodox yachts.

I have known of very many yachting inventions. Apart from that for cold moulding plywood hulls, no one has made any money from any of them. Only Fairly Marine were, however, prepeared to pay royalties on the cold moulding idea. No one else did, claiming that the idea had already been used for violins, furniture and even Noah's Arc (though I could find no reference in my Bible).

In general, yachting patents are very hard to sustain and yachtsmen are unwilling to pay for them. Their only excuse is to protect a boat which is already being manufactured.

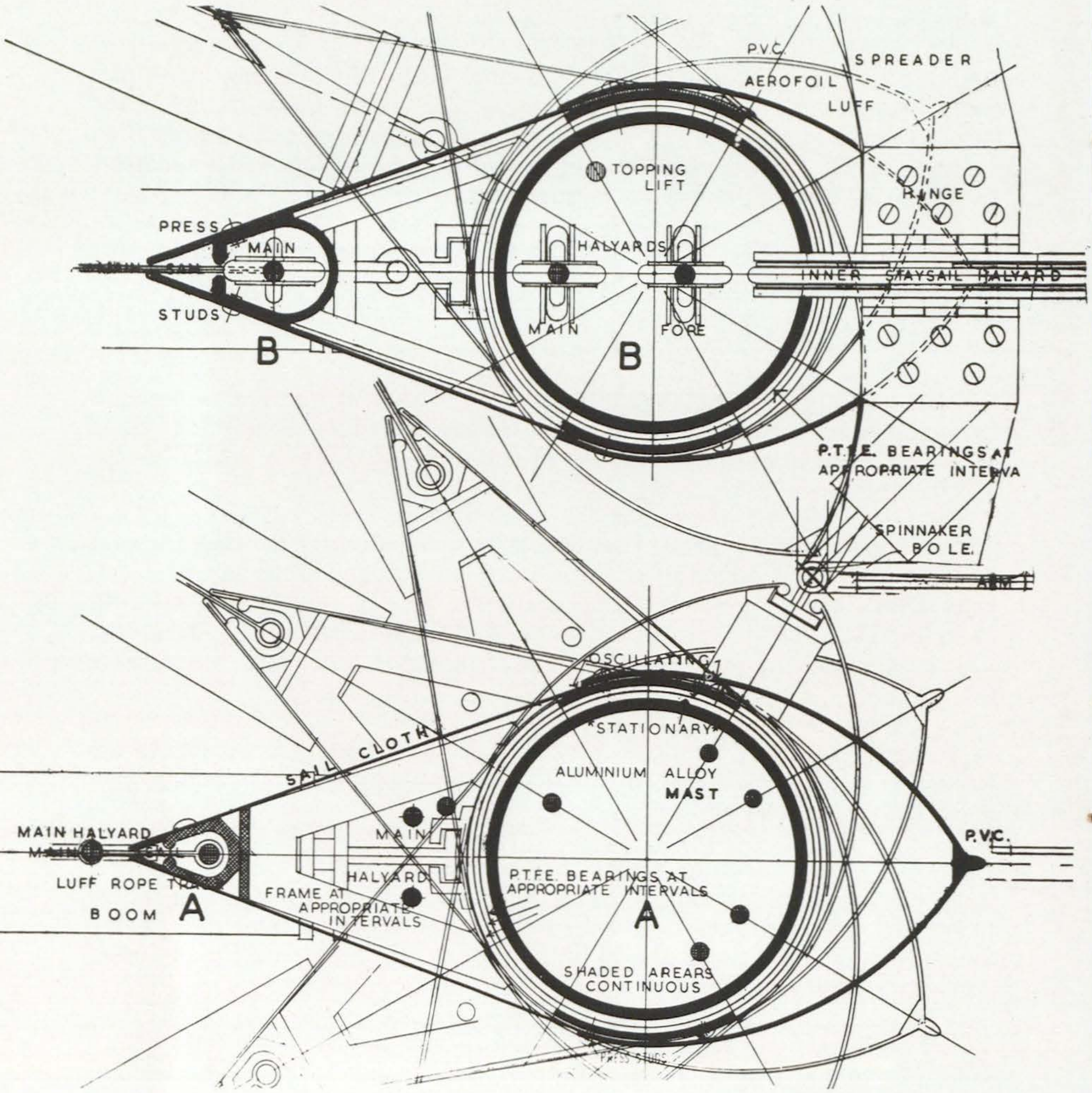
One of my own yachting 'discoveries' was in the use of stabilising hydrofoils which I demonstrated in 1956. A friend of mine repeated my experiments and took out patents and the boat is now being manufactured. I very much doubt if the patents would hold but they are an obstacle for any other would-be manufacturer.

In my view, you are very unlikely indeed to reap any financial return from your provisional patent. I will, however, send your letter on to Michael Ellison for a further opinion.

Sincerely, John Morwood.

CURRENT DESIGN "B" WITH ROUGH "TAIL"

by Bertram Carter



Letter from Christopher Hook to Michael Ellison

C. Hook, Burfield, Bosham, Sussex, 23rd November, 1976.

Dear Mike,

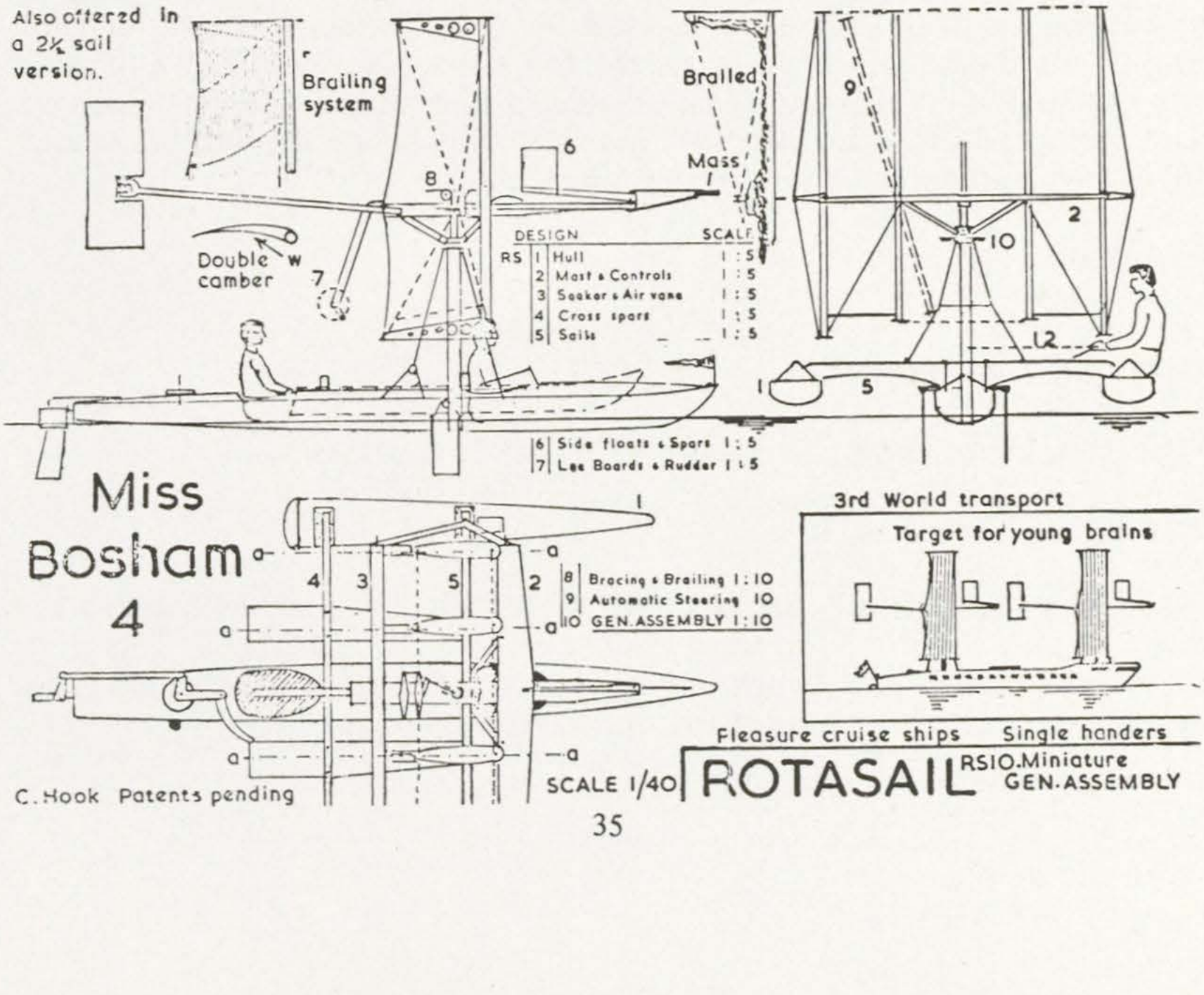
As I now have a really good performing Miss B. 3 and Miss B. 4 to be built this winter (new 18½ ft. hull as drawn) from the mould loaned to me by John Walker, and also film of Miss B. 3 sailing nicely, I am making quite good progress. I have a quote for model tests of the sail system for which I would have to have Ministry help of course, but the alternative is to try and use the A.Y.R.S. wind tunnel at Hythe.

