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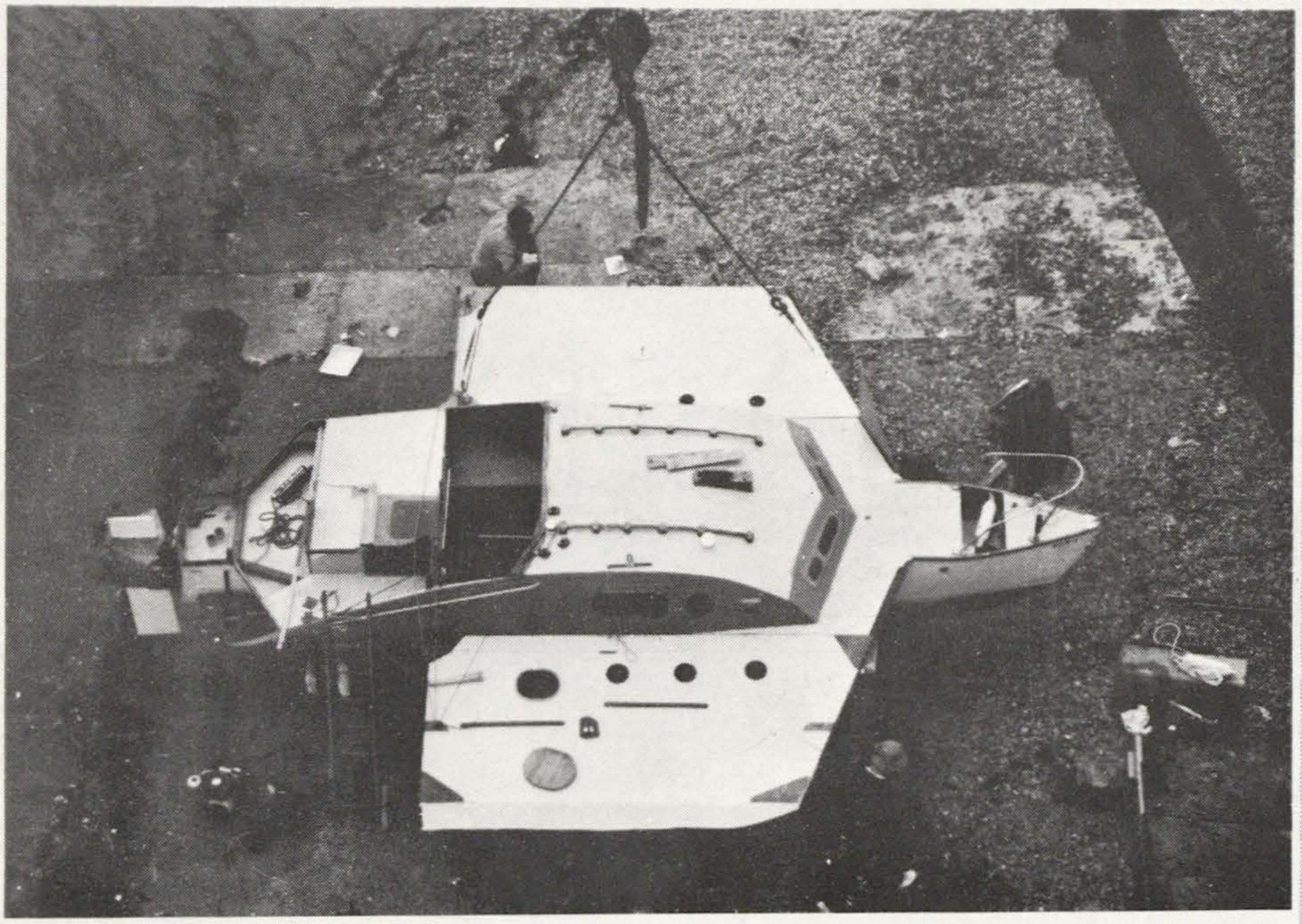
DECEMBER 1982

RACING
HYDROFOILS AND MULTIHULLS
CRUISING



'SABU'

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AMARAN Prototype 1 in Holland

Portland

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THE AMATEUR YACHT RESEARCH SOCIETY

(Founded, June 1955 to encourage Amateur and Individual Yacht Research)

The Society has members in all countries of the world where sailing is a sport. Information for publication comes from members and people interested in sailing or building yachts. Funds come from members subscriptions, from the sale of books and from donations. Any person may join, the subscription for 1982-1983 is £ 10 or $ 20 U.S.A. . New ideas or details of problems are welcomed by the administrator. We try to pass these on to avoid duplication of research and to put people with similar interests in touch with other.

Administration and Membership:
Michael Ellison, A.Y.R.S. Hermitage,
Newbury, Berkshire, England, RG16 9RW.

The Amateur Yacht Research Society is a Limited Company, and a registered educational charity. Membership is open to anyone interested in the improvement of yachts and equipment.

Editors Notes by Michael Ellison

The Committee and numerous members have asked that our publications return to the early style introduced by John Morwood in 1955. This is my version and any comments or contributions from readers are welcome.

"You can't publish that - its not research". I have. To many members, details of the 19' Prout cruiser catamaran and "Klis" by Bernard Rhodes belong in history books. Before navigation became a science of "Satnav" the art was to record carefully where you came from so that you could estimate the best course to steer. I think it is most important to develop new ideas and designs with modern materials using knowledge of past success and failure.

This number contains a proposal to M.O.C.R.A. for a trailer sailer racing class. This is included because the problems of trying to get a lot into a little are world wide. No 'general purpose' craft can be as fast as a world speed record holder but many of the ideas used for the speed sailing craft can usefully be copied.

Perhaps "Sabu" has more space than her limited success deserves. Chay Blyth was said to laugh when he reported the destruction of one of his spinnakers that cost £ 3,000. That is more than the cost of "Sabu" and would pay for three of these publications as typed by me with two fingers. The ideas built into "Sabu" have come from the A.Y.R.S. and I am pleased to report that they proved entirely sound at sea.

During the 1982 London Boat Show a frail man with a bad back delivered this elderly electric typewriter to our stand as a gift. We have no idea where it came from but we do know that he pulled it across the ice and through the snow on a bent wire trug because he believes in our objectives and wants to see more of our publications. If you can help in any way please let me know; we especially need more members and editorial assistance - a whole lot of new yachtsmen have never heard of A.Y.R.S. and a mention is always a help.

There are a number of projects that members are working to develop. Hydrofoils and 'vortex generators' are mentioned in this number but not new sail rigs which must be considered for each hull design. Since Lord Riverdale described the 'wishboom' on "Bluebird of Thorne" and Rod Macalpine Downie designed the boom for "Crossbow 2" the advantages have been publicised by Garry Hoyt's 'Freedom' series and of course by Windsurfers. These together with roller reefing headsails and the 'cut clew' used by Reg Bratt and shown here on the "Amaran" will be the subject of a future publication.

THE AMARAN

Piet Viegers has long been inspired by multihulls. In 1972 he built a IOm catamaran and sailed from the Netherlands through France to the Mediteranean and Greece. Not long ago he returned to Holland and started designing and building.

Multihull Research. Design: AMARAN - the flying proa -

1. Seaworthy under all conditions.
2. Recovery after capsize.
3. Excilerating speeds unknown before.
4. Commercial possibilities.
5. Alternative to catamaran, trimaran and proa.

Prototype 1 had three amas (hulls) built using the West system. The centre frame is a circle of Ø 80 cm. The length of each ama (float or hull) is 4.61m. (15 feet)

When the Amaran is sailing close hauled, the entire boat is 14.61m (48') long and 6.95m (22.8') wide.
When sailing before the wind the vessel is shaped like a trimaran, one ama (float) at the back in the middle and two in line in front. Diamensions then 10.76m (35.3') beam 10.8m.

The Amaran weighs ± 400kg., including mast and rigging, each ama (float) weighs not more than 60 kg. and they have a minimum wetted surface. The weight is concentrated in the middle of the 'delta', the amas are at the extremities.

By using a Polynesian lateen sail, one achieves an enormous efficiency with many trim-possibilities.
It is hardly necessary to reef the sail, the more the wind, the better the surf-capabilities.
To build a vessel with less material is hardly possible, so it is most economic, smallest price, biggest boat.

Three amas (floats) are constructed very close to the ideal design for aero and hydrodynamics giving 2,000kg of buoyancy each.

The leeward amas have 2 big centreboards which can be trimmed (turned) up and down from the steering platform. Also the three amas have skegs. Each ama has four watertight bulkheads The loading capacity of the Amaran is 500kg or more as we have a huge margin of ± 5,500kg buoyancy excluding the wingsail.

Prototype 1 is suitable for 1 - 3 people. The sail has a wing-yard of 12m (39.3') long. The whole construction is put together and taken apart on the spot; beaching, beach-sailing and trailering are in the project.
What to do after capsize ? No problem ! One person can rectify this situation in a few seconds. The whole thing is unsinkable. The wing sail buoyancy prevents total capsize and by manipulating the shrouds (all running) one can jump back to the normal state.

The prototype was ready for the first trials in April '82. Who knows the first aeroplane looked like a spider as well.

Steering is done by changing direction of the forward or aft ama when sailing close hauled. When running the aft ama steers.

The akas (the legs of the spider) also have buoyancy. The platform (cockpit and crew space) is underneath the mast far

above the water. To give access to the amas (floats) there is a sloping net on each side of the akas (beams).

The biggest problem with a proa is how to tack ? (shunt) That means gybe in this case. No problem with this Amaran; sailing before the wind the yard is horizontal with the sail flying.

So the first prototype was sailing ! Success for the basic principles, but there are many things to change and it took two months to get things ready again with a second prototype for test runs in August '82. At last it worked; everything seemed to be strong enough. So entry forms were filled in for 'Speed Weeks' at Brest, Weymouth and Veere. (Holland).

Taking the amas (floats) of the prototype I have sawn horizontally halfway through, which enabled me to lower the akas (beams) deeper into the amas, which gave a stronger result.

The Amaran is still the same stress frame, i.e. tetrahedral tensegrity strut, the lightest yet strongest, yet most stable construction possible.
The big centreboards which were placed in the leeward amas have been changed to only one small centreboard to windward.
There were some minor changes to make the last trials acceptable.
The Amaran is still in a 'to be developed' phase, therefore it will be hard to conquer the established world record. During trials we obtained speeds equal or better than windspeed on many occasions, sailing at 10 knots in force 2 and 15 in force 3.
The stronger the wind the more the sail leans to windward.
As the proa sails always with the same side to the wind one changes the direction of the amas, but not the tetra-structure.
Tacking is done by loosening up one end of the yard down towards the "new" stem after which the sheet can be grasped in on the new stem-end of the structure. The sail is passed over the top of the mast.

Our intention is to develop this succesful basic concept and to create a new model which will be suitable for 3 - 4 crew, and will be able to make fast ocean-crossings unknown before. The long range surfer will be born, camping at sea, high above water and waves.

This Amaran will have a length of 20-25m, and a beam of 10-15m.

For further details: Amaran Design & Development,
Piet Viegers, Bergweg 7, 6523 MD Niomegen.

Editors Observations: The Amaran as presented at Portland was very heavy for its sail area. When the loads in the beams have been measured it should be possible to make a much lighter structure. For any craft which is intended to sail at or above wind speed hull windage is very important and netting must be a disaster equal to towing a bucket. Every skipper and every sailmaker who uses a bermudian rig with a genoa and who would like to improve performance should take a long hard look at Piet Viegers sail. It is the same as Reg Bratt's "Auster" sail but inclined. If you need a'clew' look at almost any snap of a genoa taken from windward, especially with the sheet eased.

1982 Portland Speed Week.

As in previous years the 'week' had eight days during which any person who applied to the Royal Yachting Association could attempt to break the world sailing speed record in the unlimited sail area or the established classes. Three courses carefully surveyed along Chisel beach with transit posts set in concrete provided limited choice of direction. Official observers and time keepers were present so that records set may be ratified.

The dates from 9th October to 16th were chosen to have neap tides and gale force winds from South West. Tides are reasonably predictable and being a period of rapid change in the suns declination the weather is usually unsettled.

The world records are now so high that special conditions of strong wind and flat sea are required to improve them. It was shown at Brest in September that the offshore multihulls at their present stage of development have a maximum speed of around 23 knots without wave assistance. Limited room and the absence of a publicity circus with vast sums of prize money mean that there is no reason for them to come to Portland.

This year the RYA event was paid for by the entrance fee of £ 50 which just covered the cost, helped by numerous A.Y.R.S. members who gave their time free. There were very limited press facilities, reporters who bothered to turn up had to ask what was happening for themselves. If publicity is wanted it has to be bought with free beer and proper facilities although T.V. South did send a camera team and showed a short report.

Lack of funds prevented the raising of the circular 'clock' course but in the strong winds necessary for new records the water is considered too rough even by Tim Coleman who established two of the shore transits which were used to set his 36 knot record with "Crossbow". The original 'shore' course of 500 metres is marked by orange diamonds visible from seaward but the two "Crossbow" courses can only be used by shore observers and can not be seen when afloat. To enable the course to be angled the base has to be considerably longer than 500 metres. The extra length and invisible marks does not worry boats but for board sailors with no compass trying to sail at 90 degrees to the transits proved too difficult. "Sabu" was anchored just beyond the end of the course in a minimum depth of four feet to guide people making runs but for many this did not cure the problem. Perhaps a coloured line should be drawn along the course as in road works or swimming pools to indicate the shortest distance ? It is very difficult with a strong wind, perhaps driving rain, to keep a craft of any type at her ultimate top speed and on a true course for the 30 seconds or so needed. There is no doubt that all the records will be increased by large amounts but this will involve lots of waiting for ideal conditions.

At Portland the computer was located in a caravan on Chisel beach and powered by a portable generator. The start and finish of each run is reported to the operator by radio but the watches previously used to time the event were also used to check the times. Various ways of improving the accuracy and avoiding runs which are not recorded were discussed but all would involve an increase in cost.

The only craft in the open 'unlimited' sail area class at Portland was the 'Amaran' called "Fastfit" entered by Piet Viegers from Holland. Unfortunatly this craft suffered a torn sail after a trial and the yard broke while it was being lowered and she was retired without making a timed run so that she could be prepared for the event in Holland - where there was not enough wind. The prize for an outstanding design was not awarded this year, it is one of the conditions that the craft must complete a run down the measured course.

The Dutch event, Pall Mall Cup '82, was set up on a lake with sheltered water and unobstructed wind but this year there was unfortunatly very little breeze. The course is surveyed and a video camera at each end is lined up with a light on the distant shore. A clock is run and the time shown superimposed on the screen. An observer afloat records the number of each 'competitor' as the run starts. When there is a fast run the pictures are run frame by frame and the exact time of start and finish can be confirmed. The main problem with this very accurate system is the time needed to change from one course to another as the wind direction alters.

There were 180 sailboards and 30 'boats' at the Pall Mall event which was very well run from a special events centre with six full time staff and thirty seamen.

Karlskrona Results 1982

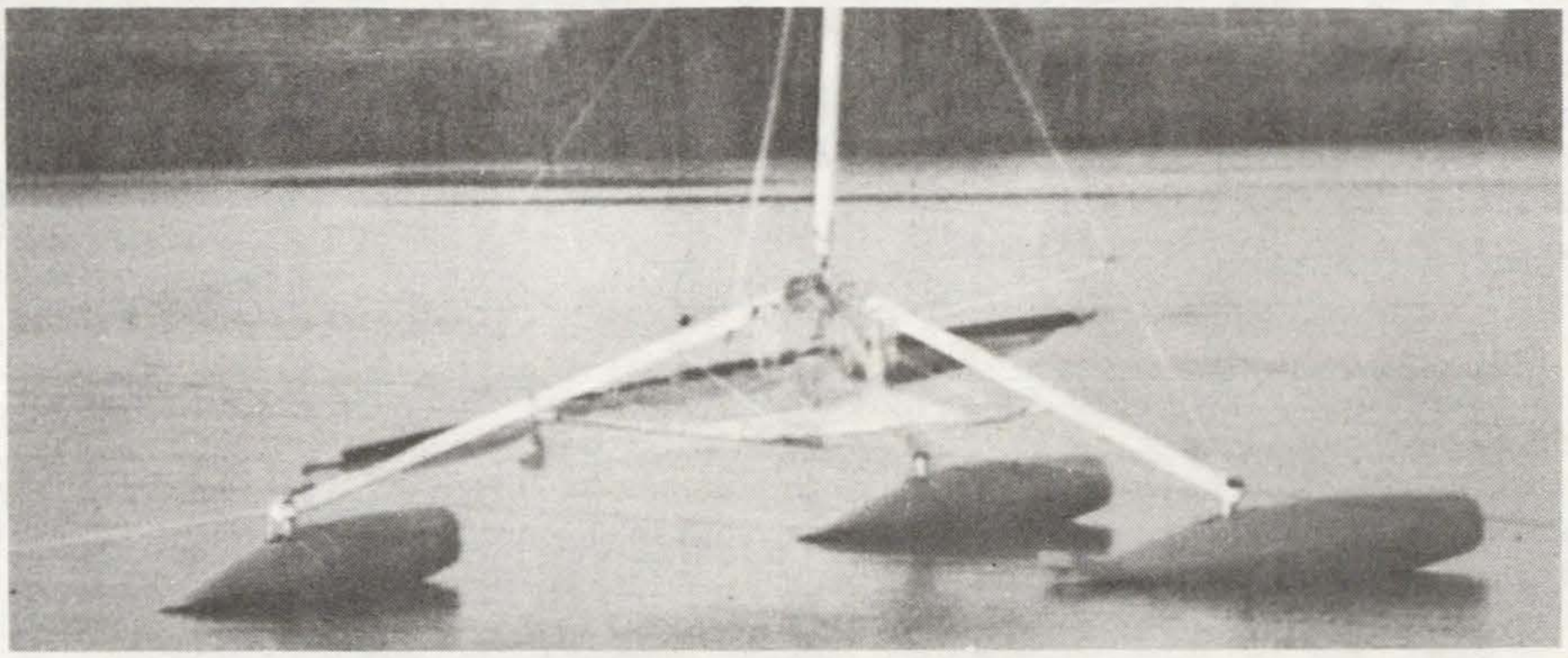
IO sq.m. class	Jaap Van Der Rest	Windsurfer	Holland	22.82 kts
A Class	Erec Quorning	Trimaran	Denmark	13.05 kts
B Class	Ulf Nilsson	Tornado	Sweden	18.44 kts
	Richard Holmquist	Hobie 16	Sweden	18.07 kts
C Class	Leif Wagner Smitt		Denmark	16.90 kts.

Previous Records

Open	"Crossbow"	T. Colman	G.B.	36	Knots	1980	Catamaran
'C'	NF^2	D. White	U.S.A.	24.4	"	1978	Canard foil
'B'	"Icarus"	A. Grogono	G.B.	24.5	"	1981	Tornado/foil
'A'	"Mayfly"	B. Wynne	G.B.	23.0	"	1977	foil cat 16'
10sq.	Windsurfer	Jaap V.D.Rest	N.L.	25.1	"	1982	Sailboard

Unofficial Records listed for Brest Speed Week were

IOsq.m. fastest 'boat' = T.Crumpton & C.Douglas "Seafly" 21.3 knots
and fastest female = Erica Keller of Holland @ 20.5 knots on TC2 board.



Speed Sailing - London Discussion.

Our Chairman Sir Reginald Bennett is also Chairman of the World Sailing Speed Record Committee. On 2nd November he spoke and led a discussion about the organised events put on to enable people to have speeds measured carefully.

Sir Reginald had just returned from the event in Holland having been on the Committee at Brest from 25th September to 1st October and 'Officer of the Day' at Portland. We had the results from the 'Sail Speed Week Karlskrona' held in Sweden from the 6th to the 11th September.

There is agreeable co-operation between the countries involved with these events and plenty of problems with computers used to record the times and list the results.

The Brest meeting has plenty of sponsors and more could be found with no difficulty. There was excellent press and television coverage of the event which includes races around a course. Large amounts of prize money encourage entries and the course is laid to give maximum interest to spectators.

Two monohulls, one hundred multihulls and one hundred and thirty sailboards entered. This included twelve ocean-going multihulls. Two circular courses were available but everyone used the sheltered course because waves restricted speed on the outer course which had an eight mile fetch. There were 120 staff of which eighty were afloat. There were several days with plenty of wind including gusts to force eight and two days of calm. In spite of considerable difficulty in the control of board sailors 1,200 runs were timed on one day. A German sailboard set a new 10 sq.metre record at 26.5 knots and the fastest 'A','B' and 'C' class yachts were the British "Seafly", "Icarus" and "Jacob's Ladder" pulled by kites. The big prize for the race was won in light wind by a French Tornado catamaran without foils.