I am not competitive in the sense of being after any challenge cups. What I have to offer is a full rigged ship sailed on one line only. I can already interest Foreign Governments in a new lease of life for their ailing shipping industries and I may even interest the British in a few decades !!

Marc Worst pointed out that I had not made enough of the Rotasails' ability to cancel out all the effects of the wind direction changes and velocity changes (which change the V_A values) by the work of the seeker.

At anchor for example, the seeker will be constantly at work and the air-vane will have constant minute adjustments of 1^{o}. The result is that the sails never even flutter and the boat is stock still. The same must be happening under way of course, but it is harder to observe.

Yours sincerely, Christopher.



Letter from Vic Clarke to John Morwood

P.O. Box 334, Johannesburg, 2000, South Africa. 76-11-11.

Dear John,

I am planning to build a yacht with a skiff type hull on which there will be experimental sails, centreboards, mast and hydrofoils, not to mention an experimental construction method. The hydrofoils will cantilever from the bottom chines 1/3 L from the bow like a low wing monoplane. Each foil will span 24 ins. with 18 ins. root chord tapering to 12 ins. The moment the hull heels the weather foil will become ineffective above the water while the lee foil produces a righting force of several hundred pounds. My sizes and forces are guesses after much reading on the subject.

Foil No. 1, I found in an American plan which claimed that it was very efficient. I suspect that it is an approximation to an airfoil designed for easy lubrication, chord +, – 5 ins. No. 2, is suitably thin and pointed and is the nearest I have found accurately coordinated in a shape which I think is suitable. In 18 ins. size it will be easy to make an accurate mould for solid GRP casting. I would very much like to hear your views on the subject of hydrofoil sections. Contrary to much I have read in A.Y.R.S. publications and yachting magazines, I don't like blunt leading edges in hydrofoils. Water is not compressible so hydrofoils should have knife-edge entries.

I can see objections to the placement of the foils so near to the surface. I visualise the hull heeling so that the lee foil is properly submerged and the weather foil above water, with some danger of cutting through swells balancing out the righting effect of the lee foil. My 4, 5 L/B ratio is meant for semi planing. An alternative design to aid the foil efficiency would be 9 L/B ratio with double the draught and therefore deeper foils. Speed would be aided by planing and foil lift. I am not 100% sure about including the foils but would still like your comments for other developments.

Vic Clarke.

Reply from John Morwood

Woodacres, Hythe, Kent., 19.11.76.

Dear Vic,

I think that most people use an "Ogival" section–flat on the bottom with an arc of a circle for the top and a thickness-chord ratio of 1 in 12. This gives the pointed leading edge which you so rightly want and also never too great a maximum negative pressure at any one point on the top.

Your basic idea seems well worth a trial and would do what you hope in calm water but, as you say, there might be trouble in waves.

Another way of doing what you want might be to use symmetrical sectioned foils with some sweep back pivoted near their leading edges. On each tack, the weather foil could be allowed to (trail) while the lee foil was given an angle of attack to produce righting moment.

Sincerely, John Morwood.

Letter from Lt. Col. R. T. White to Michael Ellison, 6th October, 1976.

Dear Mr. Ellison,

One of our students here sailed on "Golden Daisy," the winner of the Canada Cup (two ton). During the U.S. trials, he sailed against two multiple centre-board two tonners: "Aggressive II"" a Bruce King design with two boards side by side, 15^{o} off vertical, each with a fixed 8^{o} angle of attack and an assymetrical shape; and "Nike" a Ted Hood design with 4 boards, a ℄ metal board, two small ogival shaped bilge boards and a retractable dagger board in front of the rudder, acting as a retractable skeg.

Both boats made less leeway than "Golden Daisy" when close hauled, but both had steering problems downwind or on a broad reach with a spinnaker, in fact, "Aggressive" broached in a strong wind.

In the finals for choice of the American contender, "Golden Daisy" won because she found a light breeze when the other boat (I believe it was "Aggressive") was becalmed although "Aggressive" had been well in the lead up to that point.

Yours sincerely, Richard T. White, Lt. Col., U.S.A.F.

Letter from Douglas Hannan to John Morwood

6 Dixon Court, Sea Cliff, N.Y. 11579, U.S.A., 1st October, 1976.

Dear John,

I am back to my cellar and "go fast" inventions. this winter. I have Flying Fish's original front steering foil and plan to adapt it, and ladder foils to aluminium ladder extrusions off the Sizzler—16 ins. as a base. Meanwhile, By contrast, when sails are placed fore and aft, they have persisted. Perhaps,

The sailframe structure to be unbalanced and flop over, so that the forward section is always to leeward, giving preferable angle of sails to the wind. The sails are a 7 : 1 ratio with tip flow controller plates.

Best wishes, Douglas Hannan.

"SWAMP STOMPER"

Hydrofoil Catamaran

Length . . . . . 22 ft.
Beam . . . . . 20 ft.
(Dual una rigs/each . . . 150 sq. ft.)

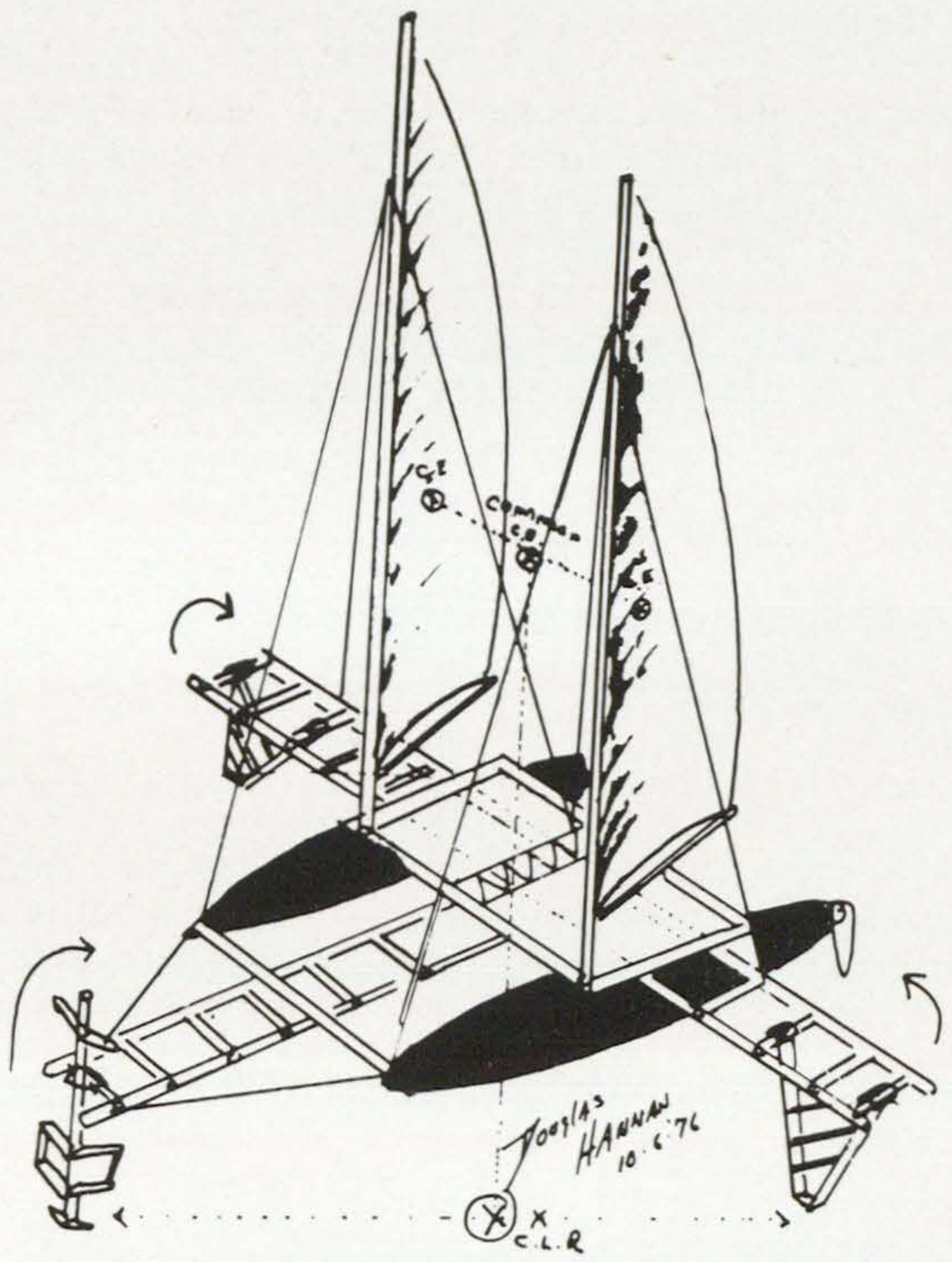
Weight. . . . . 450 lbs.
Sail Area . . . . . 300 sq. ft.

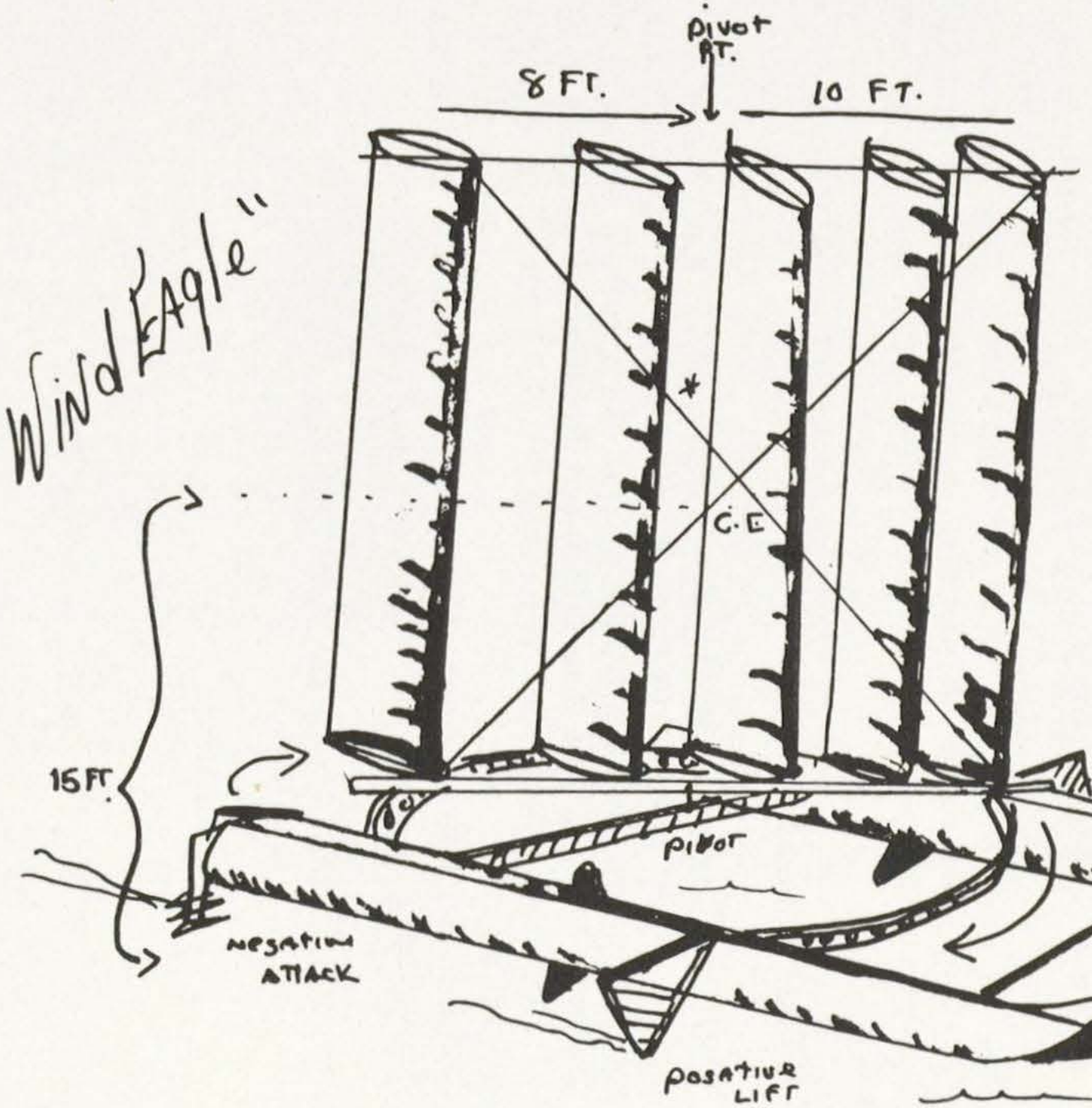
Foils retractable. Sails controlled in unison or independently.

The choice of a catamaran has seemed obvious from the standpoint of a stable platform for static standing, or for a fair turn of speed when foils are retracted in light airs. The reason for dual mainsails is that the C. of E. can be located farther aft than a jib rig (more in line with the C. L. R.). The advantage being more power without additional width or length to compensate. Centre of effort remains same height. Also lessens bow load without lengthening overall length.

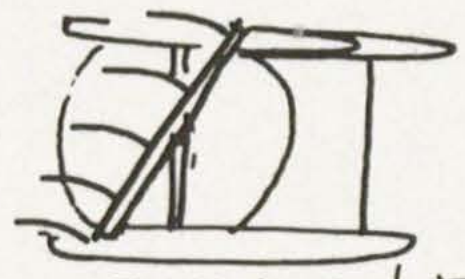
"SWAMP STOMPER"

Hydrofoil Catamaran

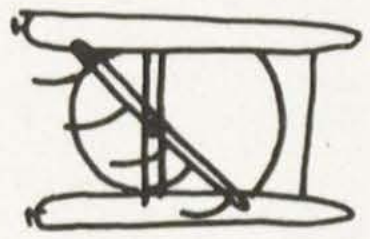




"Wind Eagle"



STARBOARD TACK



PORT TACK

ANTI DIVE SCOOP bows for reserve bouancy and dynamic lift. should rear foil lift out - and boat try to pitchpole

* Note please disregard X-SHAPED support wires as they are NON-ERASABLE

Reply from John Morwood

Woodacres, Hythe, Kent, 15.10.76.

Dear Douglas,

I do admire your thinking and inventing processes. Not, of course that I ever fully agree with anyone elses inventions but you certainly have a fully thought out system (or systems) of designing foil boats, which is unusual.

Sea Streak

The combination of the Don Nigg forward foil and the Keiper side foils both of which have been shown to work must produce a foil flyer of merit. When these are attached to a catamaran of speed for light wind stability, the whole must be a good concept.

I am not really able to comment on side by side sails. Whenever these have been used, they seem to have either been replaced by a normal rig or have just dropped out of our sight. At first, they have been well reported but with the fault that there is some wind shadow on certain courses. Perhaps that is what makes them disappear.

By contrast, when sails are placed fore and aft, they have persisted. Perhaps, the fore mast should set a genoa and the main, a normal sail. A good rig was once used over here consisting of a large genoa only with no mainsail at all.

C Class Multisail Design

This also looks good and would go well, like Clifton Flasher at the Weymouth Speed Trials. I would guess that it is a heavy rig as usually made and might only function well on reaching courses. It suffers from the **Venetian Blind Fallacy**. That is, that the maximum Coefficient which is available from an area through which wind is passing is only 1.0 whereas a single sail can have a coefficient of nearly 2.0. This comes from air being affected outside the wing to a greater extent. Aeroplanes can only use two wings successfully. When triplanes were tried, they failed to be good.

Sincerely, John Morwood.

"C" CLASS – 25 ft. x 14 ft.

300 sq. ft. Sail Area, 60 sq. ft. per sail, 3 x 22½ ft. per sail.

Weight of crew on windward hull should easily counter boat overturning– especially when foils are down.

WHY HAVE A RUDDER?

by Michael Ellison

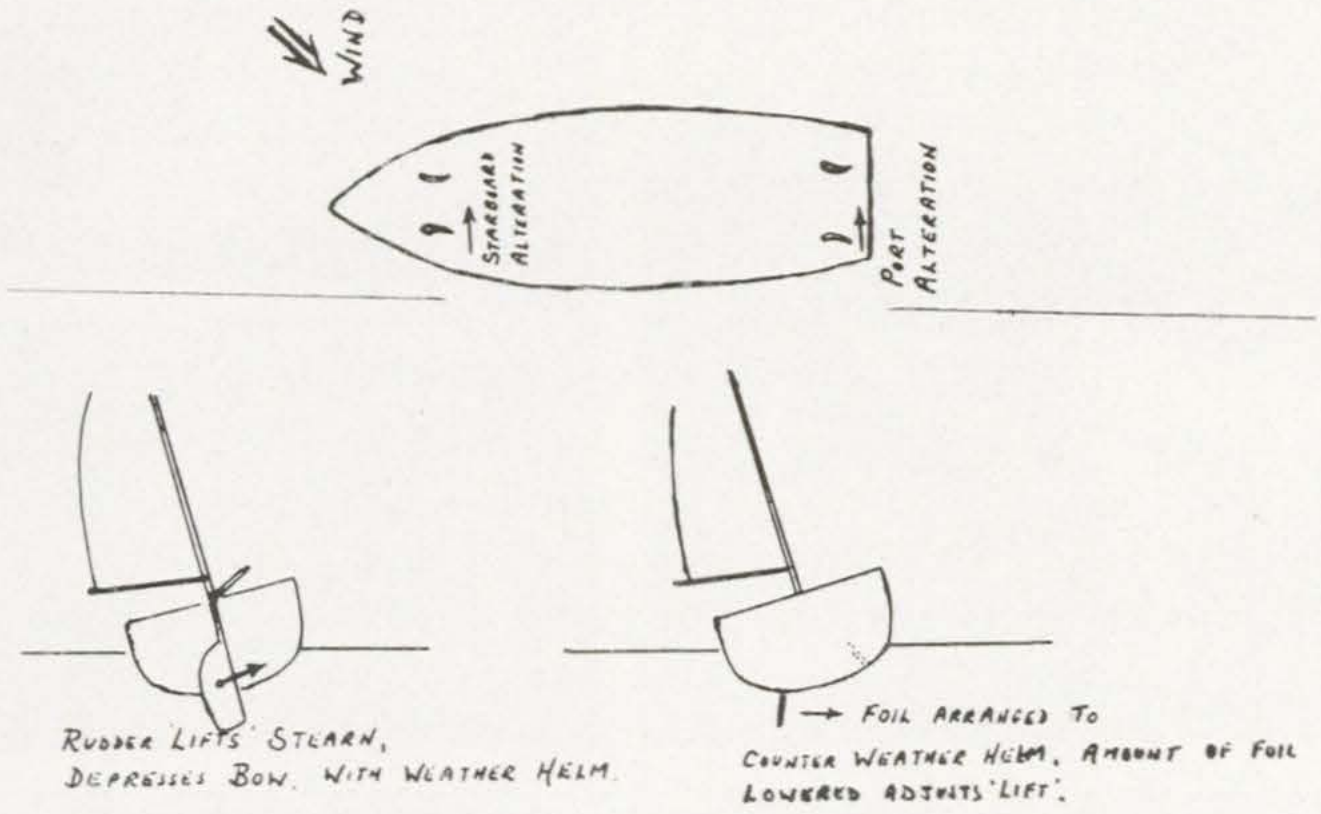
In the newsletter sent round to members with publication 79, "Rudder Design," I suggested that rudders are now obsolete and are only useful for manoeuvring at slow speed. Noah probably fitted one to the arc and every craft built afterwards looks naked without one.