The circular courses in Brest harbour are marked by posts set into the bottom and the times are recorded by boats which try to keep two posts in transit. Clocks run continuously and the time of each run starting and finishing is recorded.

The Portland meeting was not sponsored and was run by twelve staff. There were sixty "entrants" and on Wednesday 13th 420 runs were timed during the afternoon while the wind from the 'right' direction gusted to gale force. Jacob's Ladder in 'C' class did a run at over 25 knots and a sail board at over 27 knots and it is expected that these will be ratified as new world records.

It was agreed that 'boats' and 'boards' set records at different wind speeds but there were problems due to the number of boards and lack of control.It was felt best to limit the number at future events perhaps by having invited entries only from known fast sailors.

CHAMELEON

Designer: DOUGLAS HANNAN
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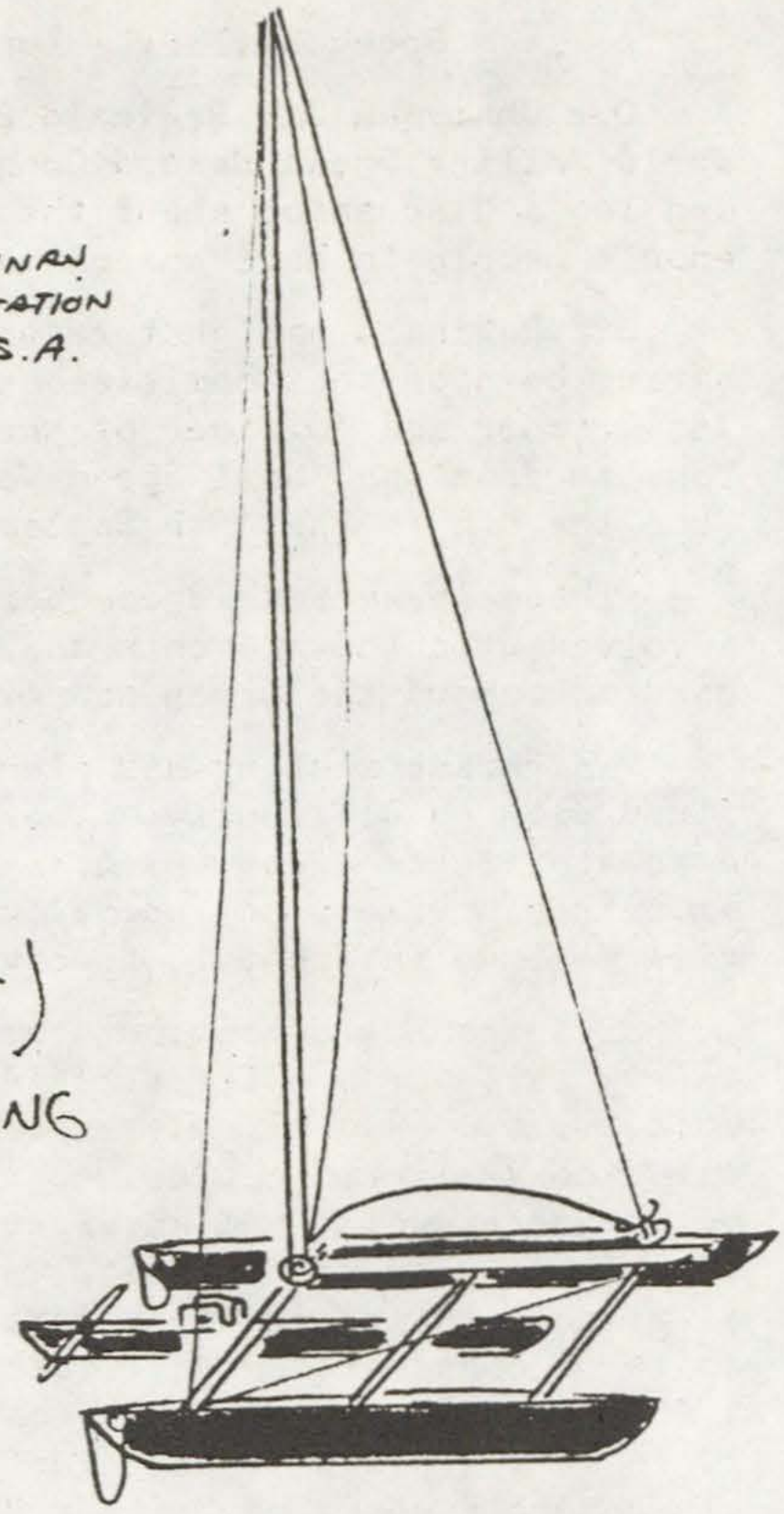
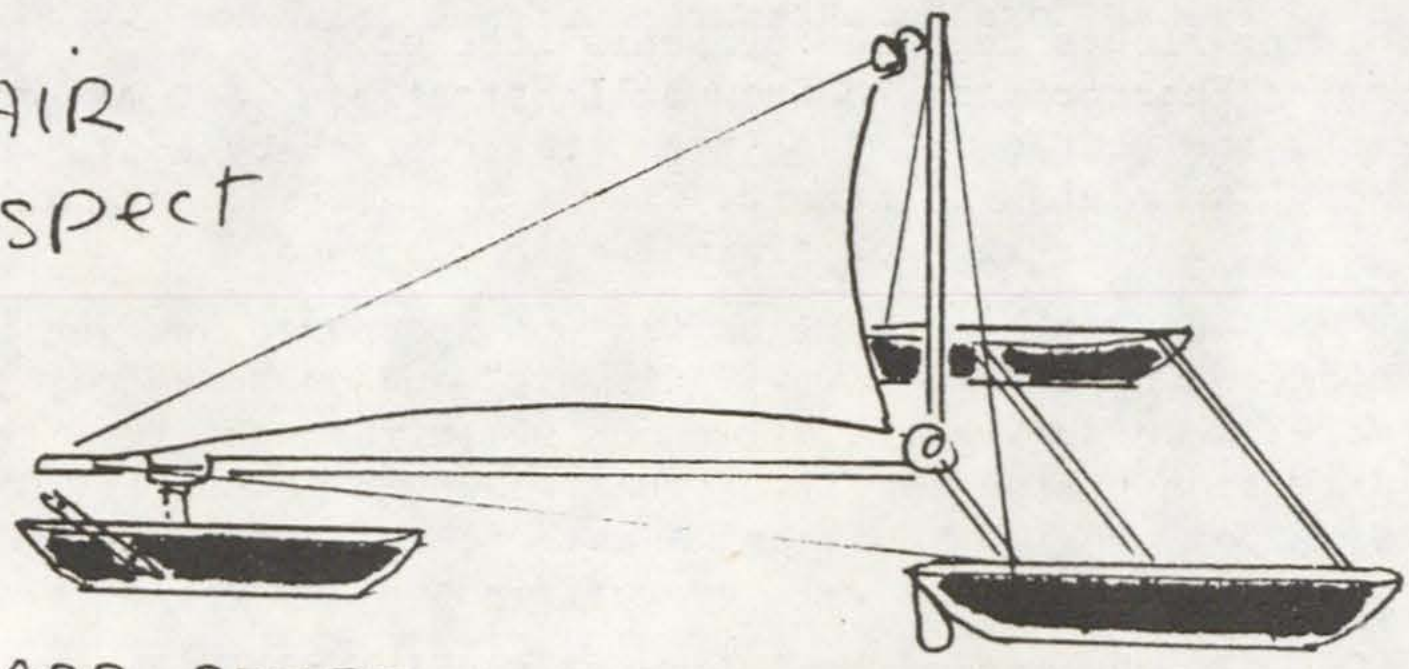
N.Y. 11746 U.S.A.

LIGHT AIR
HIGH ASPECT
MODE
(STANDARD SAIL
generating LIFT.)
RUDDER STEERING



HEAVY AIR
LOW ASPECT
MODE



CANARD STEERING

(VORTEX SAIL
generating LIFT)

* NOTE: pivot should have keem on center cross beam instead

Project "Sabu"

Take a 'Telstar' 26' hull moulding, some marine ply, some firewood, a number of cast off and second hand fittings. Add a selection of marine glues. Mix together and move about for five years. Make a deadline by entering a race with a non-refundable entry fee of £ 150 and book a crane for launch day. You can probably imagine the last weeks of hectic action and the almost complete craft now sailing and called "Sabu".

One purpose is to compare hydrofoil stabilisers against the floats fitted to the standard 'Telstar'. This follows from "Mantis 3" and "Mantis 4", "Dalibor" and later French yachts that have proved that foils work offshore and that foil stabilised yachts do not fall over when hit by a squall or when running down wind.

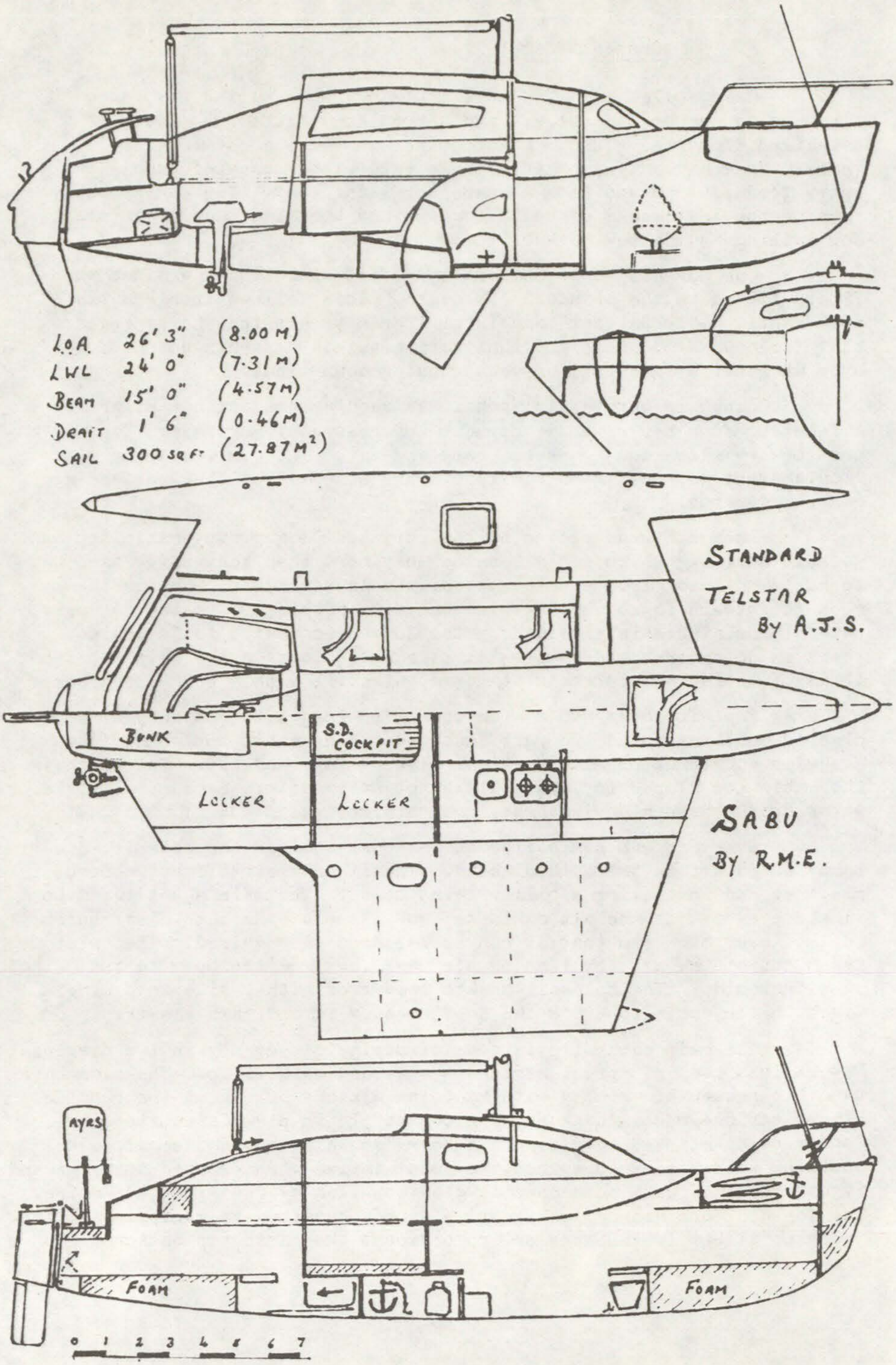
"Sabu" is our family yacht. We need accomodation similar to a Telstar, four berths and equipment for reasonable cruising. The cabin must be dry with room to dress, cook and eat. The aim was to have a displacement and sail area similar to the standard so that performance can be compared.

Lack of funds prevented the purchase of a g.r.p. cabin top and cockpit moulding which costs considerably more than the hull. As I had to build the deck from scratch I designed an aft cabin. Moving the cockpit forward improves the trim when four people are in the cockpit. Lateral resistance is provided by the low aspect ratio foils and so there is no centreboard case which makes more room in the main cabin but it is of course shorter than standard but still with over 6' headroom.

The aft cabin has a wide bunk 6'6" long with buoyancy of empty plastic containers and two part foam under. The cabin top is of foam sandwich construction with vertical plywood fore and aft. The hatch in the cabin top slopes forward - it is not satisfactory because a little water drips through during heavy rain storms.

Everyone who has sailed on the boat admired the cockpit. Steering is by whipstaff on the aft bulkhead. The lines are stiff but control is positive and not having a tiller gains space. The main sheet leads to a single eye bolt in the aft cabin top and is held by a jamb cleat built on the lower block so that it can be released as required. The twist is taken out of the sail by leading a stray line from the boom to the 'wing' on either side. The headsail sheets lead from either side to a single winch on the cabin top with the handle below it and jamb cleats.

The main cabin top is made of strips of 4mm ply in two diagional layers laid over $\frac{3}{4}$" spruce stringers sheathed with g.r.p.. The sides are two thicknesses of 4mm ply with Macrolan windows bolted on the outside. Ply to stringers was 'Cascophen' glue and ply to ply 'Cascomite' glue. Construction started by gluing a timber 'gunwale' round the g.r.p. hull moulding with Borden epoxy but the joint failed when exposed to frost and it was re-glued with some special glue supplied by Unetex of Yorkshire. The foredeck and anchor locker are also ply sheathed in g.r.p.. All the interior timber is mahogany or iroko except the cabin top battens.


L.O.A. 26' 3" (8.00 M)
LWL 24' 0" (7.31 M)
BEAM 15' 0" (4.57M)
DRAFT 1' 6" (0.46M)
SAIL 300 SQ FT (27.87M²)
STANDARD
TELSTAR
BY A.J.S.
BUNK
S.D.
COCKPIT
LOCKER
LOCKER
SABU
BY R.M.E.
AYRS
FOAM
FOAM
0 1 2 3 4 5 6 7

Space forward of the collision bulkhead is filled up to an inspection hatch with two part foam and empty containers (to save cost and weight). This gives access to the nuts on the outer stay chainplate and the stemhead roller fitting. Under the forward bunk I left a drain of perforated zinc down the forward edge and along the 'keelson' to avoid water on "Iroquois" and other g.r.p. yachts which use foam to stiffen the hull - somehow water builds up between the hull and the foam and can not escape.

To keep the c.g. as low as practical the main anchor plus chain (35lb fisherman or 'Admiralty Pattern' stock type) i stowed under the cockpit with two gas bottles. Two part foam is used to hold them in position and protect the echo sounder transducer. A twelve volt battery lashed in a heavy polythene container is also stowed on the bottom under a step - not a good position but as low as possible and ready to jettison in the event of total inversion.

I chose a two burner gas stove with grill and a gas light in the cabin (under a ventilator) for ease and convenience, either Calor or Gaz can be used. From experience of various leaks I have found it most important to site the bottle close to the galley so that it can easily be turned off. Having the bottle in a ventilated locker only protects against a leak in the valve or joint on the bottle top and these are very rare indeed. The usual leaks are in rubber connections to swinging stoves or chafed pipes where they wander along behind floor boards and through bulkheads. The only protection is to turn the gas off after use. I have cruised on a yacht with the gas bottle in the anchor locker forward and I don't think it was ever turned off while we were sailing.

A toilet was bought but it is still in the building shed. After cruising with a few types of marine heads Jane will only use a Lavac or a bucket. Rules require a fitted bucket and this was done by putting it in a plastic bag and pouring foam around it. It can be lifted out for use in any convenient place !

Rudder: When lowered this is the deepest part of the yacht and so the 'box' with sliding blade is mounted on a board with a hinge at the top and a peg at the bottom so that it can break and swing aft if I hit an obstruction or run aground hard. Having the steering lines at hinge level means that steering should be possible with it trailing aft. A friend tore a hole in his transom and flooded the hull by hitting an obstruction with a standard rudder. Having helped to write the book on rudder design I am sorry to admit that the present (number 3) blade has expanded and is very firmly stuck in the box. The box is designed to be strong enough to hold a blade with a hydrofoil if pitching proved a problem and as this blade is laminated from hard wood strips I hope there will be no further trouble.

Power was to be provided by the 'C' class mast and sails from "Wills Venturer" donated to A.Y.R.S. in 1966 and used on "Mantis IV" in 1974. The mast is 34' and sail area 300 sq.ft.. It was my intention to cut it down to 28' which is the standard height for a 'Telstar' which

uses a lower aspect ratio rig of the same area. I was persuaded to keep the full mast and bought an old sail to set from the masthead in light conditions - it cost £ 5 at the 'Boat Jumble' and £ 15 to mend plus another £ 15 every time I hold on too long as the wind increases ! On paper "Sabu" should right herself from a 90 degree 'knock down' with the 28' mast but having the longer mast and not too much faith in paper I have fitted a small mast float at the top spreader 28' above the cabin top. M.O.C.R.A. rules require "a viable means of access or egress when the yacht is capsized." This can be by escape hatch or by having a mast float to enable the crew to use the normal hatch. In the case of small multihulls it is difficult to see how an escape hatch can be fitted, with an aft cabin two might be required.

Auxilary power is by Seagull mounted on a lifting boat-shaped tray hinged from the aft end of the 'wing' and held by a slide to the hull. I have a 4 h.p. Mercury with the advantage of clutch and reverse gear but it is unable to run at even a slight angle of heel and its horses must be lazy as they do not push as hard as the Seagull. The new owners of the Seagull factory say that it is now permitted to use 20:1 instead of 10:1 fuel to oil even in very old engines like mine.

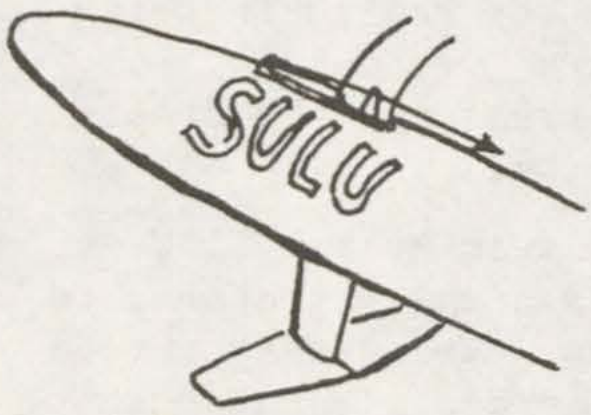
Foil Shape and Size

The foil shape was chosen to resemble the wing of Concorde. It is modified because Concorde does not have to land on its wingtips and bounce up and down as the tide goes out. This shape brings more area into the water as the boat heels moving the centre of resistance forward thus hopefully bringing the boat up into the wind and reducing the load. In fact she carries slight lee helm but is directionally stable and can be left for short periods if the wind is forward. As with all small craft she is sensitive to trim and I consider the cockpit position is a big help. Provision was made when I built the mast support to be able to move the mast forward and carry a small mizzen mast. With a total beam of 19'6" I was worried about having the sail area too high but a reef has to be taken at the top of force 4 to protect the mast and at that stage stability does not seem a problem. Joseph Dusek, after a lot of tank tests and full size experience, says that foils should either be high or low aspect ratio and he considers mine to be the worst choice at a medium aspect ratio. I claim that for the size of boat and sail area they are low with sailing waterline of eight to nine feet with a draft of about 2'6" to 3' on the lee side and the tip of the weather foil, about 2'6" by 9" deep, in the water. Deep, narrow, 'high aspect' foils seem to be favoured by the French led by Tabarly. These have to have small floats above them to act as 'end plates' and give an advantage in speed over trimarans above 12 knots. If "Sabu" gets to 12 knots we might not be able to maintain the exact sail trim necessary to keep the c.l.r. reasonably below the centre of effort. I have seen various means of lifting or retracting narrow foils in harbour and light weather but they all involve extra drag at the joint and extra weight. In my opinion the best design so far is the retracting foils by Rodney Garret on "Sulu" and this boat is now owned by "kite man" Keith Stewart.