It was my suggestion that the rudder can easily be replaced by two lifting hydrofoil sections fitted into almost vertical trunks. When the craft is on course, these sections would both be within the trunk, or on hydrofoil craft within the strut supporting the foil. When off course or for example to correct weather helm one foil would be lowered to give exactly the required amount of "lift" in the required direction. The main advantage I expect from removing the rudder is an increase in speed due to removal of the large rudder area which is only needed when docking. Various publications state that the rudder causes a large amount of the total drag at high speed and by using foils to steer less foil will be required as speed increases. The foils could be operated by a steering wheel or tiller as preferred.

At a meeting there was some discussion about fitting the steering foils to or near the bow instead of aft, it being suggested that it might be preferable to pull the vessel onto the desired course rather than push the stern in the "wrong" direction. It was noted that the bow rudder as fitted to the "Flying Fish" by Don Nigg is in fact very effective even though the craft itself has not proved very practical.

Will any member who has tried this idea please report.

On a sailing craft one could steer using one aft and one forward foil on the same side on either tack so that course corrections always give 'lift' to windward and do not increase leeway.



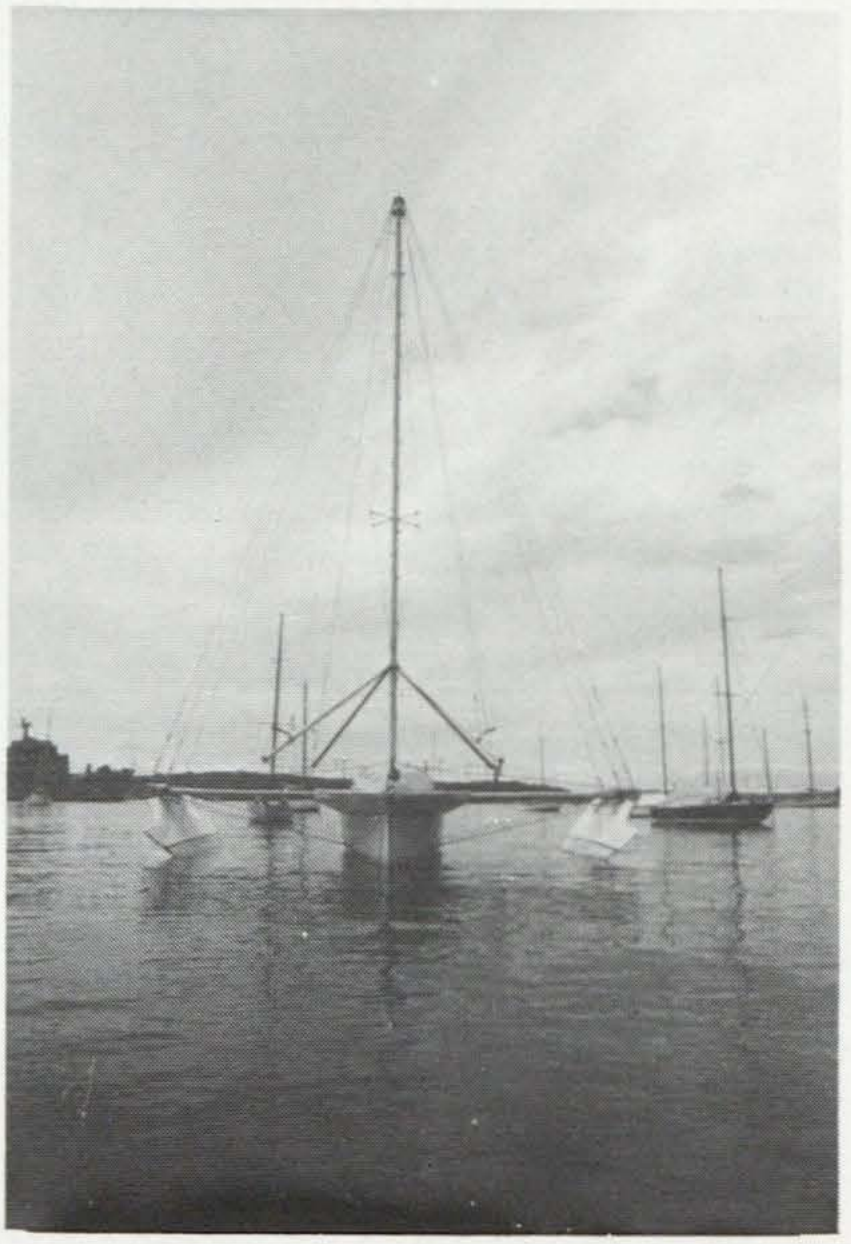
Letter from Josef Dusek to Michael Ellison. Sydney, 9.11.76

Dear Michael,

Regarding Dalibor, I am sending you some pictures and negatives to show its present form—outside. At this moment, I am remodelling rudders and fixing a steering wheel into the cockpit. Next week I will select a new set of sails from **Hood**, Australia. They are making for me, two tall jibs for heavy weather, 400 sq. ft. total. My light air sails in future will have over 700 sq. ft.

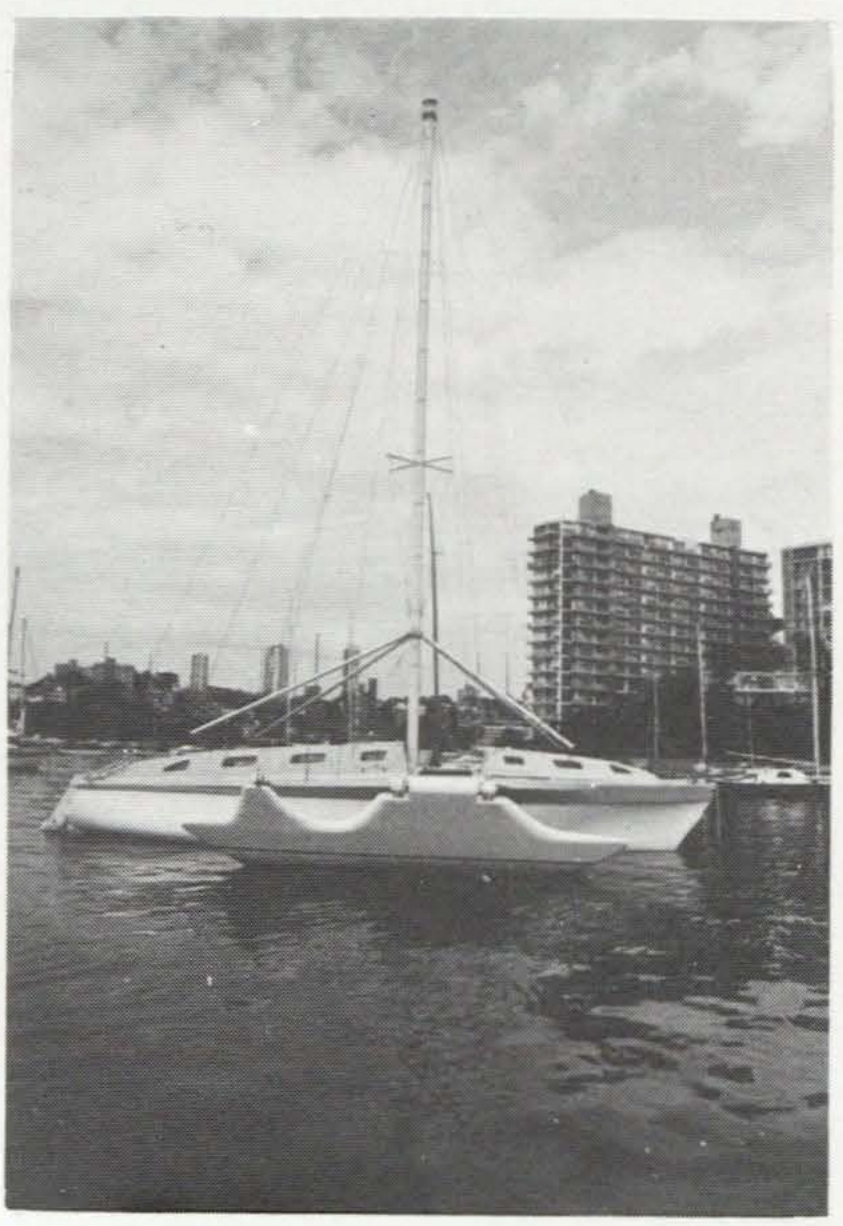
I fully share the concern of David Chinery regarding joint of foil to booms or wing, but I fully explained to him my method of settling this problem in my letter to him and I hope that he has passed this letter on to you.