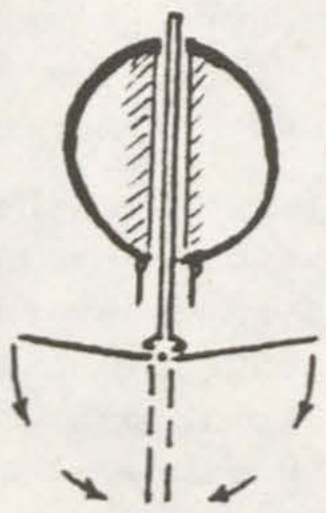
Construction of the foils and wings was left till last and started in February 1982. The 'book' figure is 4% foil area to sail area but practice is to increase this to 6%. Most experts choose 45 degrees for the foil angle but for some reason the lift from the foil does not need to be high enough to match the apparent centre of sail effort. This must mean that more heeling moment comes from the lower part of the sail area probably due to twist. A cruising yacht must be able to dry out on moorings and moor to walls or other yachts and this limited me either to hinged or shallow foils. I believe that part of the excellent safety record of the 'Telstar' class is due to deep flat 'wing' deck sloped underneath to lift as it enters a wave. This type of deck was chosen because it is stiff, strong and has a useful stowage space as well as providing buoyancy for people to walk about or step aboard when the yacht is not sailing.

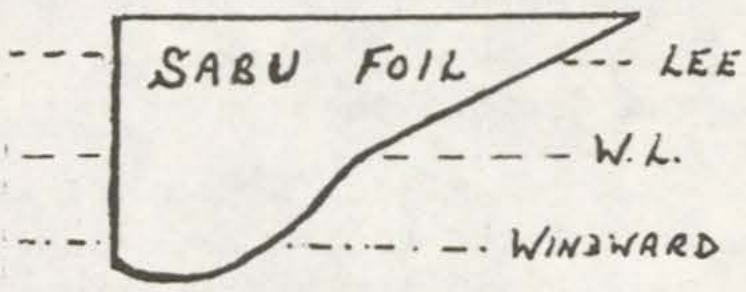
Gerald Holtom showed that a cabin 'Foiler' with buoyancy in the cabin top and non buoyant foils and beams is self righting by the action of the wind and waves from a total capsize. Chosing to stiffen the leading edge of my 'wing' with foam means that "Sabu" will be stable if she capsizes beyond about 90 degrees and the mast breaking would make her hard to right because the hull buoyancy is intended to counter flooding being positioned low down and in the ends. There is a water-tight bulkhead under the cockpit which should further restrict flooding.

Friends and advisors all warn that boats turn out to weigh more than expected and the longer they take to build the more they weigh. As building was spread over five years I built the wings to hold the foils 3" above the marked waterline. On launch day the crane driver estimated 1.5 tons and when weighed for rating without crew, food or water she weighed 1.7 tons which is right among the standard boats and below the marked waterline. This means that she has a constant small angle of heel to starboard when at rest. (The starboard 'wing' is 3" longer than the port).

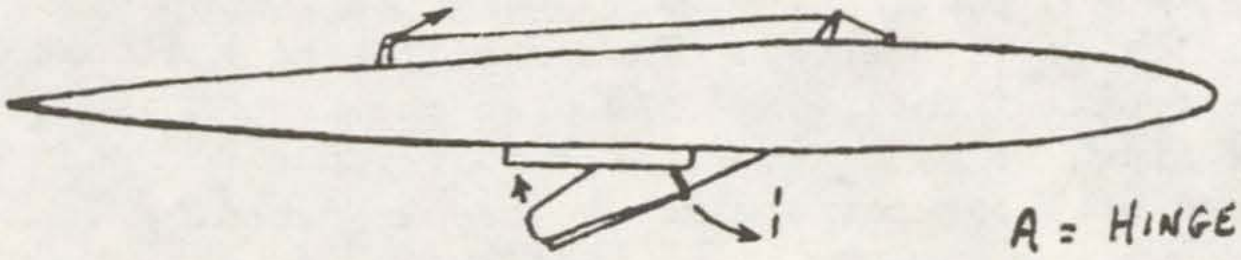


FOIL WORKING





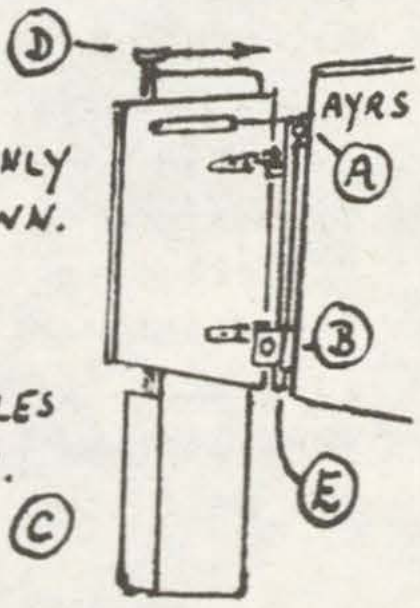
Concorde Wing
Energy lost forming vortex on first edge is recovered as flow passes increased angle



FOILS FOLDED STOWING.

AYRS PUBLICATION 68 PAGES 54 TO 59

A = HINGE
B = WOOD PEG
C = TRIM TAB WORKS ONLY WHEN BLADE FULLY DOWN.
D = TRIM TAB TILLER, LINES TO VANE
E = BOARD WITH PINTLES HELD BY PEG & HINGE.



Launch and Trials

For the launch I have many people to thank. The weather was perfect for at least a week so that painting was easy and all the tools and rope collected together outside. Volvo lent a demonstration estate car which pulled the hull with no trouble at all. Jim Lloyd brought a Hylift crane on 23rd April and loaded the craft onto the trailer. We turned it backwards and loaded gear into the stearn to get some weight onto the car. On 24th we drove to the old Itchen ferry ramp at Southampton and friends brought the two wings and foils on different trailers. Jim Lloyd brought his crane and Peter Ellison brought a 240 volt generator. The starboard wing had previously been bolted into position and it proved difficult to get the bolts back into place. The port wing was lifted into position by the crane and the holes drilled on the beach which proved much less difficult. The original intention was to lift the complete "Sabu" onto the hard below the high tide mark and let her float off during the night. This was changed and the crane came back on Sunday 25th, lifted the mast into position and when secure lifted "Sabu" into the water. The delay gave us the chance to make a good job of painting the antifouling and also gave the epoxy filler in the wing joints a chance to set.

The qualification passage for the 'Round Britain' was completed on May 8th and we were very pleased with performance. Roger Goodall who helped build "Sabu" and Norman Champ, editor of "Sailorman" magazine were brave or stupid enough to come with me. The next event was the "Round the Island" classic which we started well but got in a muddle with a force 5 wind against tide chop. The steering lines came off a pully and while steering from aft had to tack for another yacht. At this stage a shroud came out of the spreader. While I was up the mast replacing the wire she heeled well over to starboard and shipped a lot of water into the wing hatch. Between each wave my son bailed the wing and replaced the lid as necessary but sadly the spare pump was lost as he put the lid back. We hove to, had a cup of tea, restored the steering and decided that perhaps it was not our day for racing.

After "Round The Island" was the Seahorse Cowes Multihull Week, this weeks racing is expensive but enjoyable and was our first chance to sail against other multihulls in moderate conditions. We quickly showed that performance was not as good as a lighter Telstar and alterations were prepared. Instead of sailing on the Channel Race to Plymouth we went ashore and faired out the entry at the outer corner of each 'wing' by securing 4mm ply with wire and pouring two part foam into the space. The outside was faired and filled with epoxy. This small fairing almost elimenates pounding at the front of the 'wing' and also the wave that pushed in front on the lee side. It made a noticable difference to speed although we had been pleased with our performance before we raced.

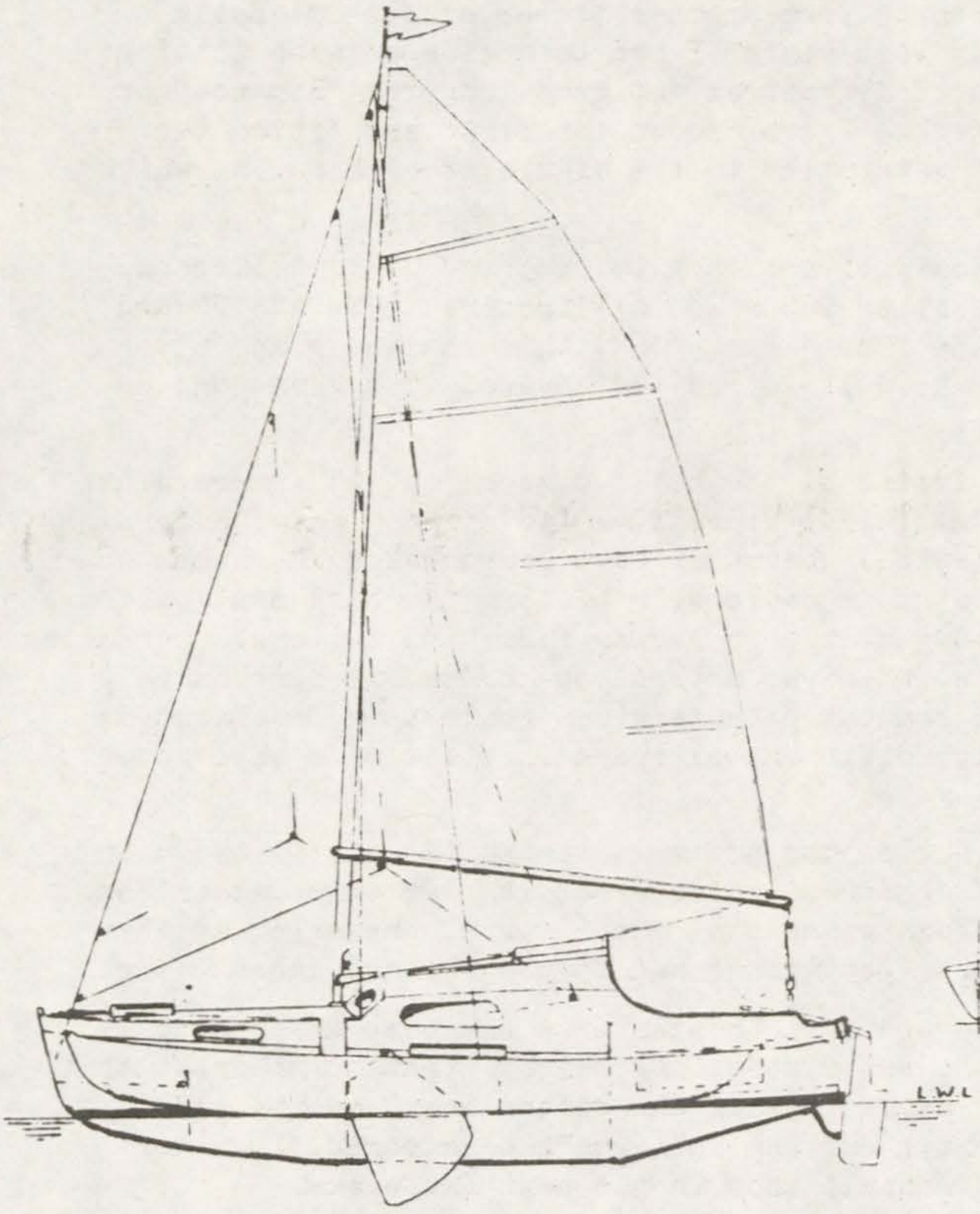
Having completed the first season I would like to make more detailed comparisons with a standard Telstar by towing both craft to measure the drag at different speeds and with the tow line at different angles to the mast. By changing trim we could compare the results with those from model tests published in past numbers.

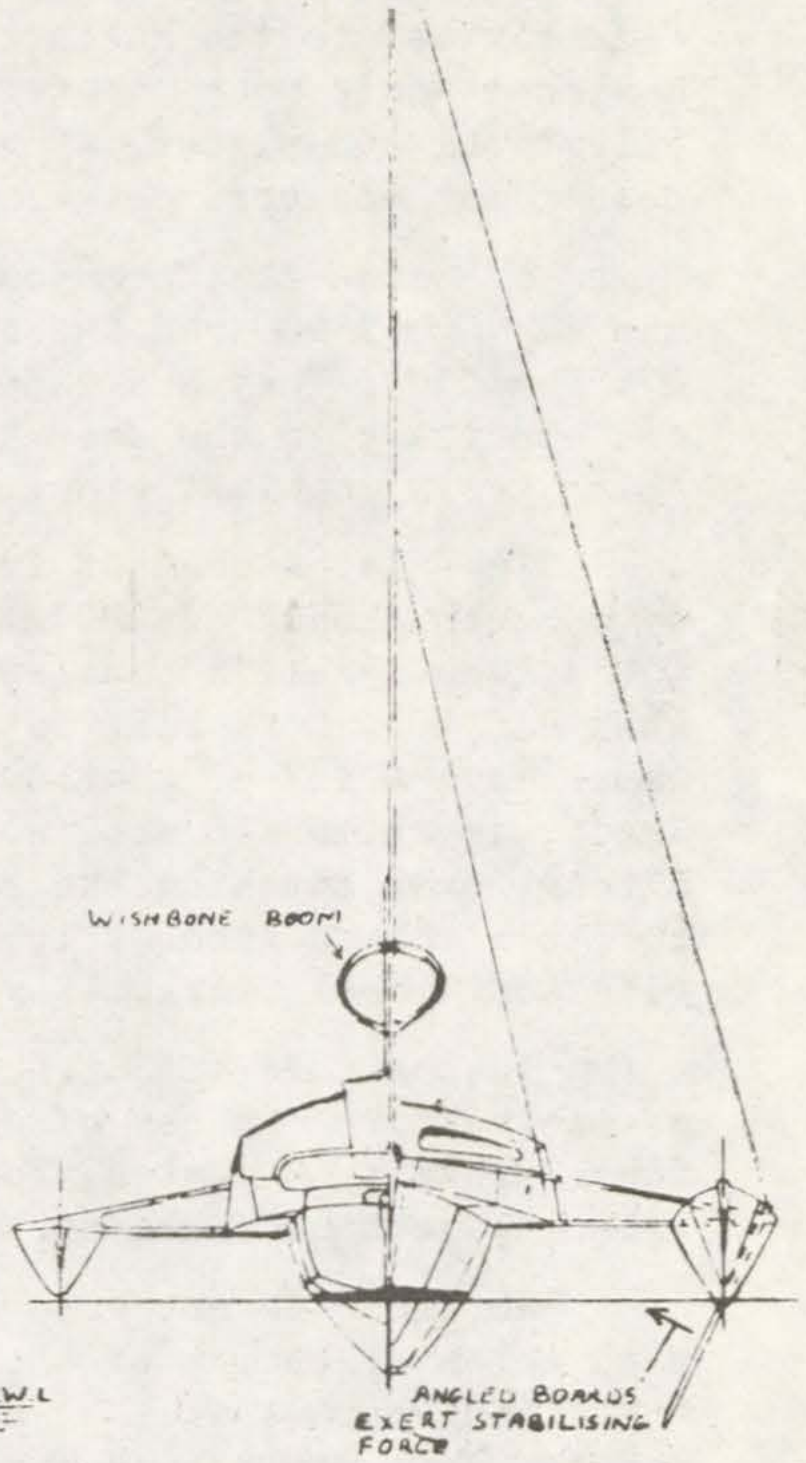
An account of preperations for and the start of the 'Round Britain' race will be published in our next issue with details of the trim tab self steering which is easy to make.

"KLIS III"

FOIL STABILISED TRIMARAN – Designed by

BERNARD RHODES
104 Wharf Road, Ostend
Waiheke Island
Auckland, New Zealand





Length Overall . 23ft. 9in. = 7.24m.	Weight on L.W.L. 2400lbs./1087kg.
Beam . . . . . 17ft. 0in. = 5.18m.	Sail Areas:–
Beam Dismant. . 7ft. 10in. = 2.39m.	Mainsail . . . . . 210sq.ft./19.5m^2
Draft Max. . . . . 2ft. 19in. = 0.86m.	Genoa . . . . . 190sq.ft./17.65m^2
Min. . . . . 1ft. 7in. = 0.48m.	Jib . . . . . 90sq.ft./8.36m^2
Weight Empty. . . . 1200lbs./544kg.	Storm Jib . . . . 36sq.ft./3.34m^2

Details of"Klis 3" in publication 86, Details of "Klis" in numbers 60,61,66,67 and 69 (Multihull Safety Study). She was built in U.K. and sailed to N.Z.. Friendly natives prevented her return.

Capsize "Jan" was a 31 foot trimaran which capsized in the Atlantic on 13th July 1976. An account of how she rolled over by wave action and his quick rescue is given by Hamilton Ferris in publication 86. That number also contains an account of the capsize of the 31 foot trimaran "Silmaril" while running under bare poles about 250 miles from Lands End and the rescue of her crew.

Vortex Generators - Experimental Leeway Reducers.

Wharram catamaran "Tangaroa" - P.J.van Deenen, Holland.

After favourable reports from another member of our Catamaran and Trimaran Club (C.T.C.) last winter I had to decide between fitting "end plates" to the hulls of my Wharram designed Tangeroa "Himanoa" or making a scale model to test. I decided on the first and fitted two elliptical end-plates, symmetrically to the middle of both hulls, which means flat and horizontal.

From the sketches you will see each is composed of two ellipses, one of 1000 x 400 and the other 700 x 280 millimeters (39.4"x15.7" and 27.5" x 11"). They are made from 10mm (5/16") thick marine grade ply and -contrary to the sketch- well faired and covered with glass and epoxy resin, against wear.

The plates are not fitted to the hulls direct, but by intermediate of a bottom board of 120 mm (4.7") wide, 20mm (.8") thick and 3 meters (10') long. (see 'A' in sketch) Normally that board takes the bumps when sailing in shallow water, occasionally hitting the hard sand bottom. As we have a lot of shallow water here leeway reduction, without increasing draft, is quite attractive. Whatever method you choose, it must be very strong; just touching the sand at 8 knots gives quite some deceleration ! For this reason I chose two different ellipses in place of a thick one to give additional flexibility.

In the fore-aft direction the spots indicated 'B' are filled with suitably faired peices of deadwood and covered with 1mm thick stainless steel protection plates. This gives one smooth curve, obviating anything (fishing nets or lines etc.) getting hooked to projections under water.

So far I do not know what will happen when the boat dries out. If sand piles up on top of the end plates, its weight might be so great that the fixing screws will be pulled out of the bottom board as the yacht floats. That would be a pity, but the hull won't be damaged. I do not expect this to happen but I shall know in the next few weeks.

Since fitting the end plates I have only sailed some hundred miles. I can only give preliminary figures about velocity-made-good to windward.

On two different occasions I timed the boat over the same, well-defined track of 8.4 miles with similar wind and weather conditions. Under windstrength BF. 4 to 5, SW, with a short choppy sea, wavelets some 30 cm high, I calculated the average speeds to be 2.9 and 3.2 knots respectively.

That does not sound impressive. However for a notoriously poor close hauled performer as my "Himanoa" it means an improvement of at least 25%, compared to formerly.

So far I have not found any disatvantage of this modification. This positive result is so convincing, I am now the more decided to make a scale model. I should like to experiment with different shapes (pear shape) and mounting positions.