Yours sincerely, Josef T. Dusek.



"Dalibor" Josef Dusek's Foiler

"Dalibor" Josef Dusek's Foiler



"Dalibor" Josef Dusek's Foiler

Letter from Douglas Hannen to John Morwood

6 Dixon Court Sea Cliff, New York, N.Y., 12th November, 1976.

Dear Mr. Morwood,

Reading earlier A.Y.R.S. journals, I find that many more individuals wrote in who had little formal training, but put imagination and ideas to work in crude form. As of late, lengthy theory seemingly predominates. Perhaps it is because individuals like me don't feel qualified to contribute. Although the many various formulas exist to prove out a theory (and do) they some times prove a deterent, trying to wade through without being an expert in the field of fluid dynamics. It would greatly help if the writer (if not the editor) could rough out a synopsis in layman's terms.

It has been my good fortune to occasionally drift over to see what Prof. Bradfield has been up to as of late. He is sometimes short handed for helpers when he tests NF^2. I must admit that when I saw his most up to date version of NF^2 it warmed the cockels of my heart. For I had believed that a catamaran bed for the rear foils would be a much more stable platform than his single Tornado hull for the main bouyancy. Well he had switched to a pair of inflatable floats (a la "Kelek"), thus becoming more stable and losing 140 lbs. in the process. A forward float completes the arrangement. It looked very similar to my concept of 'Sea Streak' for stability. He has switched from a jib and main, to a 235 sq. ft. main alone. And it really moves as a result! "Icarus" may have upped its record, but after clocking roughly by my watch, I think that the good professor, is just refining his craft for the break-through come next spring. Out of courtesy, as he asked me to assist, I can't quote my approximation, but in my opinion he has a winner.

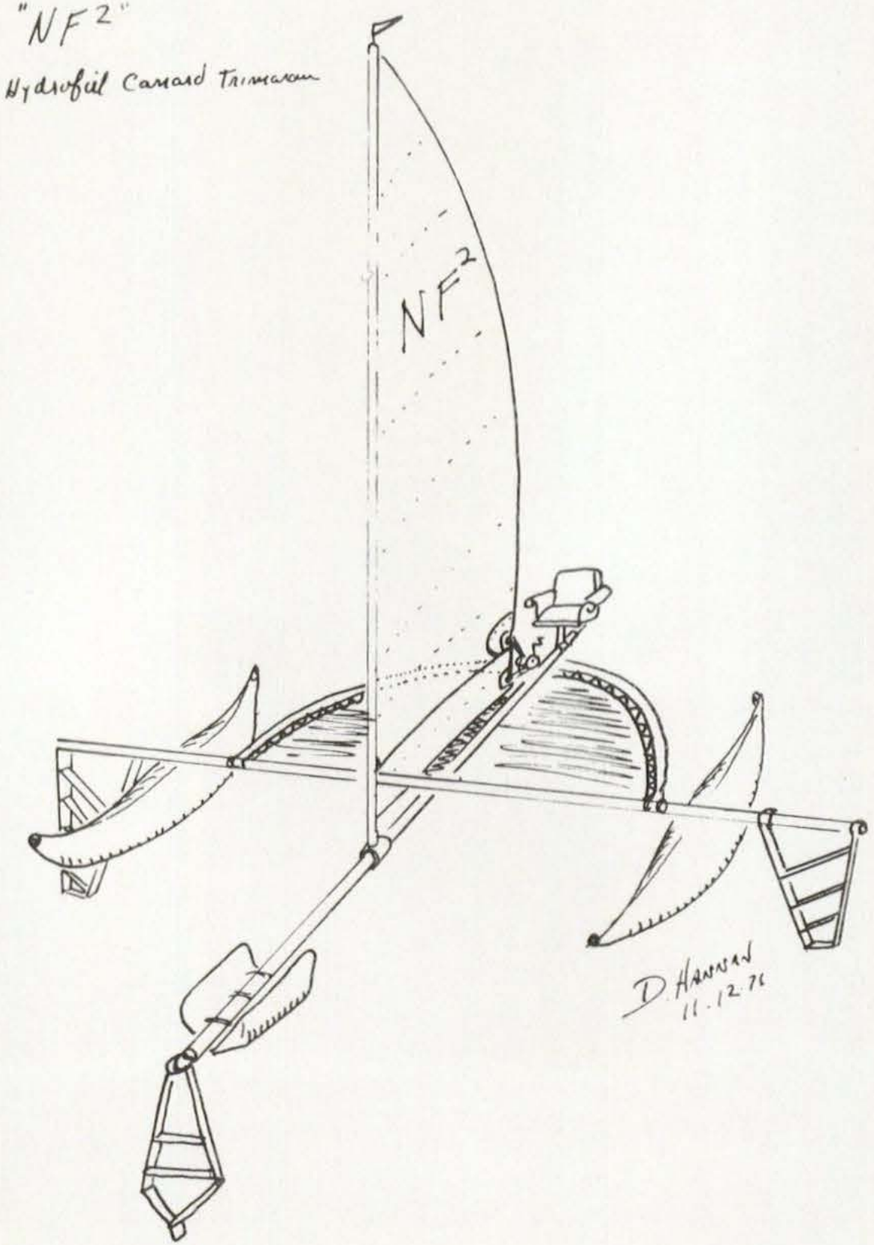
This last brain storm, entitled "Dragon Fang" has already been submitted to John Shortall (so don't send it on), but I wonder if you have ever seen or heard of a sliding rig such as this? For stability and light air sailing it is a **trimaran** with foils retracted. For heavy weather sailing, it becomes a hydrofoil **proa** that doesn't have to shunt, but merely moves the main hull to the new leeward side. The spring loaded front bearing allows the boom (?) to compress so it can be brought to the other side, and yet allow the pivot point (mid boom) to work without jamming when it swings through its arc to the other side.

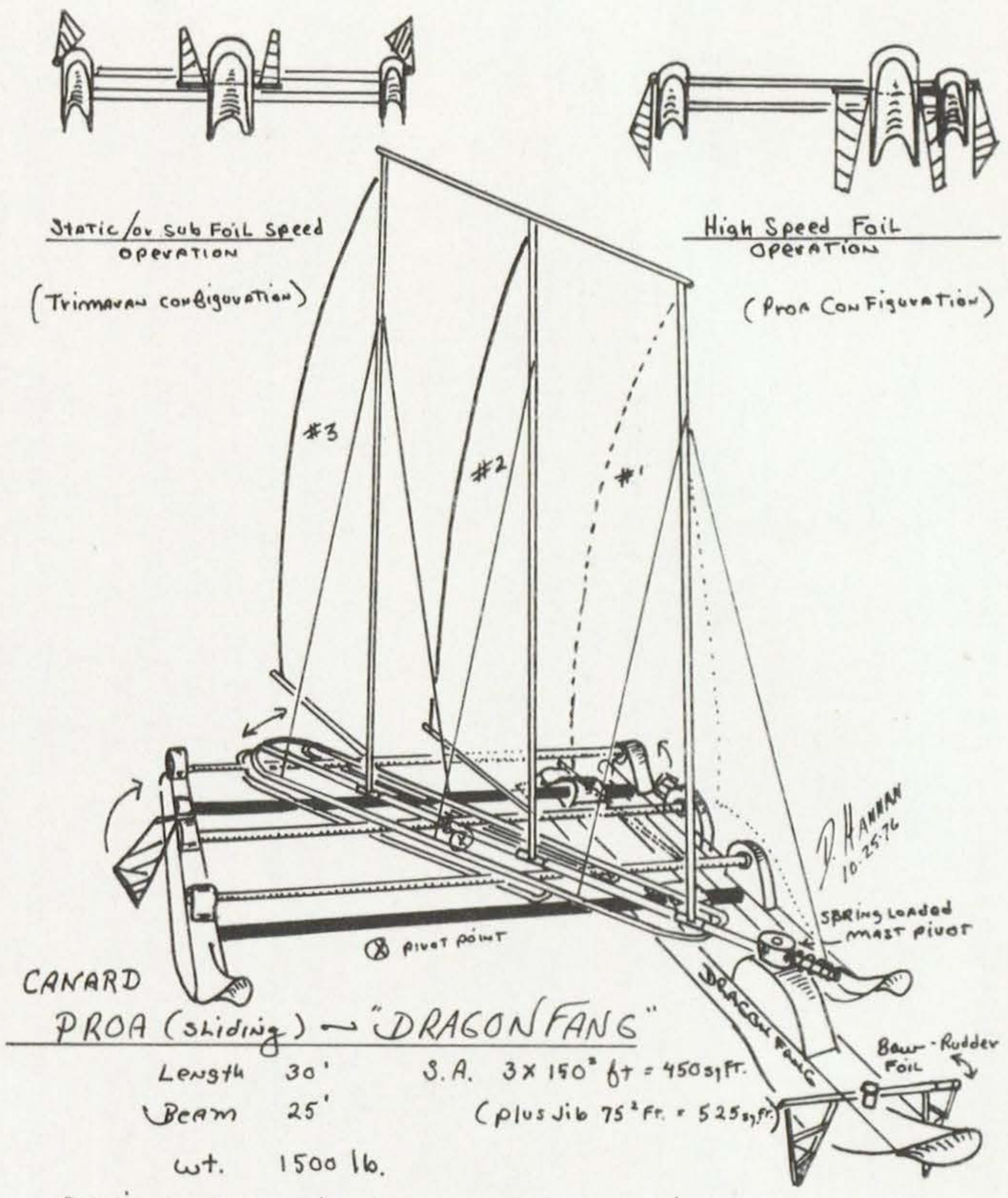
I myself can find fault with it; such as complexity, weight, and I know your feelings on multiple sails and my favourite scoop bows with rounded step hulls. But granted all that, I am still infatuated with the low centre of effort that multiple sails give (which can mean a narrower beam as a result). What is your opinion?