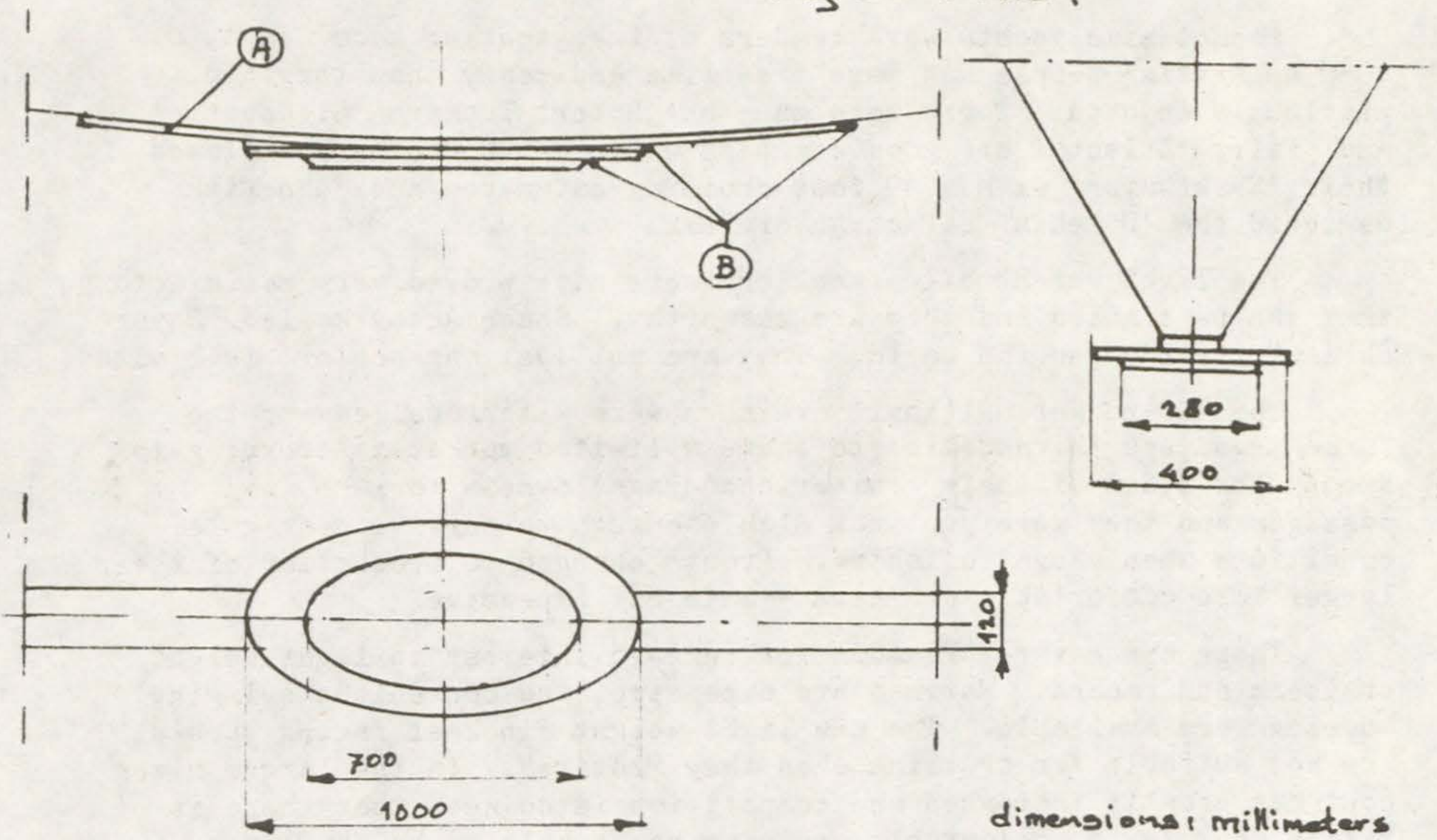
For the moment I prefer to sail. I will keep you informed about my progress in the development of these, at least to me, intriguingly simple devices.

Paul J. van Deenen, 129 Nieuwendammerdyk, 1025 LG Amsterdam.

Leeway reducers (experimental)

Wharram catamaran "Tangaroa"

May '82 P.I.v.D.



dimensions: millimeters
drawing: not to scale

Vortex Spoiler - User Report.

G.M. Irons of Co. Dublin fitted a stainless steel plate 5' x 6" at the bottom of the centre hull keel of his Clipper trimaran, reducing the draft by an inch or two at the same time. He also changed the angle at the bottom of the keel to be parallel to the water line to avoid a tendency to pull the hull down due to greater depth ford.

There is a distinct impression that windward performance has improved, but this should be qualified. While most trimarans have quite high windage mine is unusually bad in this respect since I raised the cabin a few inches to avoid back ache, and the windward performance was very poor due mainly to excessive leeway. Tacking performance does not seem to have changed significantly, but is certainly no worse. I experience some difficulty in comming up into the wind, perhaps again related to windage although I suspect that my rudder, approx 18" square, could usefully be increased in size.

Rather sparsc comment I'm afraid but hopefully there may be more to come. I feel that more experimentation on this sort of modification may yeild interesting results.

21 Years to Learn Nothing ?

For and Against Pocket Cruiser Racers.

Wanted :- High performance, shallow draft, easy to launch, trailable. Seaworthy, stable, inexpensive, mobile homes.

Pocket size yachts were leaders of the yachting boom in 1950 - 1960 as British people had more free time and money than they had previously enjoyed. There were many but Robert Tuckers 'Silhouette' and Fairy 'Atlanta' are good examples while Prout Brothers followed their 'Shearwater' with a 19 foot cruising catamaran and John Fisk designed the 'Dolphin' catamaran cruiser.

The light weight bilge keel cruisers have proved very satisfactory, they can be trailed and they are seaworthy. Shane Acton sailed "Super Shrimp" right round the world. They are not fast and comfort is limited.

The two pocket multihull cruisers were withdrawn leaving the 'Cracksman' and 'Hirondelle' to share a limited market. According to Prouts the speed of their cruiser encouraged owners to make long passages and they were just not stable enough to survive near gale conditions when caught offshore. Prouts changed to production of their larger more comfortable cruisers - safe but expensive.

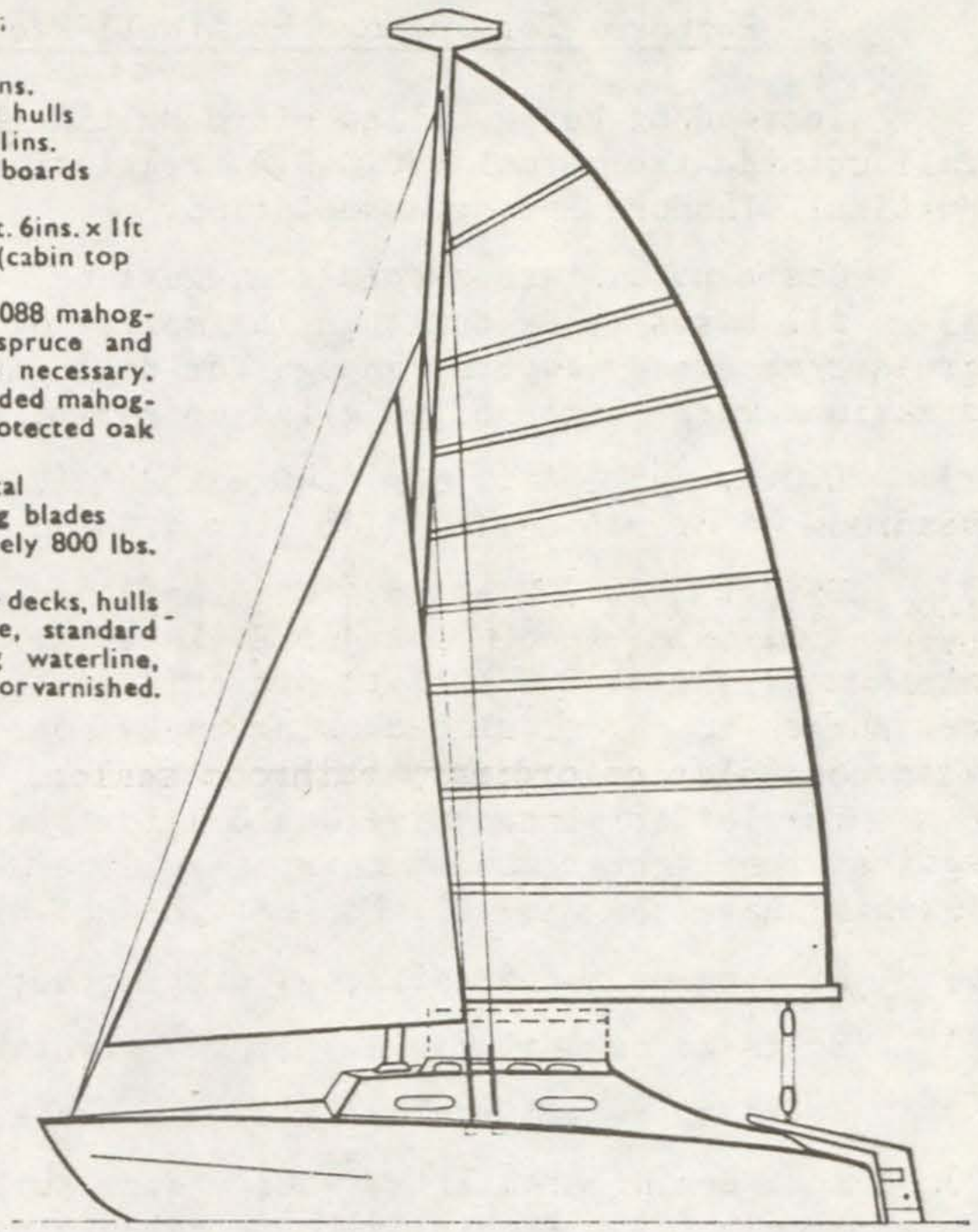
There are several reasons for renewed interest in light weight cruisers and racers. Marinas are expensive, few convenient swinging moorings are available. The new light weight fin keel racing yachts are not suitable for cruising when they "retire". In the larger sizes cost has greatly increased and competition is so keen that there is little room for a comfortable cruising yacht able to be handled by a man and wife when not racing. More leisure time but less money to spend per hour encourage many to do their own maintenance and this is best done at or near home. Towing economics and trailer law make light weight most important especially as the average car is also lighter. Lightness in a monohull means less ballast and therefore less stability. People moving up from high speed dinghies or across from sailboards find the older pocket cruisers too slow. We need more drive from lower sails. 1938 book "A Manual for Small Yachts" says "An old rule for sail area is to square the L.W.L. the answer being in square feet, but this would now be considered to give too large a sail plan." A retractable bowsprit with roller furling and reefing headsail could be a useful starting point.

The sea has not changed at all in the last 2,000 years and the wish to sail those extra few miles is probably just the same. The material available to us, the navigation aids and the rescue service are better than was dreamed to be possible a few years ago while sailing schools and 'how to do it' books are available to anyone. It is true that yachting is probably 100 times safer than it was but with 150 times the number of people involved there is an increase in the number of accidents recorded. The "ban everything" brigade point to the statistics and demand rules to control sailors. In the U.S.A. the Coastguard control all small craft in Rhode Island so that they can not put to sea in a fresh breeze. Probably other states have similar rules. In Britain no-one, especially the met office, has any idea how strong the breeze is or which direction it might come from during the next four hours. The best hope is to keep our boats seaworthy, do all we know to encourage survival and support the R.N.L.I..

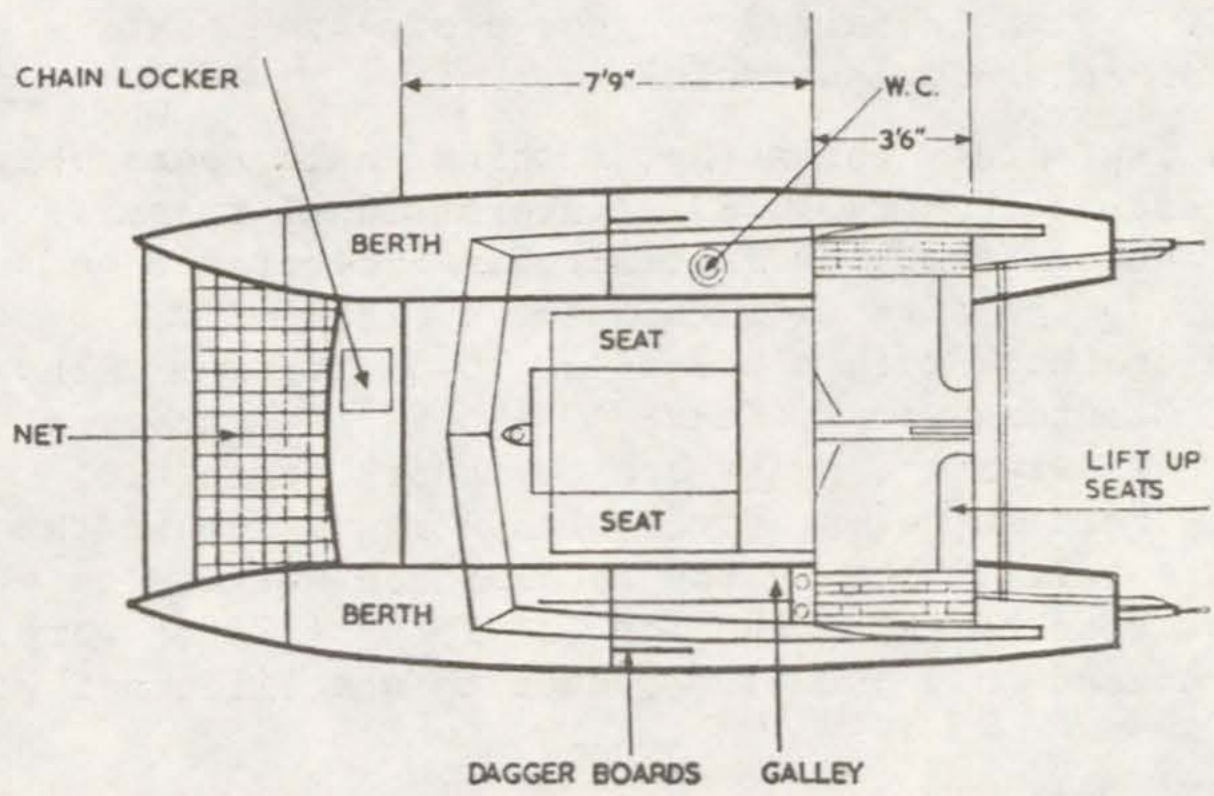
19FT. CABIN CRUISER CATAMARAN

Specification

Length O/A—19ft.
Length W/L—17ft. 9ins.
Beam—9ft. to outside hulls
Draught, hulls only 11ins.
Draught with centre boards 2ft. 9ins. each
Cockpit—3ft. 4ins. x 7ft. 6ins. x 1ft
Headroom—4ft. 9ins. (cabin top raised)
Construction—B.S.S.1088 mahogany ply, silver spruce and hardwood where necessary. Hulls 3/8in. moulded mahogany with brass protected oak keel skids.
Centre boards—Pivotal
Rudders—Alloy lifting blades
Weight—Approximately 800 lbs.
Sail area—225 sq. ft.
Finish—Non-skid side decks, hulls colour to choice, standard with anti-fouling waterline, cockpit and interior varnished.



The rig is a fully-battened mainsail and jib giving a total sail area of 220 sq. ft. Oval in section, the mast is set up with galvanised steel shrouds and stainless steel rigging screws



G. PROUT & SONS LTD.

Sleeping accommodation for two is provided in the cabin, and there is room for two more berths in the hulls. Stowage space is provided between the cabin floor and the main deck and in the hulls. The dagger boards are situated outside the cabin area.

Reference - Hull shapes.

Results of tests on various hull shapes suitable for multihulls are given in 'Cruising Catamarans' page 71 in edition 1 and page 37 and 53 in the blue 2nd edition.

Tests on stern shapes by Eric Lerouge are on P.46 of 92.

From :
Richard Woods,
Foss Quay,
Millbrook -Torpoint,
Cornwall, PL10 1EN.

Proposal For Inshore Multihull Racing.

Instead of being called Micro Multihull Racing boats that fall outside the normal M.O.C.R.A. regulations might form a Multihull Inshore Racing Association.

Basic parameters should I suggest be

1) All boats to be built in the spirit of the class. Trailable cruiser/racers, seaworthy enough for daylight, inshore races with a maximum race length of 50 miles approximatly.

2) L.O.A. max 25' (7.62m) LWL max 24' (7.31m) Beam unlimited. headroom 4' over 5 sq.ft (1.2m over 1.5m2). 3 berths (2 sea berths)

3) Either S.A. 300 sq.ft.('C' class) and min weight 700 lbs or:
A maximum Bruce Number of 2 (Imperial measurements) plus a minimum weight of 700 lbs, to prevent too lightly built boats. The Br. number to be calculated using empty boat weight - weighing is then possible on ordinary bathroom scales.
The latter alternative would allow moulded GRP boats to sail against the lighter wooden ones. (e.g. the GRP 'Typhoon' and ply 'Gwahir' have the same Br. No. of 1.85 but different weight and S.A.

4) No wing or solid sails, no sitting out aids.

5) Boats to be unsinkable. (Crew rightable ?).

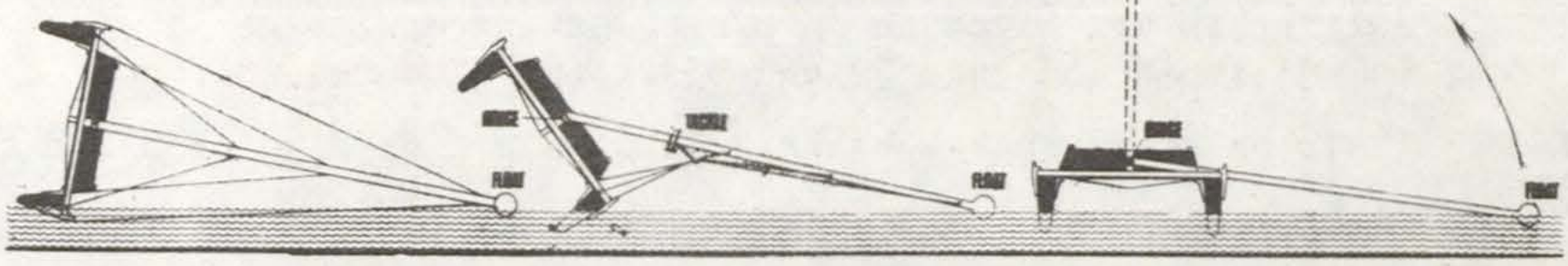
6) Boats to be trailable - i.e. max trailing width 8'.

7) A screening stability value - e.g. ability to carry full sail in a force 5 (?). Stability to be calculated using lever calculation.

8) Penalty (e.g. 10% weight penalty) for non-production boats (under 10 boats or sets of plans sold).

There are also a few safety rules that I think could reasonably be changed for a MIRA class.(From M.O.C.R.A./International rules).
7.1 - headroom reduced from 4'6" minimum. 7.2 Pipecots to be acceptable as bunks. 8.1 One fire extinguisher in place of 2. 8.2 One bilge pump and one bucket in place of 2. 8.3 Minimum 15lbs anchor plus chain and 30 meters warp (Kedge 10 lbs ?) . Anchoring will only be done in shallow water, boats are obviously beachable, while races will not be held in gales, so I think a reduction in the anchor weight is acceptable. 15 lbs is the recommended weight for a 25' monohull. (Present requirement 20lbs for 18'-25'6" + 25fms warp) 8.4 2 torches to be reduced to 1 and 11.3 reduce to one lifebuoy.

Right: The boat is back on the water with its mast lying flat but ready to be rehoisted.



From:
Richard Woods

Update on Micro-multihulls November 1982

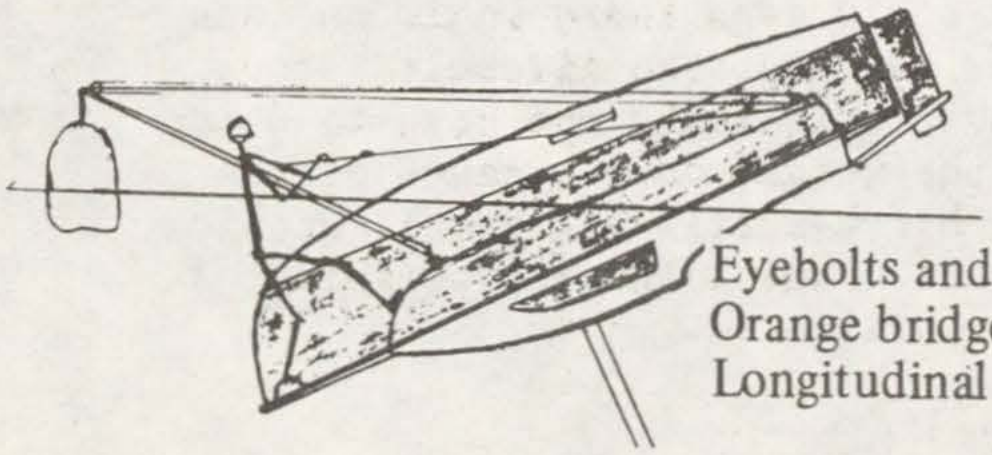
Interest in Micro-multihull racing seems to be increasing steadily. Although there are a number of boats already sailing that meet the spirit of the class, I think that unless a positive decision is taken at the M.O.C.R.A. A.G.M. to run races there will not be enough time before the season starts for other people to build or prepare boats for 1983, and so the initial impetus will be lost and it will be another year before racing can begin in earnest.

Obviously, there is not enough time between now and the A.G.M. to come up with a complete and definitive set of rules, but this need not prevent races from being organised. 1983 should be a trial year, with all boats welcome. However, provisional rules (guidelines might be a better word) should be published so that those planning to build or design new boats will know the sort of boat that MOCRA wants to encourage. Boats should be allowed to race in the existing inshore races, with results worked out using normal Portsmouth Yardstick system (if owners of existing cruisers object to this, then the results could be separated, but using a PY system there are no real grounds for objections).

The correspondence I have had as a result of my article showed that, in the U.K. at any rate, most people are interested in the larger, more extreme boats rather than the smaller, simpler ones. Thus I think that MOCRA should initially promote the most extreme boats, but if there is a demand to organise races for smaller boats then, obviously, another set of rules should be drawn up. Also I think it would be a good idea to limit the performance of boats before they become too extreme and become C class racers.

The following is a list of existing boats, together with their Bruce numbers and stability, that would meet the spirit of the Micro-multihull rules, so the final rules should allow all these boats to race. I have also listed four 'conventional' cruisers for comparison (The data is from brochures, studyplans etc. and so may not be exact)

Type	Bruce Number	Stability (empty)	3 Crew to windward
Gwahir	1.926	16 knots	24 knots wind.
Typhoon	1.936	18	24*
International 23	1.72	18	25
Seawinds 24	1.80	16	24
Pahi 26	1.63	20	26**
Aztec	1.726	15	21
Iroquois	1.37	22	24
Hirondelle	1.25	20	24
Havcat 27	1.59	20	23
Prout 19	1.6	15	22



by Bjorn Enqvist

METHOD OF RIGHTING HAVKAT

Eyebolts and lifelines under bridgedeck are standard.
Orange bridgedeck is standard.
Longitudinal metacentric height is twice athwartships.

* The Typhoon, being a trimaran can only have 2 crew on the windward hull, the helmsman will be in the cockpit.
** Pahi 26 is designed as a trailable cruiser rather than a racer. Bruce numbers are imperial units, final rules should be metric.

Although the Micro-multihulls listed are all very different, and all are designed by different people, the Bruce numbers vary only 10% excepting the Wharram Pahi 26. More surprisingly, perhaps, is that the stability of all the boats (if the crew are in the right place) is remarkably similar and, except for the Aztec, is no worse than the 'conventional' bridgedeck cats.

The parameters proposed (published October Multihull International) were necessarily brief and I will expand and explain the reasoning.
1) "Spirit of the Class" is very vague, it has in other classes successfully prohibited extreme or undesirable boats or ideas.

2) The 7.62m maximum length means that all boats will be easily handled ashore. A shorter waterline length (say 30cm less than the overall length will prevent everyone adopting vertical bows (which may be one of the causes of pitchpoling) and also also allow designers greater freedom. There is no reason why overall sailing beam should be restricted. It is very difficult to design a fast, aesthetically pleasing [redacted]ng multihull under 7.62 m with 1.35 m headroom. The Microcup monohulls have a sitting headroom rule, and 1.22 m can be quite comfortable with a lounging type seat. Headroom over 1.5 m length seemed reasonable, bearing in mind that trimarans have only [redacted] cabin. This figure may have to be reduced to allow some boats- e.g. Trailertri's to race. A length rather than area was chosen because hullbottom will normally form the cabinsole, and so round bilge boats would be penalized. Whether racing or cruising, I think a Micro-multihull will sail best with 3 crew. Although racing will only take place in daylight cruising may be at night, hence the need for at least 2 sea berths. These will have to be more comfortable than harbour berths and this will help prevent the monohull practice of berths under the cockpit sole etc.

3) The three basic parameters that affect speed are length, sail area and displacement. Since all will be about the same length the two critical factors are sail area and displacement. For many years the Bruce number has been propagated as the best ratio for predicting speed, using these two factors and so it seemed the best and simplest way of limiting (or predicting) performance. I chose a figure of 2 as that would include all Micro-multi's in existence and not allow the class to become too extreme.

I thaught it would be preferable to use the weight of an empty boat (i.e. a sailing shell), as it would mean there would be less to weigh (if a race-ready boat was weighed, the lifebelt, stove etc. would have to be weighed) and people would not have to skimp on the weight of the boat to keep the weight down because of the extra deck equipment etc.. As all Micro-multihulls are light and trailable it is unnecessary to have a crane to do the weighing. A spring-balance or weighbridge will suffice.

7.5m COASTAL RACER GWAHIR

L.O.A	7.5 m
L.W.L.	7.0 m
B.O.A.	4.5 m
DRAFT	.2 - 1.05 m
WEIGHT	275 KG
SAILAREA	28 m^2
HEADROOM	1.2 m

Richard Woods,
Foss Quay,
Millbrook-Torpoint,
Cornwall PL10 1EN.

NOTE DAGGER BOARD IS ON INSIDE OF HULL ANGLED OUTWARDS UNLIKE MOST OTHER CATAMARANS.

FEATURES:

- ROUND BILGE, COLDMOULDED HULLS.
- TRAILABLE (WIDTH 1.75)
- 3-4 BERTHS
- 2 DAGGERBOARDS

ACCOMMODATION LAYOUT SIMILAR TO JANUS

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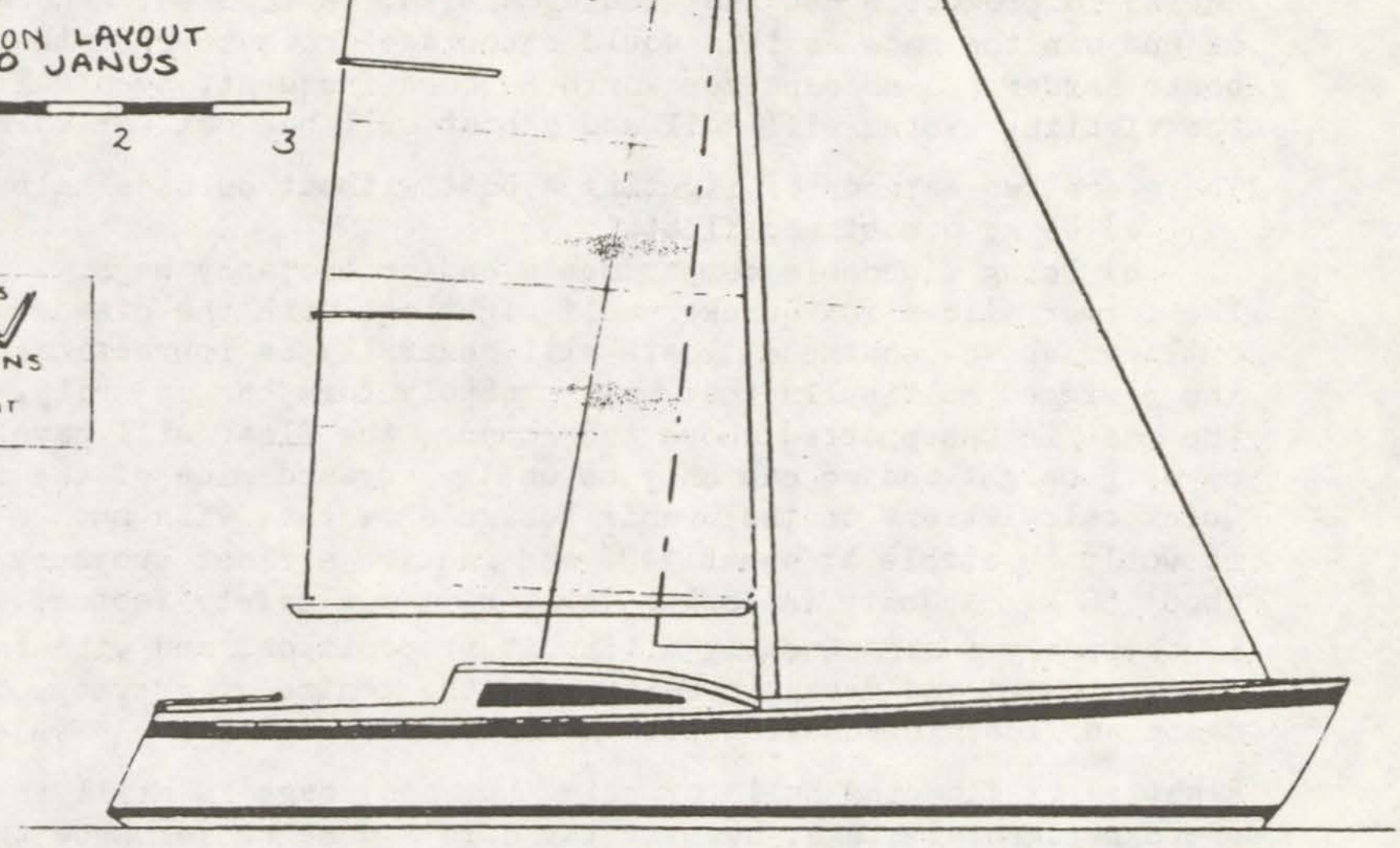
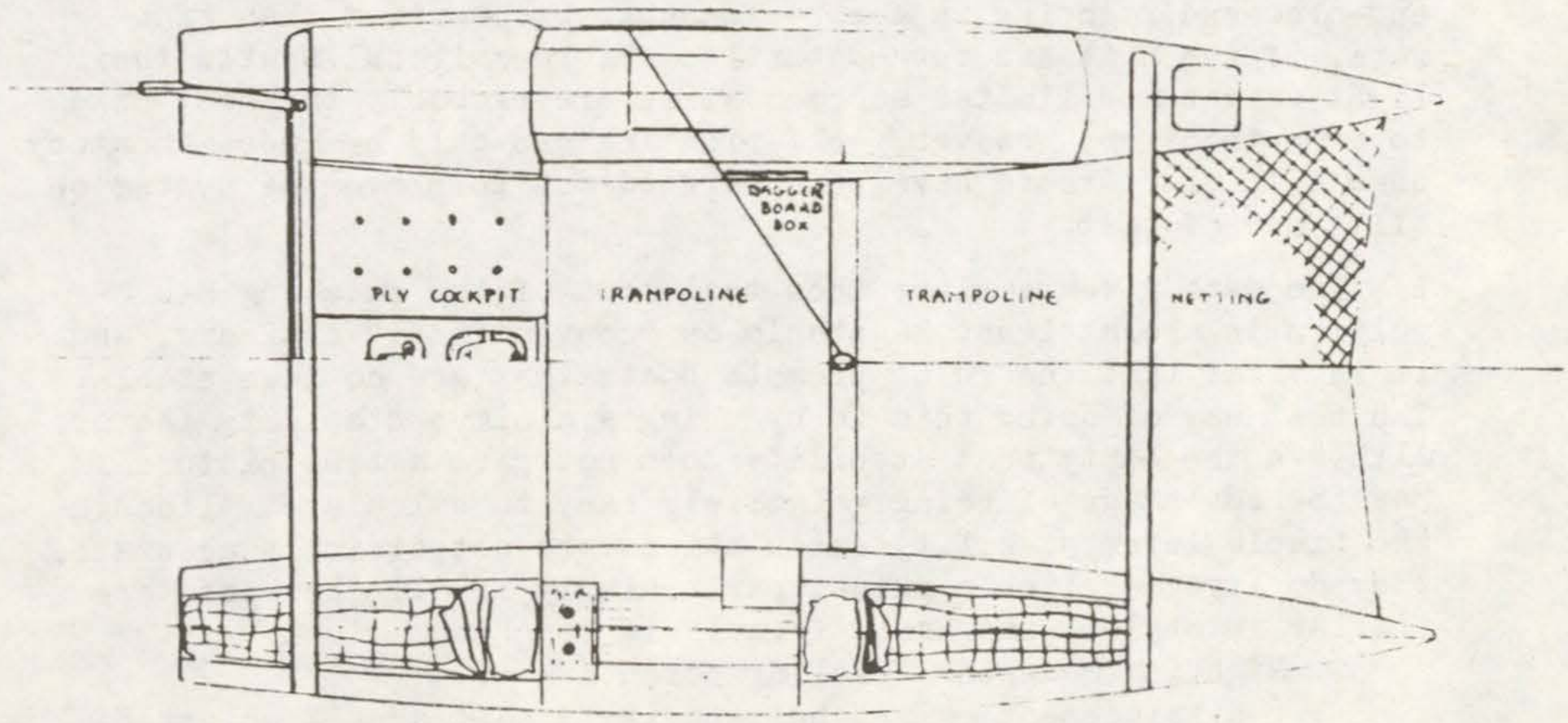




JANUS

6.6 m TRAILER CATAMARAN

4) The actual sail area should be measured. The IYRU already have a good method of doing this. Although a deg ree of experimentation in the rig is desirable, I think all would agree that interest in the C-classdied as soon as one had to have a solid sail to win. They are very expensive, difficult to rig and must create problems when anchored. Thus I would propose that:

a) if the mast chord is greater than, say, 2% of its length (about 180 mm on a 9 m mast) the mast profile area should be included in the mainsail area.

b) the solid part of the mast/mainsail should not exceed,say, 20% of the total sail area. Thus a "Lady Helmsman" rig would be acceptable, but not a "Patient Lady" rig.

5) It is obviously essential that boats must float when holed or capsized. "Crew-rightable" is another matter. If a boat did capsize it would be a great advantage if the crew could right it without outside assistance. However, I think that it would be unwise to promote boats that could capsize, be righted, and carry on and win the race as this would encourage crews to push their boats harder and so capsizes would be more frequent. Eventually the righting system will fail and a boat will be lost, or worse.

There are two methods of righting a boat without outside help :

a) Using a masthead float.

b) Using floodable compartments and/or buoyancy bags.

The former allows for quicker self righting, with the disadvantage outlined above. Masthead floats will generally be impractical on the $\frac{3}{4}$ rigged multihulls that will probably form the majority. As the mast is unsupported above the hounds, the float will have to be at $\frac{3}{4}$ height and so can only be on the forward side of the mast. Quick calculations on the Gwahir design show that with such a float it would be stable at about 110° and require a float buoyancy of about 50 kg capacity (allowing for a suitable safety factcr). This is obviously a structurally difficult proposition, and with the extra windage and dramatic raising of the centre of gravity, the masthead float is inadvisable.

Righting by flooding hulls or using buoyancy bags is still in the experimental stage, however the trials done so far show that end-over-end righting is a more feasable proposition than side-ways, if the boat has turned turtle. Micro-multihulls with their light weight and limited accommodation are probably the best size to experiment on; however, self-righting can only be made mandatory once sufficient tests have been carried out to prove the system on all types of boat.

7) The data given earlier show that most of the existing Micro-multihulls are at least as stable as "conventional" cruisers, and it is vital that the rules promote boats that are no less stable. The best way of doing this is by using a minimum stability factor. Although the empty boat stability does not give a true picture it has the advantage of being relatively easy to calculate. Although the simple lever stability calculations are not strictly accurate, they do give a reliable guide, particularly if all the boats are similar in style. The basic formula is :

Righting moments = heeling moments or

(displacement - 2) X hullspacing = sail area X height of centre of effort X w.p.

Using metric units this boils down to:

$$\text{windspeed} = 2.67 \sqrt{\frac{\text{Displ. x spacing}}{\text{S.Area x height}}}$$

which, for Micro-multihulls, should be greater or equal to 7.5 m/s (15 knots) for an empty boat. The height of the centre of effort requires several measurements (or scaling from the sailplan), while the other parameters are already known, or easily measured.

I think to calculate the real stability with 2 or 3 crew on the windward hull is reasonable as it is highly unlikely that they will be racing hard in any other position. A Micro-multihull will be day-sailed like dinghies - crews will be prepared for capsize in strong winds and react accordingly, thus, paradoxically, reducing the chances of capsize. (Capsizees in conventional multihulls have generally been because the crew - sheltering behind a bridge-deck cabin - have been unaware of the weather conditions). Thus, given the calculated stability figures, one could expect to have a better safety record.

8) We do not want to have the situation where the only way to win is to have a professionally built one-off design, as that would hardly encourage low cost cruiser/racers. However, we do **not** want to discourage the amateur designer/builder from building his own boat, especially as Micro-multihulls could become a good breeding ground for new ideas, thus the problem is how to differentiate between one-off boats. A Bruce number above a certain figure (say 1.75 ?) could be penalized by having a corrector weight added. If below this Br.No. then there would be no weight penalty. I suspect that the professional one-off will be the most extreme boats,while the true amateur boats will generally have a lower performance. The well designed and built amateur boat is still penalized, but if all penalties are removed once 10 or more boats or plans are sold, then the number of boats unfairly penalized will be very low.

Editors Notes.

Bruce Number = square root of sail area divided by cube root of weight.
The reference for this is 'Design for Fast Sailing' and our publication 66 pages 106 and 107.

I have no doubt that there is a demand for such small racing craft. Cruising multihulls are no longer competitive, most of the early owners have grown old. Rod Macalpine-Downie claimed that the Iroquois was designed as a "comfortable, coastal caravan-cruiser". They used to race with considerable success but have lost interest. Sponsors and the publicity circus with almost unlimited funds have put line honours beyond most private week-end sailors offshore. I question that existing in a four foot tube with no floor boards so that you "stand" in bilge water can be called cruising. How does one put on trousers ? Sailing "like dinghies" and "reducing the risk of capsize" means to me that some means of recovery is needed.

A yacht which capsizes could be retired in the same way that she would if she hit a mark. The cost of replacing instruments and inconvenience of sleeping in a wet bed should discourage all but the heavily sponsored competitors. Should we decide now to discourage commercial craft ?

Ill-defined Bruce Number. From John Darby,
9 David St., Carlton 3053, Australia.

I was sorry to see the ill-defined Bruce number in your paragraph on the proposed mini multihull cruiser racing. As a quasi-scientific society we should use dimionsionless ratios as is done in all work on fluid dynamics, all proper writing on naval architecture and as I advocated fifteen years ago in AYRS 61. It is particularly easy to achieve such a quantity in the present case; dividing the square root of the sail area by the cube root of the volume of displacement instead of the mass is all that is needed, and the Bruce numbers are converted by multiplying by the cube root of the density of water in pounds per cubic foot. (i.e. $64^{\frac{1}{3}} = 4$). To give a limit in the present case of 8 - incidentally a dangerously high figure as our experience here in the last few seasons has shown.

Alter the Bruce Number ? From Tony Williams,
41 Acland Drive, Strathpine, Qld.

I agree with you that there must be some other factor in my proposal to alter the Bruce number. Unfortunately I envisage the formula rapidly growing extremely complex so as to allow for all possible variations. It could ultimately resemble the I.O.R. rating rule and become just as impossible to understand. Considering the purpose of the formula is to help us understand boat design and thus design better boats I think it is best if we simply acknowledge the general exceptions to the rule and their general effect and leave it at that. Otherwise we get into a situation where it is hard to see the wood for the trees.

Scientific type formula are essential for designing the details of a boat. But in my opinion a waste of time when trying to decide on the basic design of a boat even for a very specific purpose.

For example in your speed sailing meetings all the boats have one specific purpose but they have big variations in basic design. Therefore obviously not designed to a formula.

I think that if we do eventually come up with a formula that works we would kill the thing that really matters. The element of invention.

RIGHTING MULTIHULLS

Self Righting = a yacht which if inverted is unstable.