Sincerely, Doug. Hannan.

"NF²"

Hydrofoil Canard Trimaran





CANARD

PROA (sliding) → "DRAGONFANG"

Length	30'	S.A.	3 X 150² ft = 450 sq Ft.
Beam	25'		(plus Jib 75² Ft. = 525 sq Ft.)
wt.	1500 lb.		

Sprung Loaded pivoting multi-sail MAIN

Reply from John Morwood

Woodacres, Hythe. Kent., 19.11.76.

Dear Doug.,

I must say that I conceived of the A.Y.R.S. as allowing people to contribute ideas who were scientifically uninformed. Hence the word 'Amateur' in the title. This appeared to have been broadened in the course of time to people who were not professionals in yachting but who **were** scientifically informed doing yachting research of a high level. I solved the matter by allowing the scientists one publication per year to spout off while the ideas men had the other three.

You have a good point about keeping yachts simple. One, or at the most two sails in the air is the maximum. One or at most two hulls in the water, similarly.

I can assure you that your line of thinking is what the vast majority of A.Y.R.S. members want. Few can understand (or want to) the mathematics and theory. They really want their imaginations stimulated. Simply that. It is just that we have lost this concept on the editorial side. If I were still editor, I would publish all your ideas.

Your sketch of Prof. Bradfields latest is just grand. This is certainly a boat which should be fast, largely because it is **simple and light**. I am not greatly enamoured of his ladder foils because they seem a bit complex but otherwise, it cannot be faulted.

Alas, it is hard to be very original, Francis Herreshoff (Commonsense of Yacht Design) showed a sliding trimaran of the same principle as you have drawn in "Dragon Fang". I have, however, never seen the rig before. Most people, would be content to put the masts on the main hull.

Scoop Bows

You have drawn these before and I have never commented on them. What are they supposed to do? Have you ever tried them out as models?

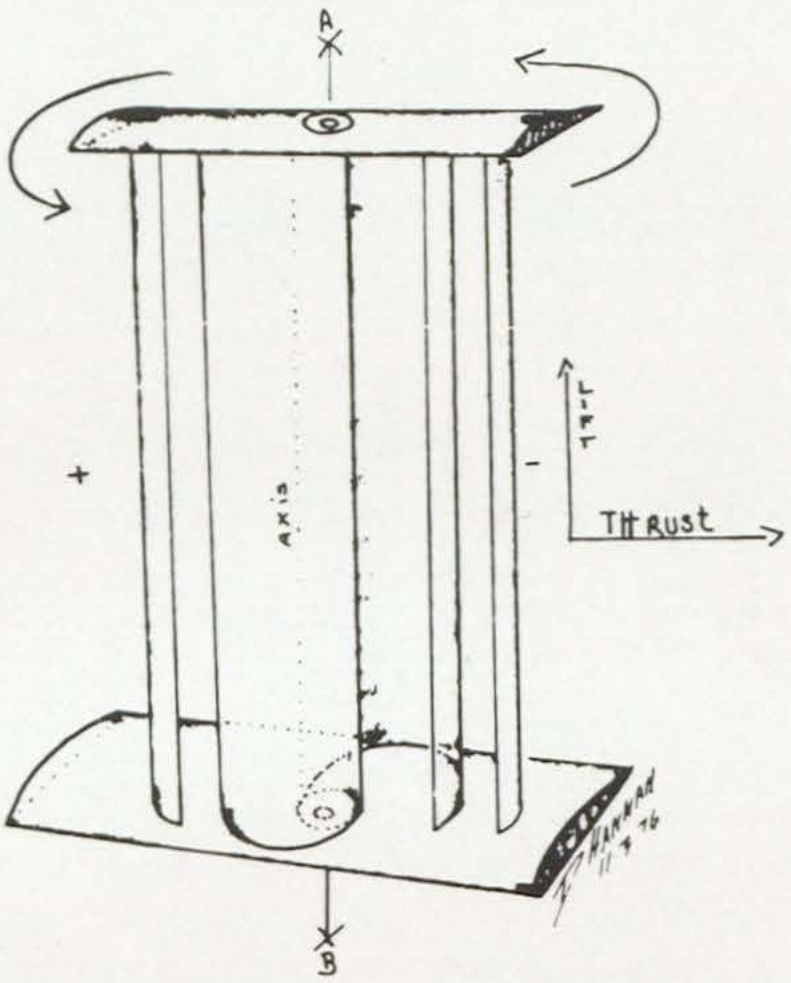
Woody Brown and Alfred Kumulai built Manu Kai the first modern catamaran. This had assymetric plywood hulls. Rudy Choy still keeps to this formula. The prouts, never having seen the Hawaiian or Californian boats used Kayak Hulls, thus converting the concept to rounded hulls.

I therefore contend with you that there is no need to describe anything in too much detail. If something has been made that works, someone else will come up with a better version if he doesn't slavishly copy but uses imagination and 'flair' of invention.

Sincerely, John Morwood.

HANNAN MODIFIED ROTOR

by Douglas Hannan



HANNAN Modified Rotor: By Douglas Hannan.

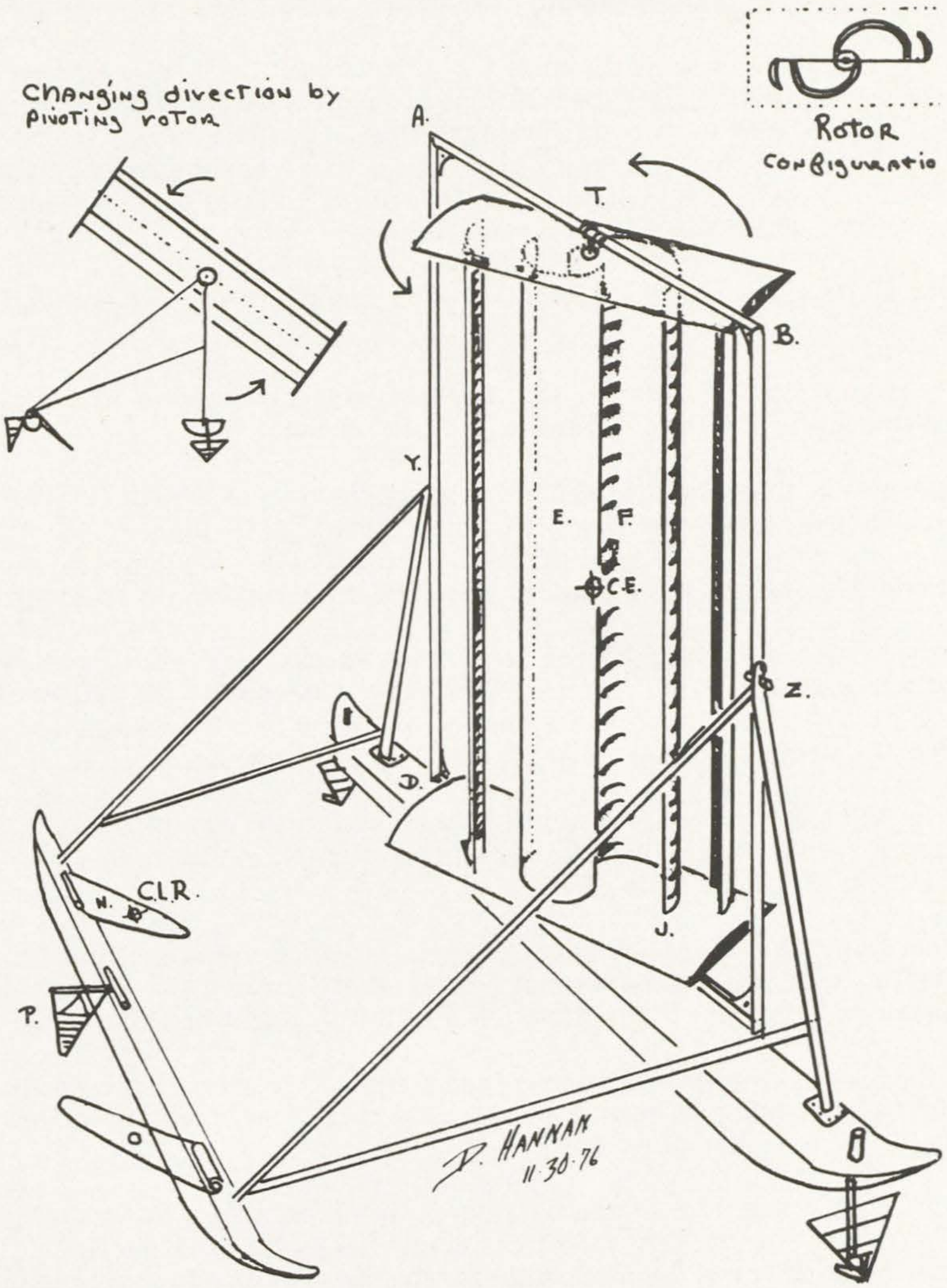
Being a Long Island Multihull Association member for the past few years, has provided me with enjoyment and an outlet for my many ideas (whether it be cartoons or concepts). As racing is not one of my major interests (probably because I am not proficient at it as yet), I have tended to lean toward the more exotic forms of sailing; those way out forms of making a boat go faster, be it sail shape or hull form.

It has been my good fortune to watch the efforts of Prof. Bradfield, as he progressed along the line of hydrofoils toward the ultimate goal of high speed sailing. His professional approach stimulated me enough to try to achieve a similar feat, but through a thoroughly different tack . . . one of improving sail efficiency.

The rotor sail is not a new concept, and was once employed to help drive a small German freighter across the Atlantic by means of three Flettner Rotors. Later on a Finnish inventor, designed a more efficient rotor to drive windmill tips before World War II. But the limiting factor has always been that the rotor would only blow as fast as the wind would drive it. I believe that I have circumvented that problem plus added vertical lift. In addition, have doubled wing tip speed for superior efficiency. Why a rotor? Simply because it possibly can develop five times the power of a same size sail!

I hope to demonstrate its problems (limitations) and properties (advantages) on a model at a LIMA meeting in the near future.

ROTA - PROA "WHIRLWIND"



Rotor-Proa: "Whirlwind"

ROTORS

by John Morwood

The Flettner rotor worked but has the disadvantage that its performance is hopeless in winds of less than 14 mph. (the fault of all thick wings on boats). This is due to **Greatly Increased Drag** at low Reynolds Numbers. The Coefficient of force per profile plan form is 10.0", as compared to about 1.0 for most sails—at least I calculated it as such once, but suspect my figures. A yacht fitted with a Flettner rotor was a disaster.

All the above applies to the Savaronius (don't know if this is spelt correctly) rotor.

I have given a lot of thought to applying both to sailing craft and have come to the conclusion that they are useless for boats on water.

It is, however, quite another matter to apply them to land yachts. Firstly, the speeds will usually be above the critical speed of 14 mph. so the full value of the drive force can be achieved. Secondly, the windmill effect of the Savaronius rotor can be used to drive the craft **Directly to Windward.**

A simple Savaronius rotor applied to a three wheeled land yacht with optional attachment, through gearing, to the back axle seems to me well worth trying. We have a very light, three wheeled motor car over here which would be ideal for the basis. It has a fibreglass body—I owned one once.

Later in this publication are accounts of the Californian 'Windmobile' which appears to work, though it looks a technical disaster. A Savaronius Rotor would be far better and more useful.

Flettner found that there was a limited speed at which rotation of his rotor was useful, with no improvement at greater rotation speed (to the best of my memory). His book "The Story of the Rotor" might be still available.

I am unable to comment on the extra wings around the rotor on the Hannan Rotor. I gather that the hope is to get extra rotational speeds from them but fail to see how this would work.

A full article on the use of the Savaronius Rotor on a light three-wheeled vehicle, such as our 'Reliant' motor car should be published in the A.Y.R.S. The trouble would be in the mechanism for changing the direction of rotation of the rotor on change of tack.

EDITORIAL NOTE

At the risk of appearing too academic, I would like to add that Dr. Peter Musgrove of the Department of Engineering and Cybernetics at Reading University has developed a self-feathering, horizontally spinning windmill

which might be suitable for boats. There is no need for speed limiting devices (with his design) in any wind strength, in fact in very strong winds the blade stresses actually decrease. Reference: Dr. Peter Musgrove, "Windmills Change Direction" – New Scientist, 9th December, 1976.

Letter from Dick Andrews to John Morwood

25 Audubon Drive, Ossining, New York, 10562, 7th September, 1976.

Dear John,

Many of my happiest boyhood hours were spent at the tiller of a sixteen foot V-bottom sloop.

She sailed well. She was certainly stable in form. She had a bonus in speed off the wind in a breeze. And she was an entirely reasonable performer in quite light air **if** heeled alee by a lee-side hike out.
According to Chapelle, the type appeared in small working sailboats before the turn of the century and was perhaps the last significant form modification before the advent of power in workboats. The so-called "skipjack" on the Cheseapeake Bay area is a fairly large version of this type with a single, quite raked mast and the so-called "sharp" rig (meaning no gaff). (They called the gaff rig the "square rig" there).

I am not sure what type of accommodations are feasible in a small version of the type. That is, head room might be limited.

Small sailing and rowing craft in the US in the ply era were almost always thus built in the V or similar models, and compound curvature was rare, after the demise of the old-time craftsmen. A few types clung to it but it has been perhaps less common than in Britain. A return to these forms in the plastics era is doubtless due to the better strength of plastic/glass in compound curved developments.

I am making up a "whiffle" model 24 ins. long to compete with BOXY. This new shape will have the same profile as BOXY but the typical V bottom sections, so the profile will be deeper at the bow. I am calling it VEEN– (old Manx word for "little" in the sense of an affectionate dimunitive).

Will report on this as tests are completed.

. . . . . HOT air, light air, very light, hot air, etc;–As you know, I have been making and sailing various types of small outriggers since 1960.

It might be possible to say that the problem for many form-stabilized craft involving extra hulls, floats, etc.–is the extra surface in light air. This no doubt operates, but another problem for them is simply that they ARE stabilized.

I have watched catamarans trying to ghost about, and it is most notable that their rigs are not asleep, but are being thrown about by the usual wash and popple.

Now I have mentioned here that our old trick with our boyhood crates was to heel them by hiking alee, in light air. There is a form of craft thus set up and this is the outrigger (double) of the Phillipines which rests cocked up over, or heeled, at all times. When it comes about, it rocks over.

I have found that this works very light air, on craft I've made over the years. But the best demonstration of its potential was made by a friend of mine who took one to a YACHTING one of a kind regatta. On a light day, he simply walked over all of the other boats there. When one considers that they were also the pick of their classes, and in our American summers, not unused to very light conditions and how to cope with them in their craft, it is clear that the cocked-over outrigger form had a significant edge.

(I have been careful to avoid the word "trimaran" simply because the term covers so many possible uses of floats, positions, etc., that it does not describe any one of them well. Possibly, if any, one thinks of a "trimaran" as heeling very little at any time.)

As to what happens when one is breaking a boat loose with very low power, or in very light and vagrant air, I do not believe that any ordinary keel or board factors are useful. I am discussing a phenomenon of relatively brief duration, if recurrent. The book on this when we were boys, racing the little craft, was to get the board up when a puff approached. We cribbed this from Manfred Curry.

If the push one gets from nature is initially athwartships, and the boat is not moving, then it is a push side ways. I don't think any form of fixed keel is helpful. Possibly a long one is better than deep. This is conjectural. I'd like to figure a way to test it!

My 14 ft. round bottomed planing dinghy with a very deep, narrow board is incidentally an excellent light air flier, and it is breath-taking to think that my friend ran over all of that lot with his double outrigger.

. . . . . In a letter of which you sent me a copy, you noted ice boats as "slowed" types, without any further discussion. If you can recall the thought, I'd be interested. On the face of it, ice boats sail faster than anything else that can be said to move on any sort of surface, so just how they are "slowed" intrigues me.

My No. 2 daughter came to Maine to visit us this summer and requested a coastal cruise in my trimaran. Forthwith I made a "quick and dirty" cabin which is really a sort of windscreen with windows, fore sheet and side sheets, and a top which has a large bay cut in it. No moving parts. This served very well and with a boom tarp, we had two very good nights at anchor and were still jolly the third day. Not bad in a 20 footer.