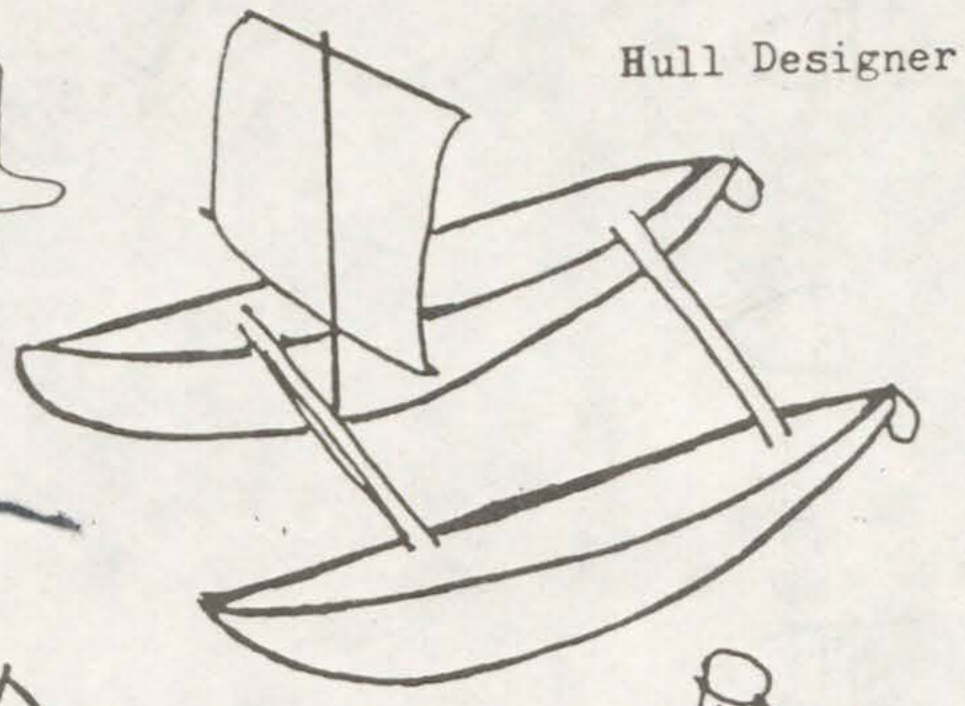
Crew Rightable = a yacht which can be recovered from a capsize if the crew take some action to make her unstable.

Michael Henderson designed many multihulls always insisting that all yachts should be self righting. He used mast floats, ballast keels and narrow beam to achieve this.

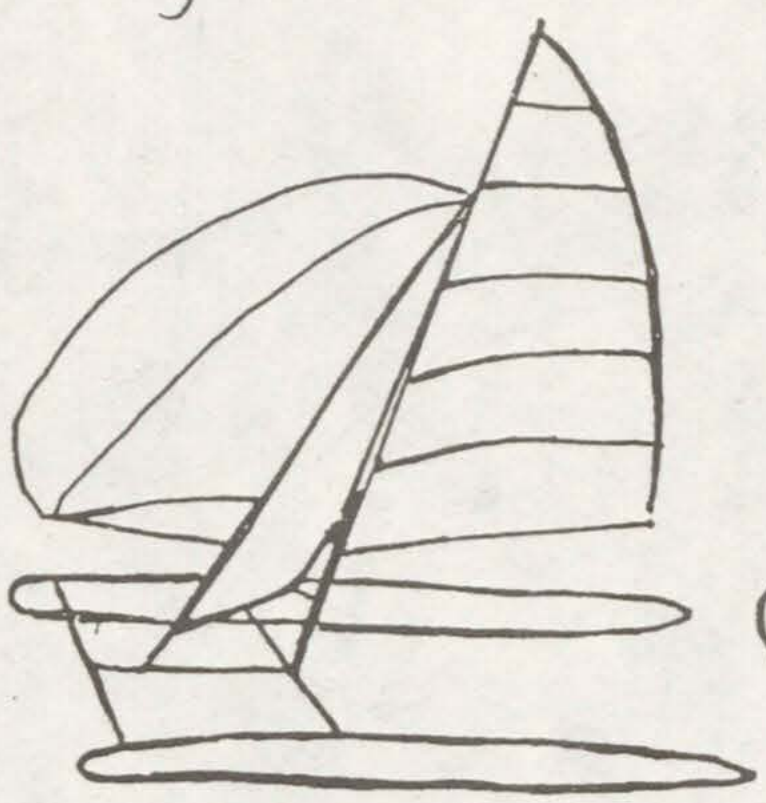
Gerald Holtom showed by model tests that his cabin foiler is self righting providing there is buoyancy in the cabin top (as "Twiggy") and that his foils and beams are not buoyant. A wood mast or foam 'sound deadening' also helps.

THE IDEAL CAT

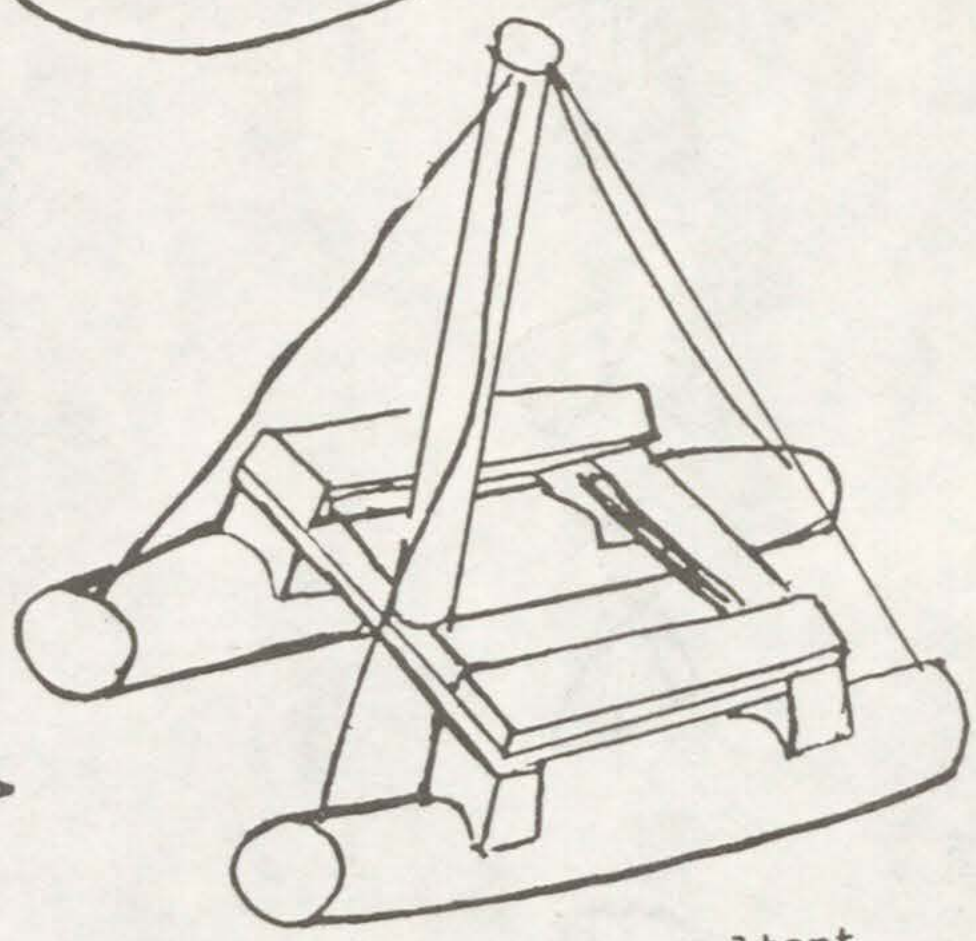
as seen by the



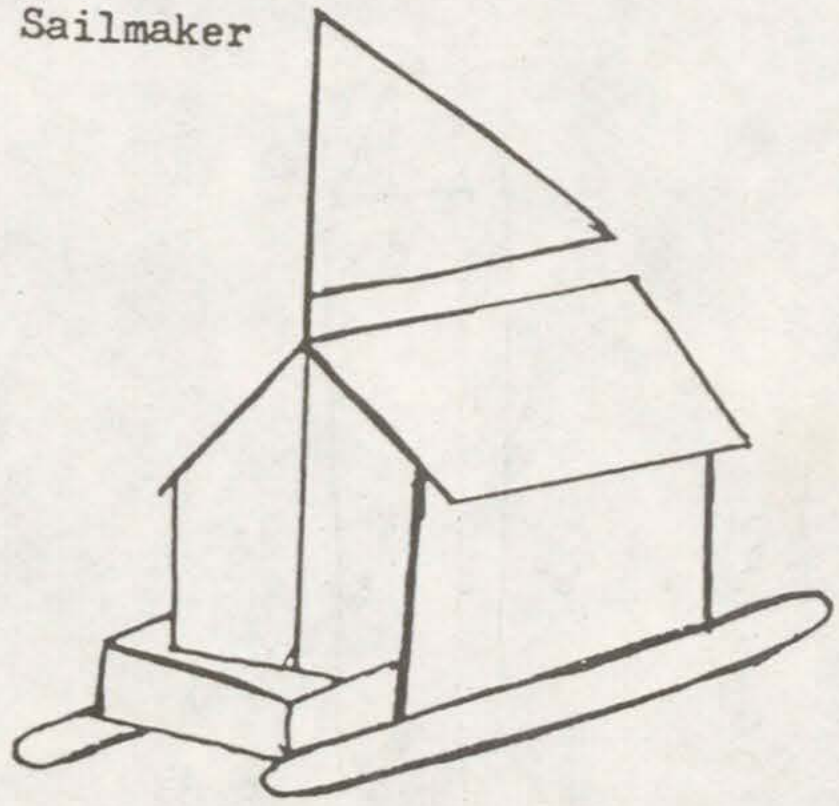
Hull Designer



Sailmaker



Engineering Consultant

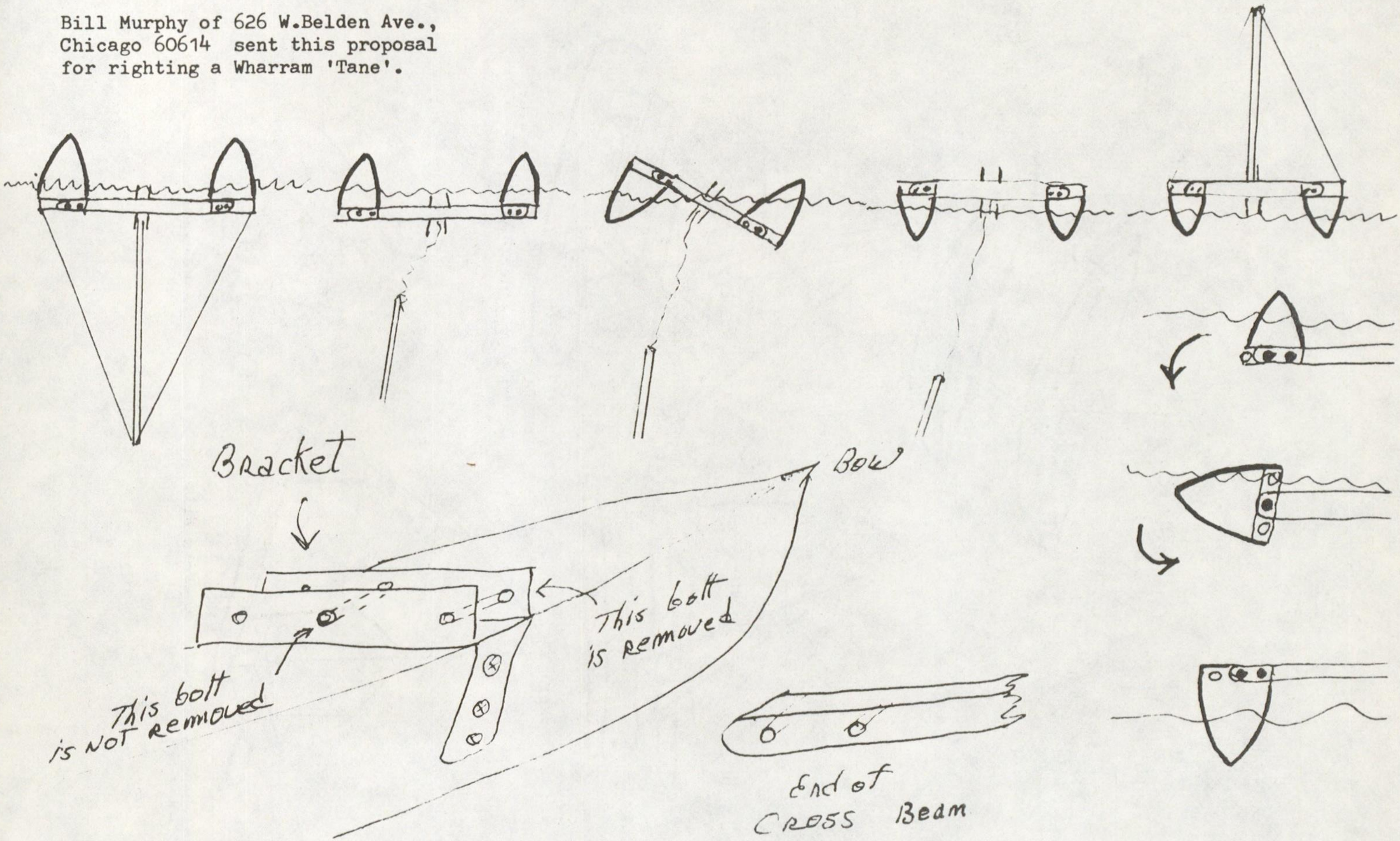


Owner's Wife

Owner

By W. VENABLE

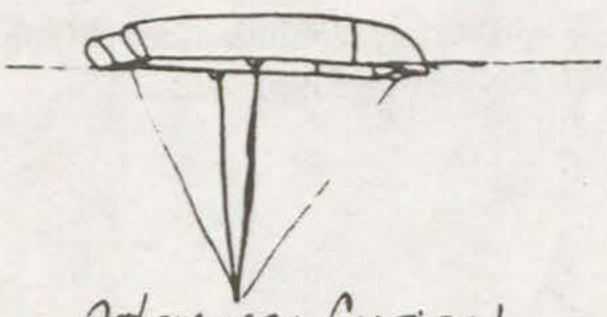
Bill Murphy of 626 W.Belden Ave.,
Chicago 60614 sent this proposal
for righting a Wharram 'Tane'.



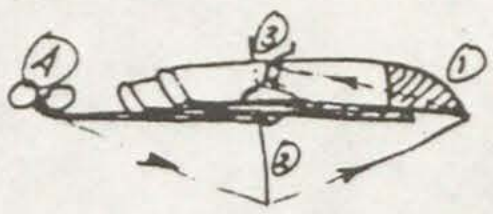
Bipole Rig and Self Righting of catamarans.

The major feature of the bipole rig on catamarans is its immense stability - inherent with the wide base. If it is arranged on a tabernackle type bases, so that the rig may lay down either forward or aft, it can easily be incorporated into a very simple self righting system.

Consider the sequence :

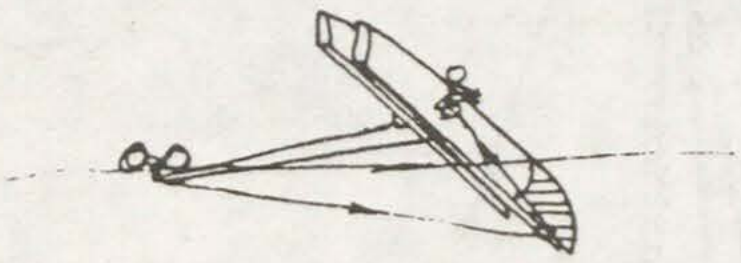


Catamaran Capsized

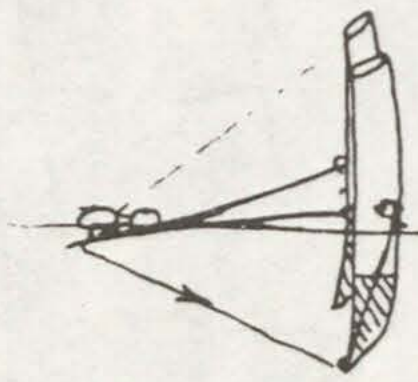


Bipole folded aft.
(Poles have some buoyancy eg. foam filled)

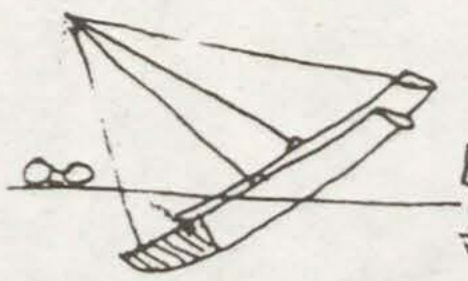
① Forward Compartment flooding.
② Spinnaker pole rigged for initial advantage in winching ③ line which runs from apex of bipole, through spinnaker pole, through turning block @ bow, to amidships winching position.
④ Inflatable dinghy, Life raft or some other large buoyancy attached to apex of bipole.



Winching has begun and vessel is submersalting over it's bow using buoyancy at bipole apex. as lever.



Nearly there..... line is rigged from apex to stern to control bipole position upon completion of turn.



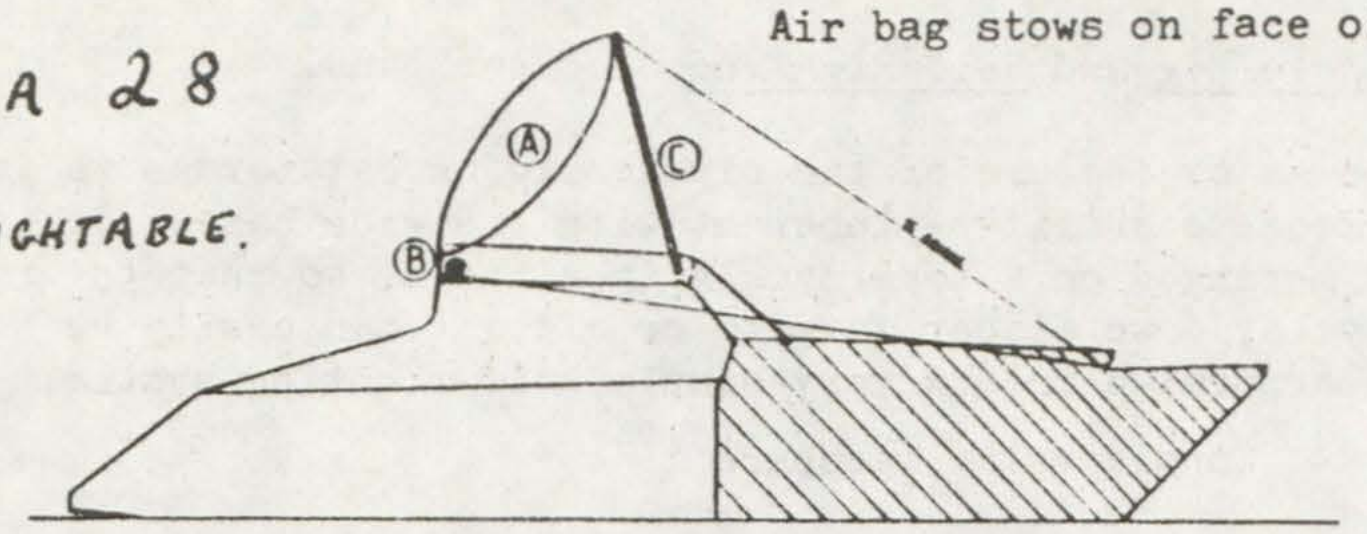
Turn completed, lowering buoyancy to the sea & preparing for re-rigging and pumpout.

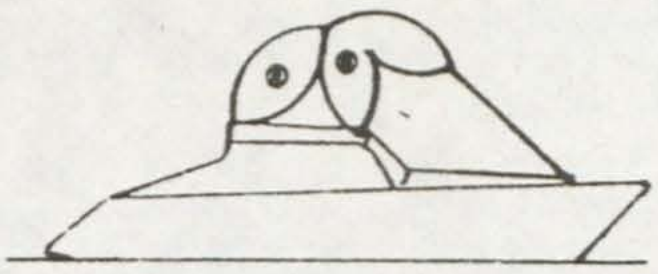
Dr. W.E. Smith,
1028 Robie St., Halifax, N.S.
B3H 3C5

A Air Bag inflates to this position
B Quick release attachment
C A - frame stows flat on deck.
Air bag stows on face of cockpit

TONGA 28

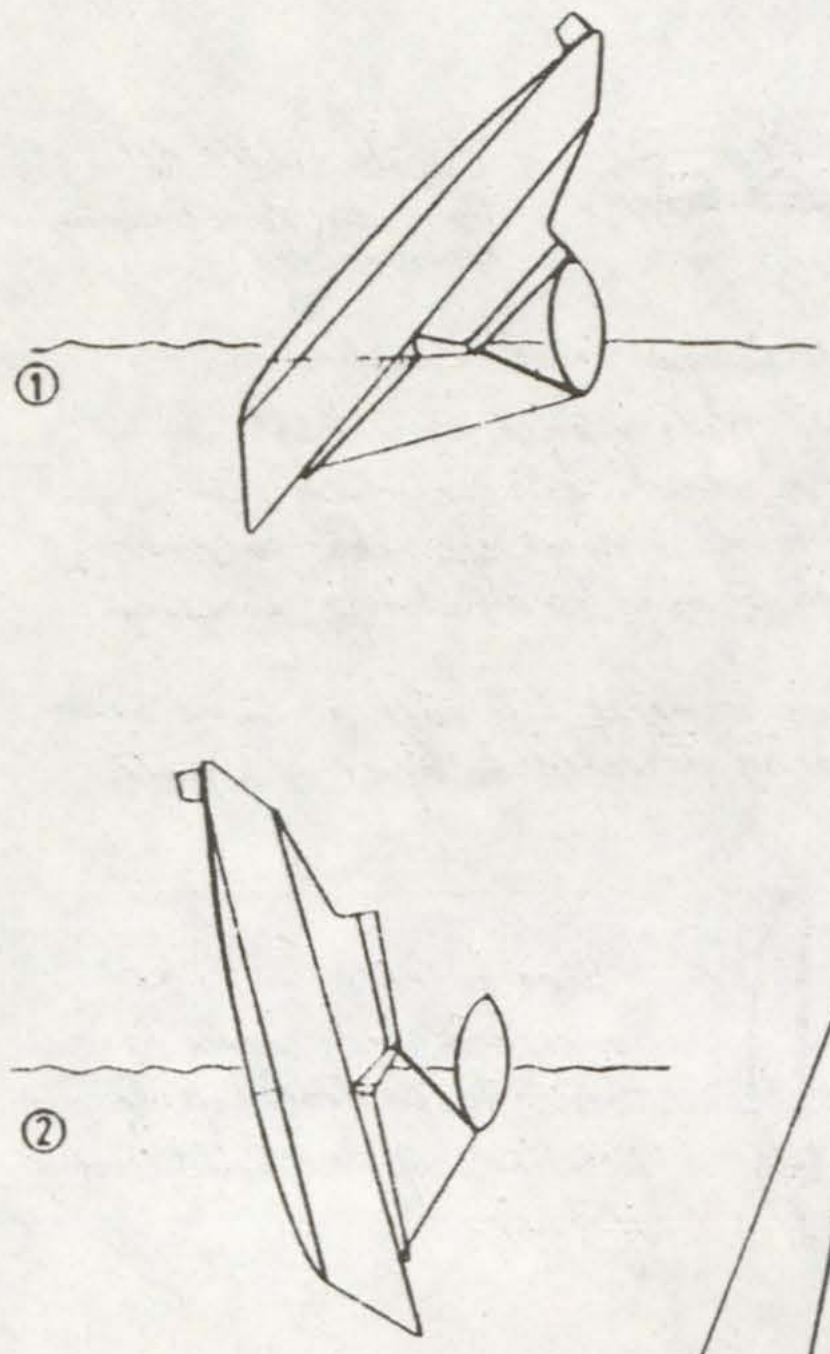
CREW-RIGHTABLE.

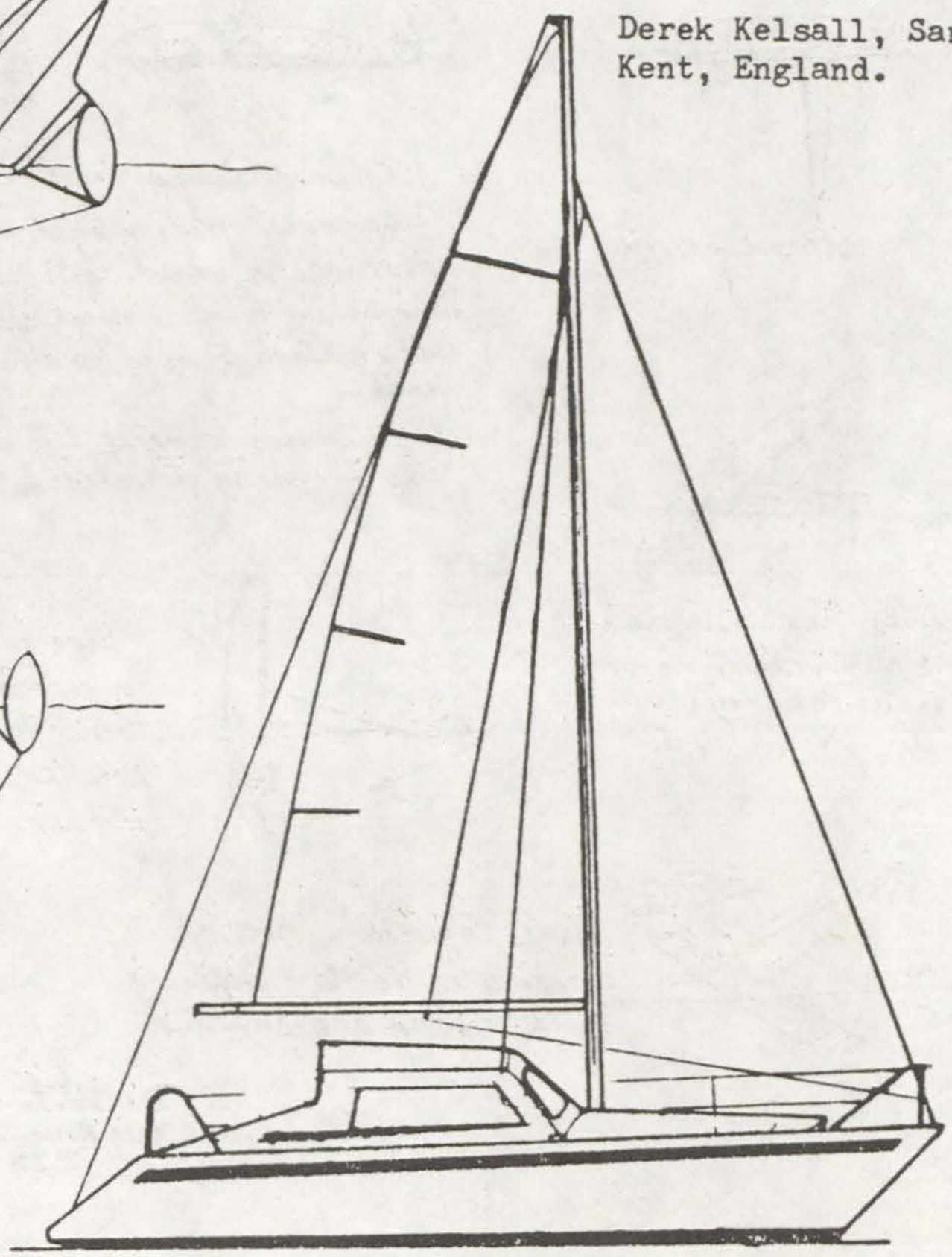


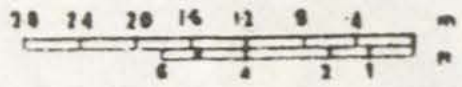


TONGA 28 Self-righting

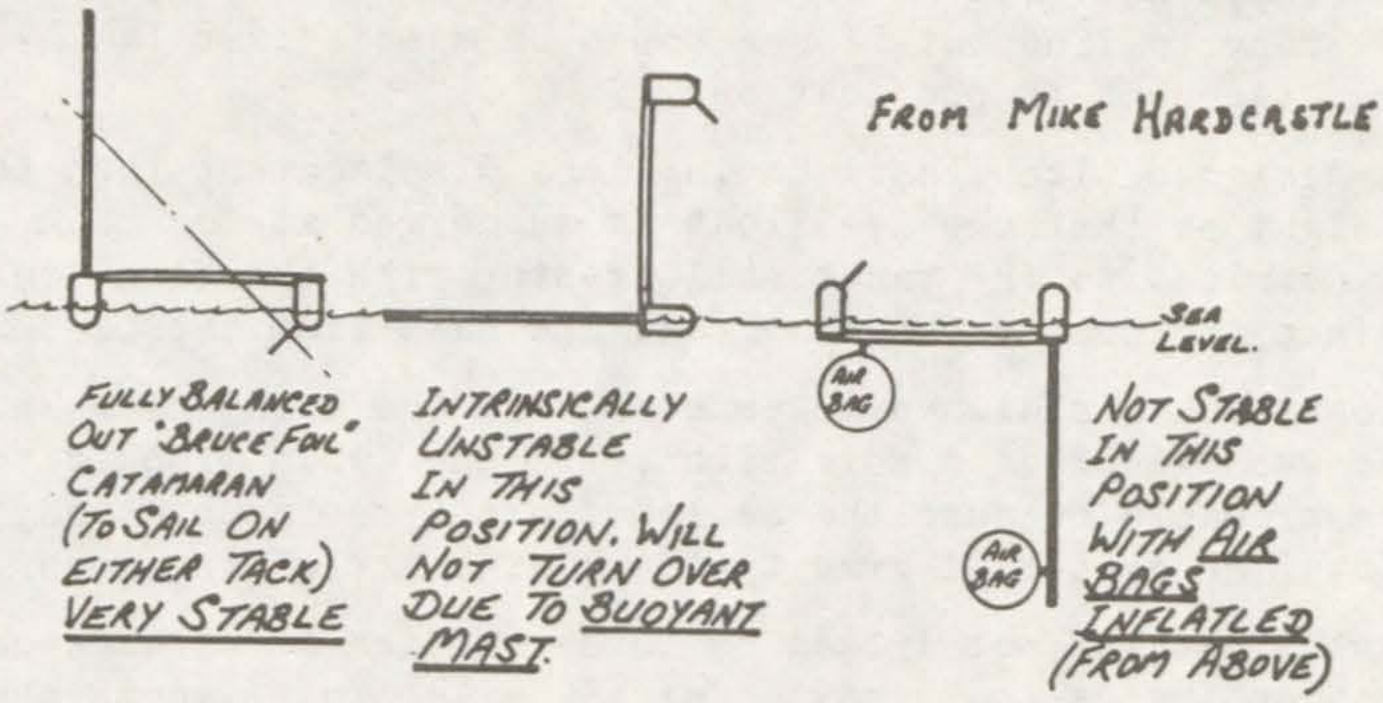
Derek Kelsall, Sandwich,
Kent, England.







Typhoon is a Kelsal trimaran using a Tornado rig and the hulls as floats. Tremolino is a Newick trimaran using Hobie cat hulls as outriggers and the Hobie rig.

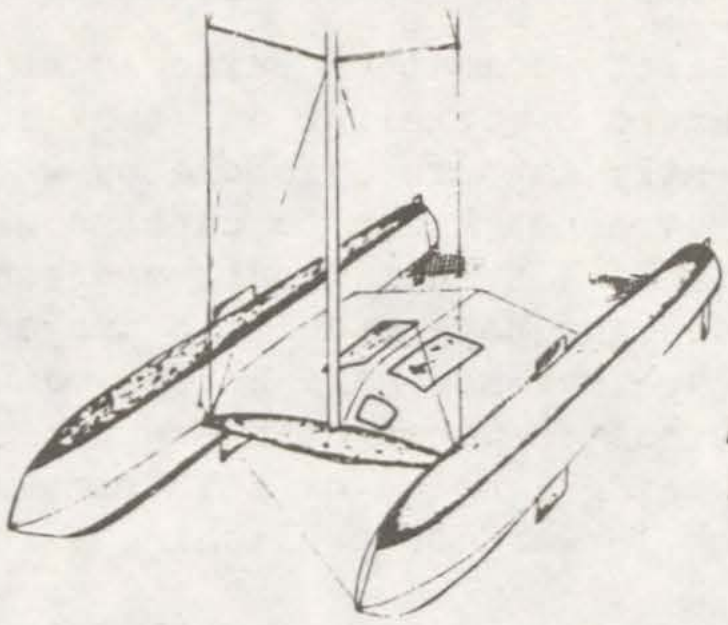


FROM MIKE HARDCASTLE

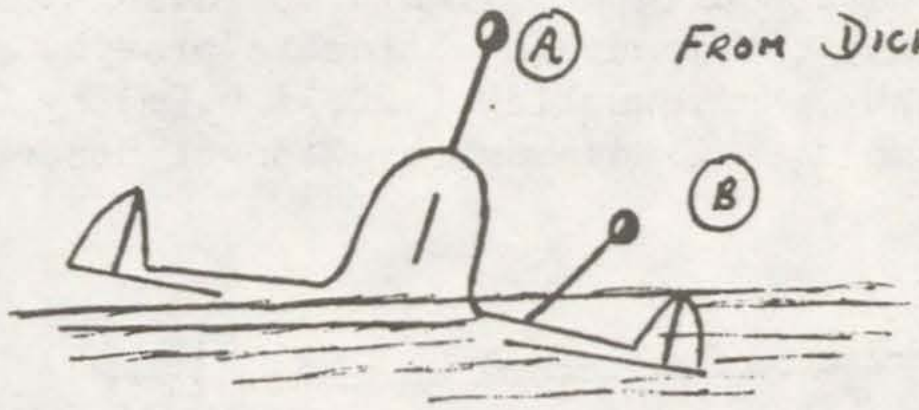
FULLY BALANCED OUT "BRUCE FOIL" CATAMARAN (TO SAIL ON EITHER TACK) VERY STABLE

INTRINSICALLY UNSTABLE IN THIS POSITION. WILL NOT TURN OVER DUE TO BUOYANT MAST.

NOT STABLE IN THIS POSITION WITH AIR BAGS INFLATLED (FROM ABOVE)



FROM
R.L. CUNDALL



FROM DICK ANDREWS

THE 18' Tri SERENDIP WITH 40 LBS AT NORMAL KEEL POSITION (A) DID NOT EVEN TWITCH WHEN 180° OVERTURNED & ONE FLOAT FLOODED. AT (B) SHE ROLLED UPRIGHT LIKE A SHOT.

LOW BUOYANCY FLOAT TRIMARANS.

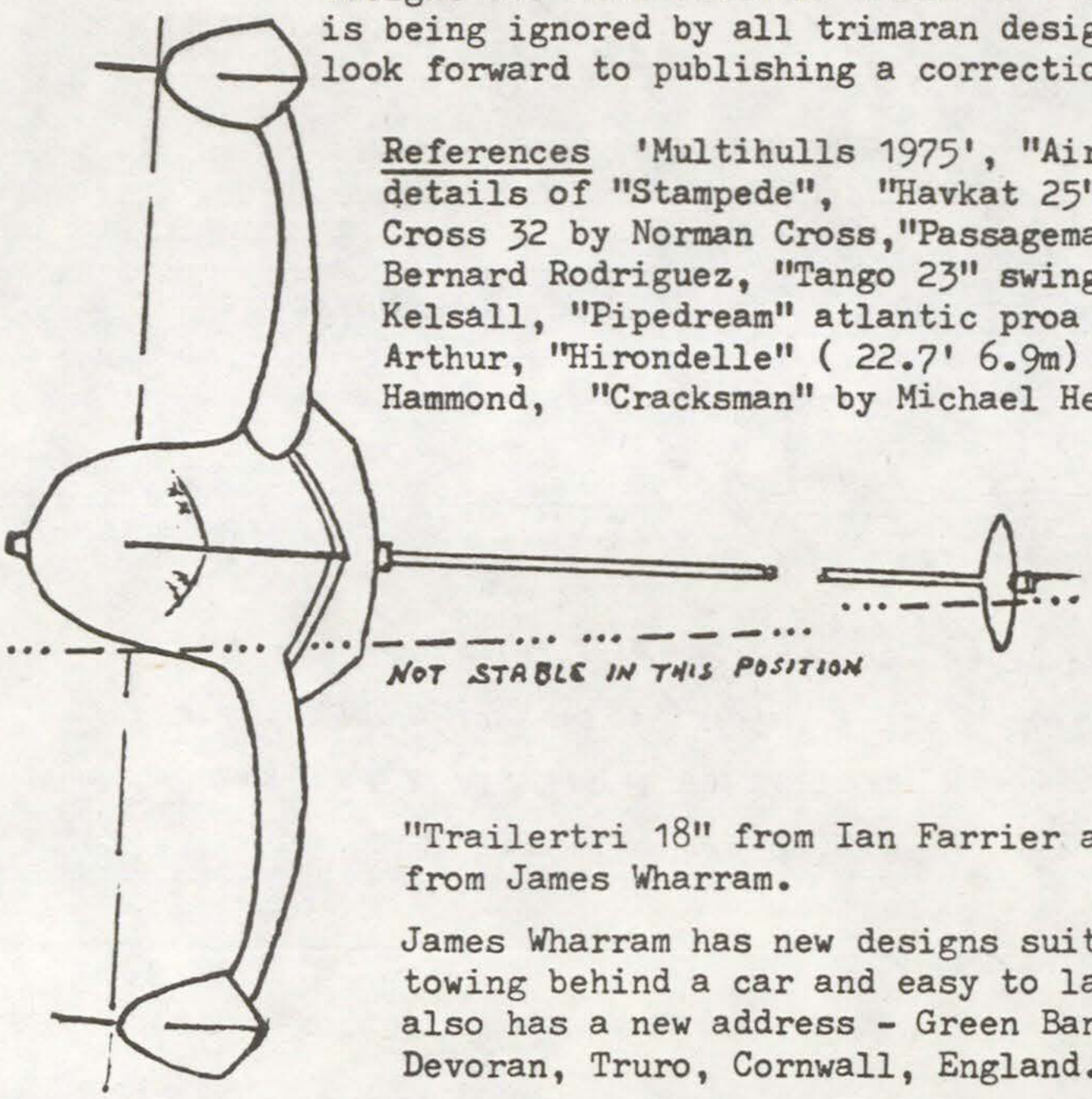
"Three Fingered Jack" was a 26' trimaran designed by Andrew Simpson of Simpson Wild and I crewed for him in the 1970 'Round Britain' race to find out if she would be a safe fast family cruiser. (Account in publication 75).

She was designed with floats having less displacement than the total weight so that the lee float is submerged if too much sail is carried. As the yacht sails faster with the float on the surface the crew reduce sail and are safe from capsize.

Mast floatation was always intended and in the event of a knock-down she was expected to self-right. If the cabin flooded this would be probable because the sealed floats provide buoyancy well above the centre of gravity to provide a righting lever.

The mast float was not fitted by Border Marine at Berwick-on-Tweed and on the delivery voyage of 650 miles to Plymouth she seemed so safe that it was never fitted or needed afterwards.

The M.O.C.R.A. safety committee raised a storm of protests from designers and owners by pointing out that low buoyancy float trimarans frequently capsize offshore by wave action without sails set. They are not known to capsize when sailing. Their recommendation is to fit mast floats and escape hatches. Since the report new designs have much more buoyant floats or lighter main hulls. Escape hatches have become mandatory for new designs for some offshore races but mast buoyancy is being ignored by all trimaran designers. (I look forward to publishing a correction...)



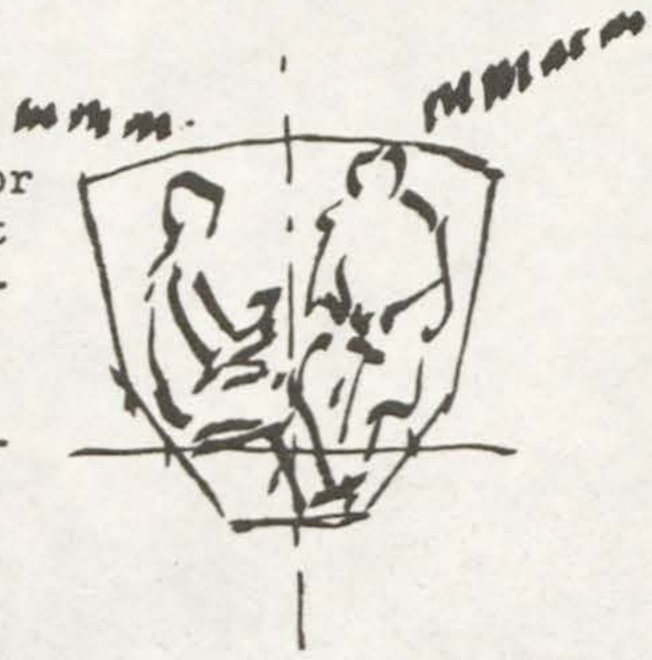
<u>References</u> 'Multihulls 1975', "Airs 11" includes details of "Stampede", "Havkat 25" by Lars Oudrup, Cross 32 by Norman Cross,"Passagemaker 36" from Bernard Rodriguez, "Tango 23" swing-wing by Derek Kelsall, "Pipedream" atlantic proa by Morris Arthur, "Hirondelle" (22.7' 6.9m) by Chris Hammond, "Cracksman" by Michael Henderson, the "Trailertri 18" from Ian Farrier and a range from James Wharram.