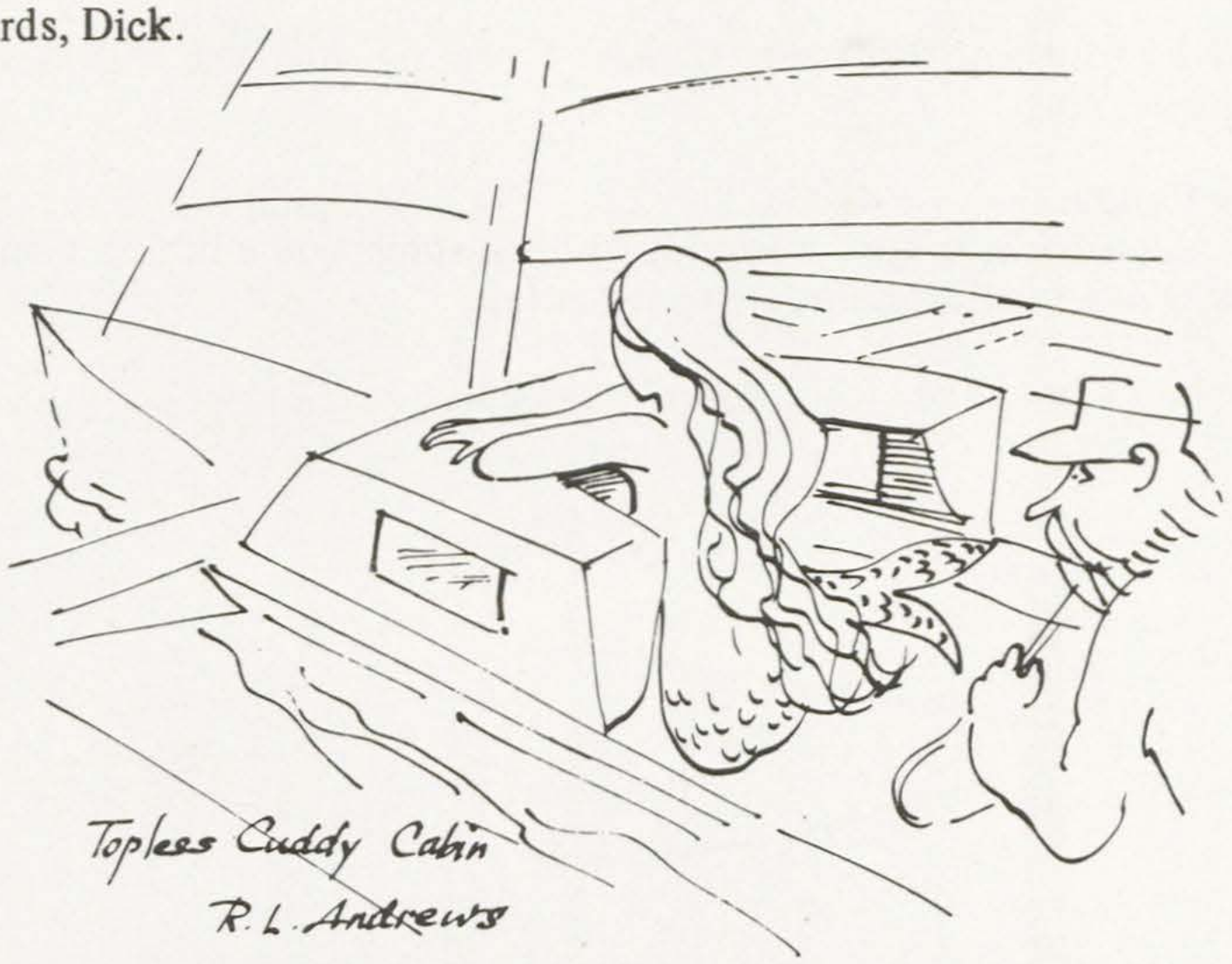
TESTS COMPLETED

"VEEN" vs. "BOXY":– I believe I have reported on this before. However the "whiffletree" results were:–

Towed on Even Keels: no significant difference.
Towed with 5° Angle at Heel: "Veen" has a slight edge.

I will reconfirm this when the local dinghy fleet goes home for the winter and their low, 60 foot floating dock becomes available. In this long pull, minor differences in resistance will more surely emerge.

Best regards, Dick.



Topless Cuddy Cabin
R. L. Andrews

Reply from John Morwood

Woodacres, Hythe, Kent, 6.11.76.

Dear Dick,

As I see it, two extreme types of boat are best for stability and hence sail carrying power. Either the Boxy New Haven Sharpie and similar—or a very low deep keel above which nearly any hull will do.

The V bottom has two advantages over Boxy. One, it doesn't pound in a head lop; Two, if heeled, the wetted area is reduced. My own V bottomed 25 footer was sluggish in light winds but when heeled to reduce the beam from 8 feet to about 6 feet, she fairly flew. Headroom was 4 ft. 6 ins. low but O.K. for us young chaps.

Wetted Surface
As you pointed out, undoubtedly the fastest boat in light airs is the double outrigger which heels to keep the sails asleep. With the lee float just kissing the water, wetted surface is minimal.

The "Slowed" Ice Boat
Edmond Bruce proved that, if a boat is fast enough, she will not go to windward at all. For example, if an ice boat sails at a beta of 15^{o} and only sails at the same speed as the wind, the gamma will be 30^{o}. If she sails at four times the speed of the wind, the gamma will be ??? 60^{o}. If she sails at seven times the speed of the wind, the gamma will be 105^{o} ???. I am not sure of the exact figures.

What I meant was that ice boats have to be 'pinched' and thus slowed to get their best Vmg.

Your Cuddy
This seems to have been a very good idea which you enjoyed. Comfortable? cruising in a small trimaran is much wanted.

With best regards, sincerely, John Morwood.

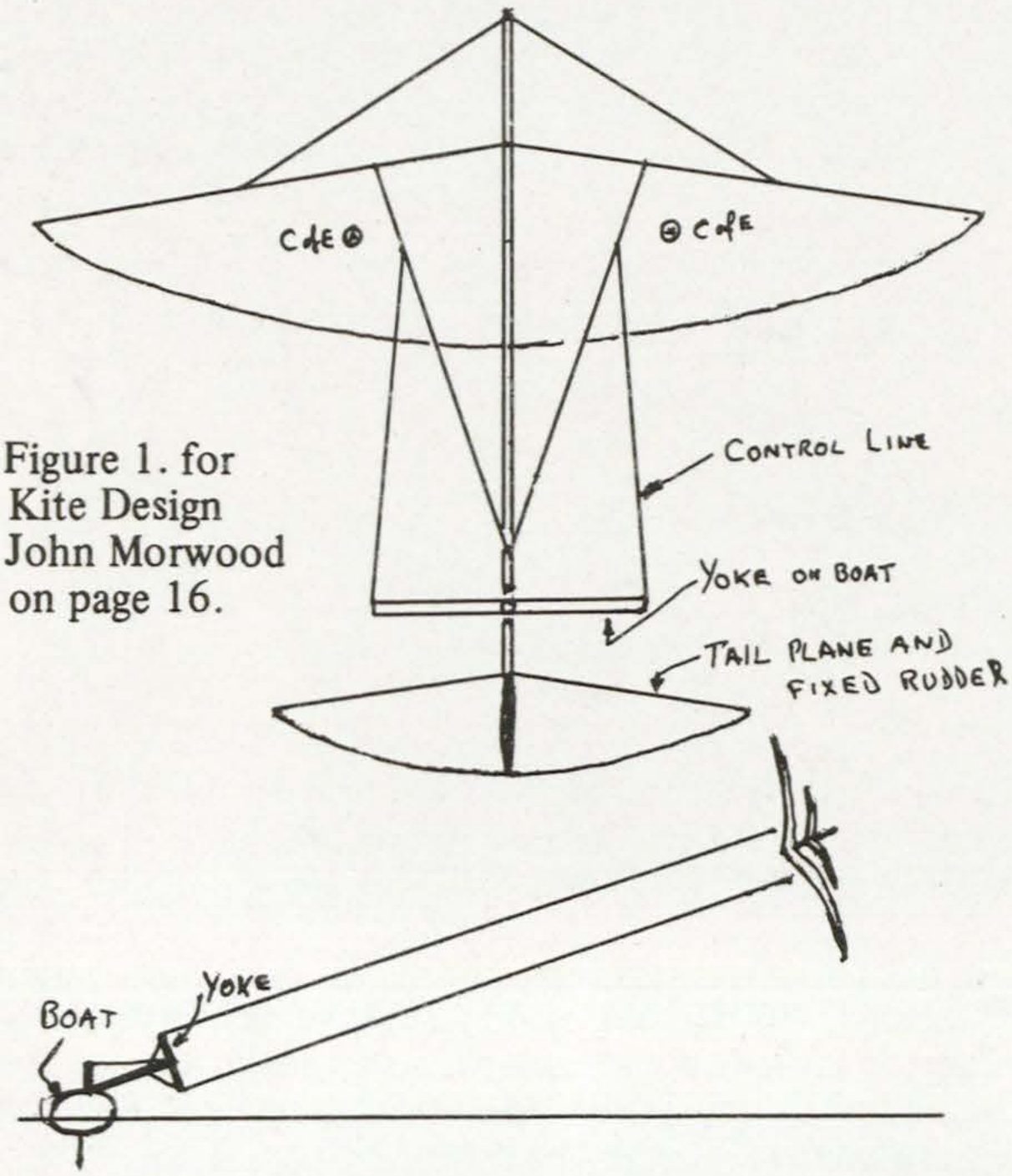


Figure 1. for
Kite Design
by John Morwood
on page 16.

GUNKHOLING 10 M. TRIMARAN – BJORN ENQVIST

Yes, it is true that we have been monitoring A.Y.R.S.;
-----but why do you ask?