James Wharram has new designs suitable for towing behind a car and easy to launch. He also has a new address - Green Bank Road, Devoran, Truro, Cornwall, England.

Multihull Hull Sections

Note from Dick Andrews 31 October 1975.

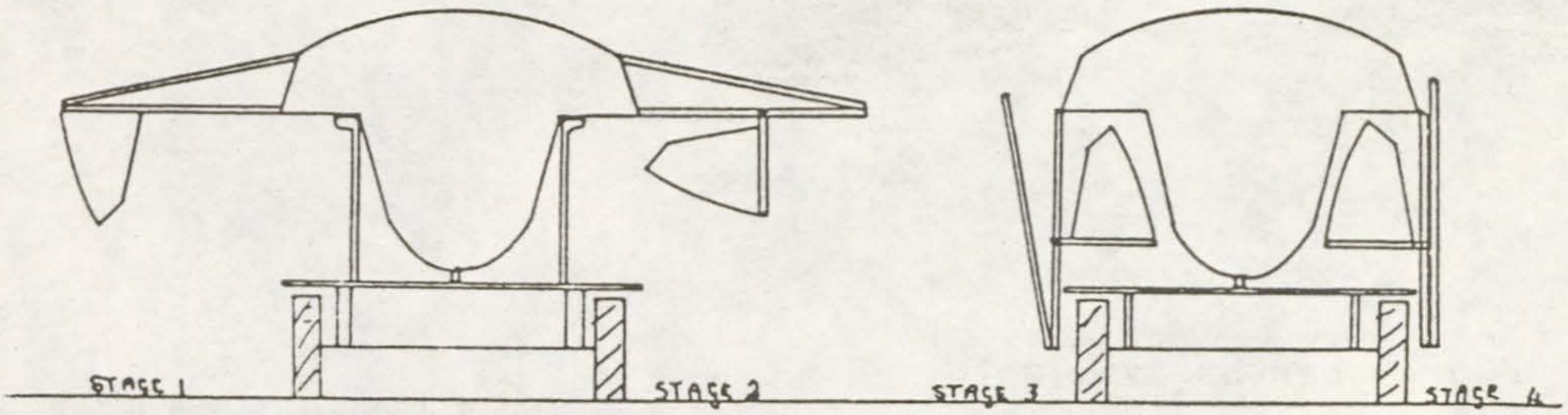
I used a section in my present boat about like the one on the right. It has worked well and I have no complaints except that it has not got a lot of room in it. In smaller sizes, such as 24 ft., one would have to bulge out above the gunwales, and it is still a pretty confined little interior.



Now a friend has suggested that the upper chine can be out of the water, and the shape be thus at the right here. It hhas a lot of interior room. It would not be hard to make. It would not bulge out above unduely. I like it fine. Only - would it jump around like a flea in a seaway ? Not that that matters more than so much - since I m not making an offshore craft - just a long-shore cruiser in terms of day sailing and night at anchor.

Same beam at static waterline.

EASYRIDER 26 FLOAT FOLDING



Folding Floats designed by Denis Lobb of Marine Enterprises, 21 Crownhill Street, New Plymouth, N.Z.

L.O.A. 26' Beam 16'10"
Folding to 8'(2.44m)
Sail Area 292 sq.ft.
Disp. 2,000 lbs ex crew.
1 float disp. 2560 lbs max.

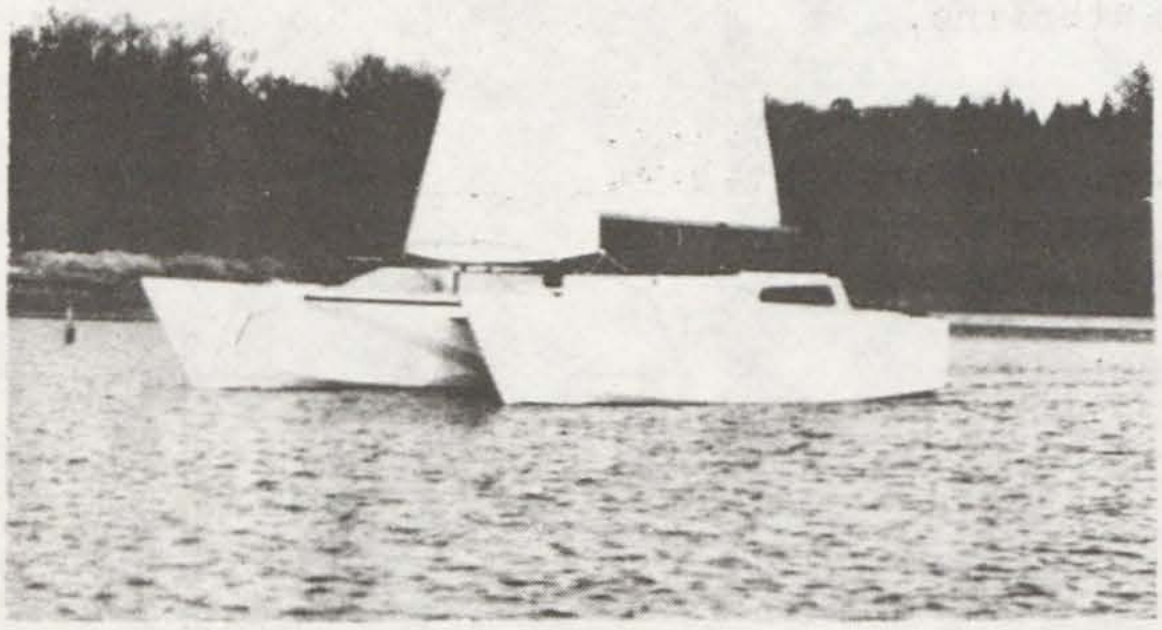
This is four berth center cockpit yacht designed for home builders using plywood construction. Plans are provided with full size templates and building instructions. Study plans cost $ 2.00.

A Lot to do - From Stephen Robbins (P.S. To John)

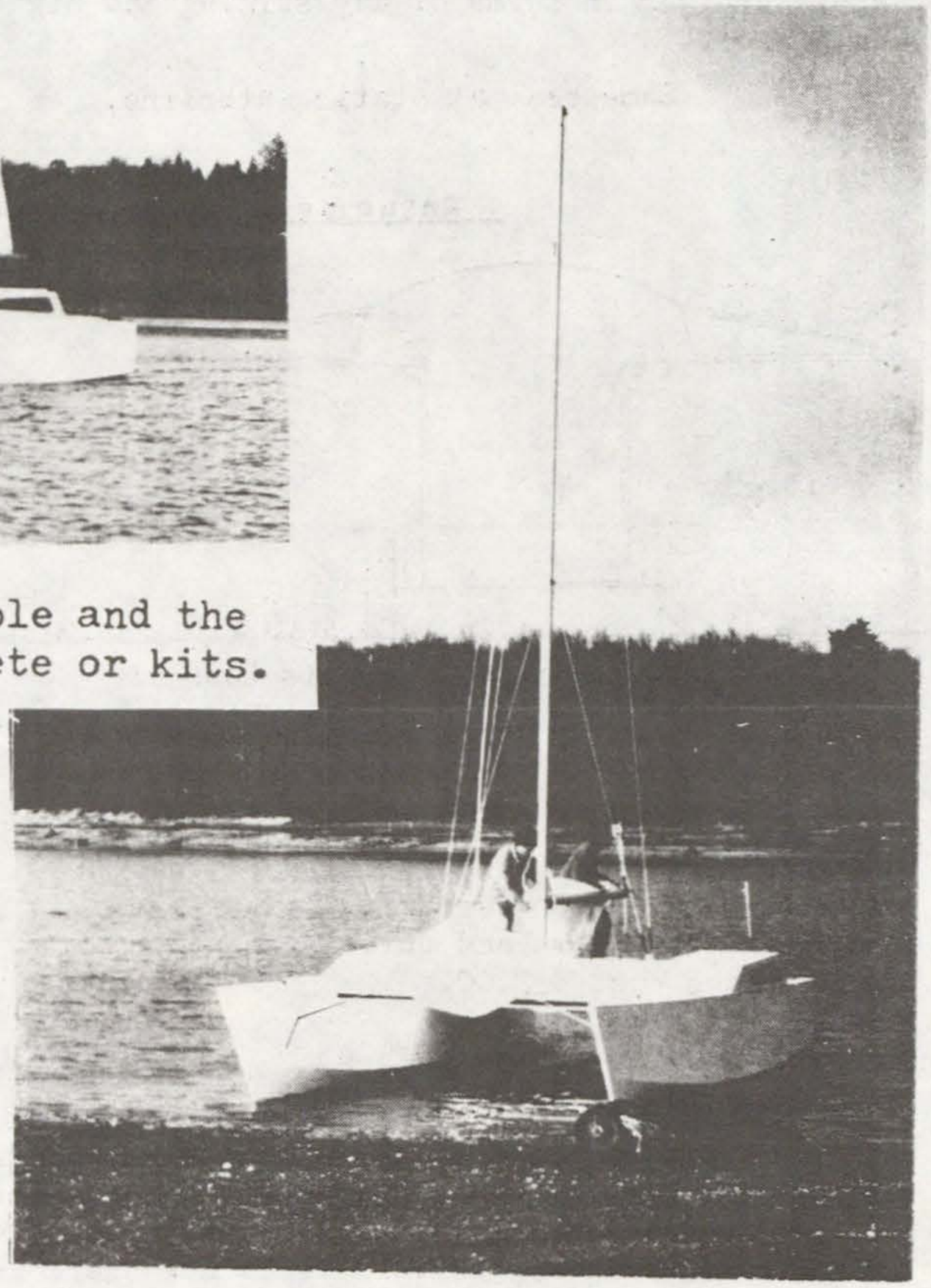
I'm with you against multihulls : they are toggles. I still dream of a ballast keel on a mono, that cocks up to windward at each puff, like a dog's leg: we have the elements: sail, hull, keel. All are free to roll. How shall we link them so that the sail shall stand up to the wind (yet bow to too-strong a wind), so that the hull shall keep upright for comfort, and so that the keel shall twitch to weather for a balancing act (involving masses, transients and acceleration as well as weights, equilibria and motions).....Come gentlemen, the answer must not be far to see ?.....

contact 75

L.O.A. 7.50m
L.W.L. 6.60m
Beam 3.90m
Hull B. 0.90m
Draft 0.24/0.94m
Light Disp. 400 kgs.
Sailing " 770 kgs
Sail area 12 m²



2 or 4 berths available and the hulls are sold complete or kits.



Details from: Multicoques Economiques Realisation
G.Montaubin - Sezais,
79160 Coulonges-sur-Autize, France.

TRISCAPH Trimaran Project by F.N. Potter, The Willow,
116 Main St., Burton Joyce, Notts.

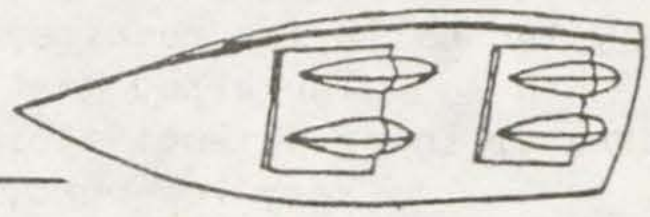
"Hotyot" is a craft having three equal floats arranged in a triangle and attached to a frame each by a single mount which allows them to pitch or take up an independent planing position.

This craft proceeds like a tricycle with one middle forward float which steers. The 1980 prototype had three eight foot floats giving an overall length of 18' and a sail area of 92 sq. ft.. The 1982 craft has returned to a more conventional trimaran configuration and reduced in size for easy transport on a car roof but the independent movement of the floats is retained.

Publication 39 contains details of a "Foil-Crab" design which steers all three hulls like the "Amaran" but I have no account of it being built. Publication 43 includes details of model and full size testing of a "triscaph" which had "floats hinged free floating with action restricted if float leaves the water". The three floats were shaped like hydroplanes and were patented in 1960 by LeRoy Malrose of California.

Retractable Planing Shields. From Joseph T.Dusek, Sydney.

Joseph has patented shields which are deployed to transfer a hull (or sailboard) from displacement type planing into the more effective hydroplaning mode. They are spring-loaded to give a softer ride and impact energy can be used to drive auxilary motors.



Hydrofoil Report. M.J. Barnsley had a measured speed of 16.4 knots with his 18 foot Bruce foiler at Portland. He read a paper at the recent London Hydrofoil Conference giving useful tank test results. Unfortunatly he has joined Dr Wellicome in disputing the test results by Bruce and Horgan who showed that performance is better with a single foil to windward. Nothing has been produced to say why the test results may be wrong.

Foil Stabilised Trailer - Cruiser.

By Dott.Ing. Roberto Rampinelli, Milano, Italy.

We have published details of the scale model tests and can now report that the full size foiler is sailing. Joseph Dusek (Foil - cruiser "Dalibor" Sydney) has sent some photographs of the new yacht sailing. Unfortunatelyin colour.

Design Objects :- A light cruising yacht, trailable (Italian law requires max length 7.80m, 25.59'), fast, very comfortable, easy to assemble and dismantle, inexpensive and easy to build by amateurs or small yards.

Construction below the waterline is moulded wood with 8 mm ply sheet above. The main beam has been built of wood like a glider spar, second beam is aluminium square tube. The mast is made of round tube with rotating streamlining to reduce drag.

Sails are two furling jibs on hollow headstays built by Roberto with commercial aluminium extruded bars coupled to form a true streamlined shape, very inexpensive and good looking; with a friend he built the rotating devices on which the sails roll up.

Advantages : Bipod mast, main beam and main sail's headstay form a very strong and light delta frame which will take all the shock loads from the air and sea.

Sails can be reefed very quickly from the cockpit, only two sails are required plus the spinnaker.

The bipod mast pivots on its base, thus is easy to raise or lower without a crane.

Very low cost, due to simplicity, commercial tubes and low amount of gadgets like bottlescrews a.s.o.

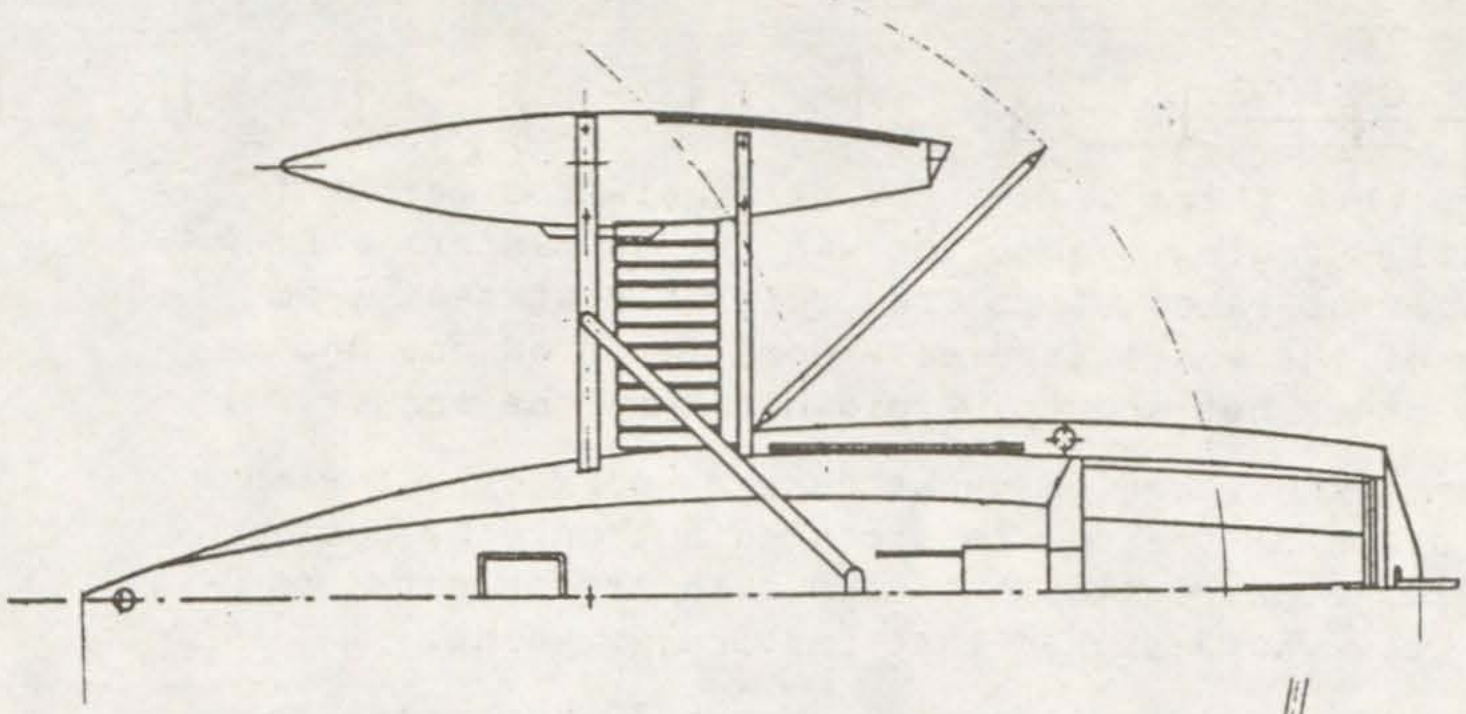
High efficiency due to clear sail luff and no windage under the foot of the sails; no direct turbulance of the mast; the only exposed wire is the backstay.

The use of foils allowes the combination of good performance and ease of assembly or dismantling because they allow very small and light floats which have been adopted for safety and balance of the yacht at rest.

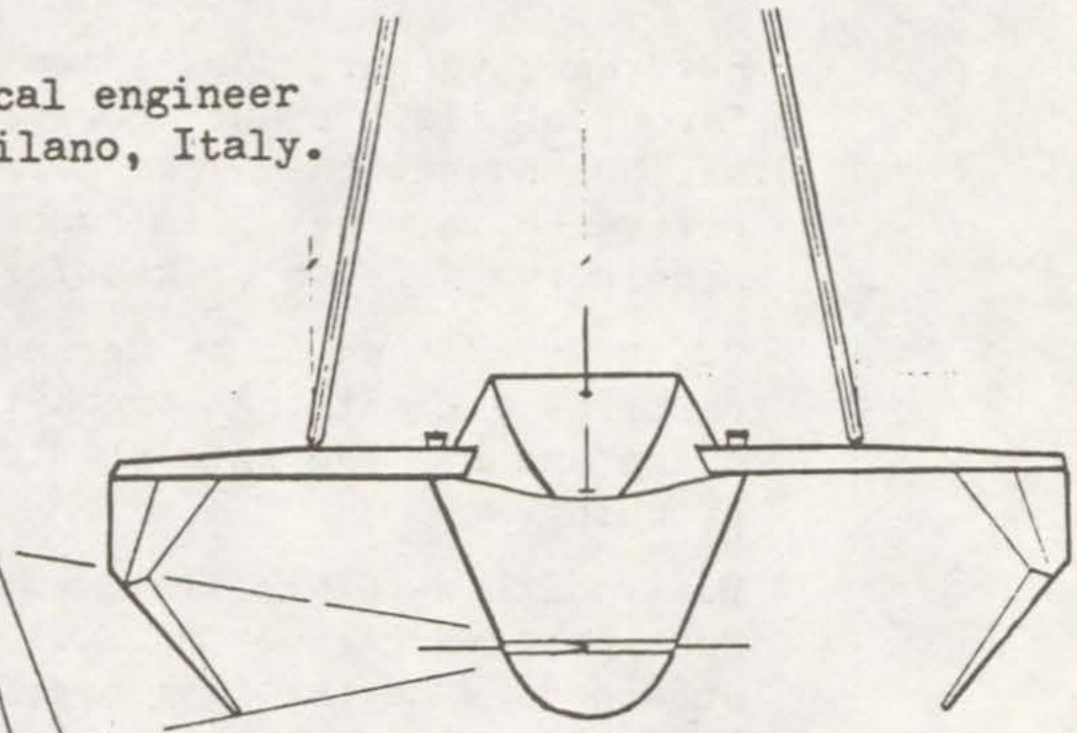
Main hull has L/B ratio of nearly 8 for good performance according to E. Bruce studies, but not withstanding the narrow beam the hull inside is comfortable giving :

- standing height in the main cabin and seperate toilet.
- 4 berths, two semi-fixed and two cloth and tube type.
- a semi-fixed table with four places to sit.
- a very spacious cockpit, two meters long.

Weight complete is about 1,200 Kg giving a Bruce Number of 1.33

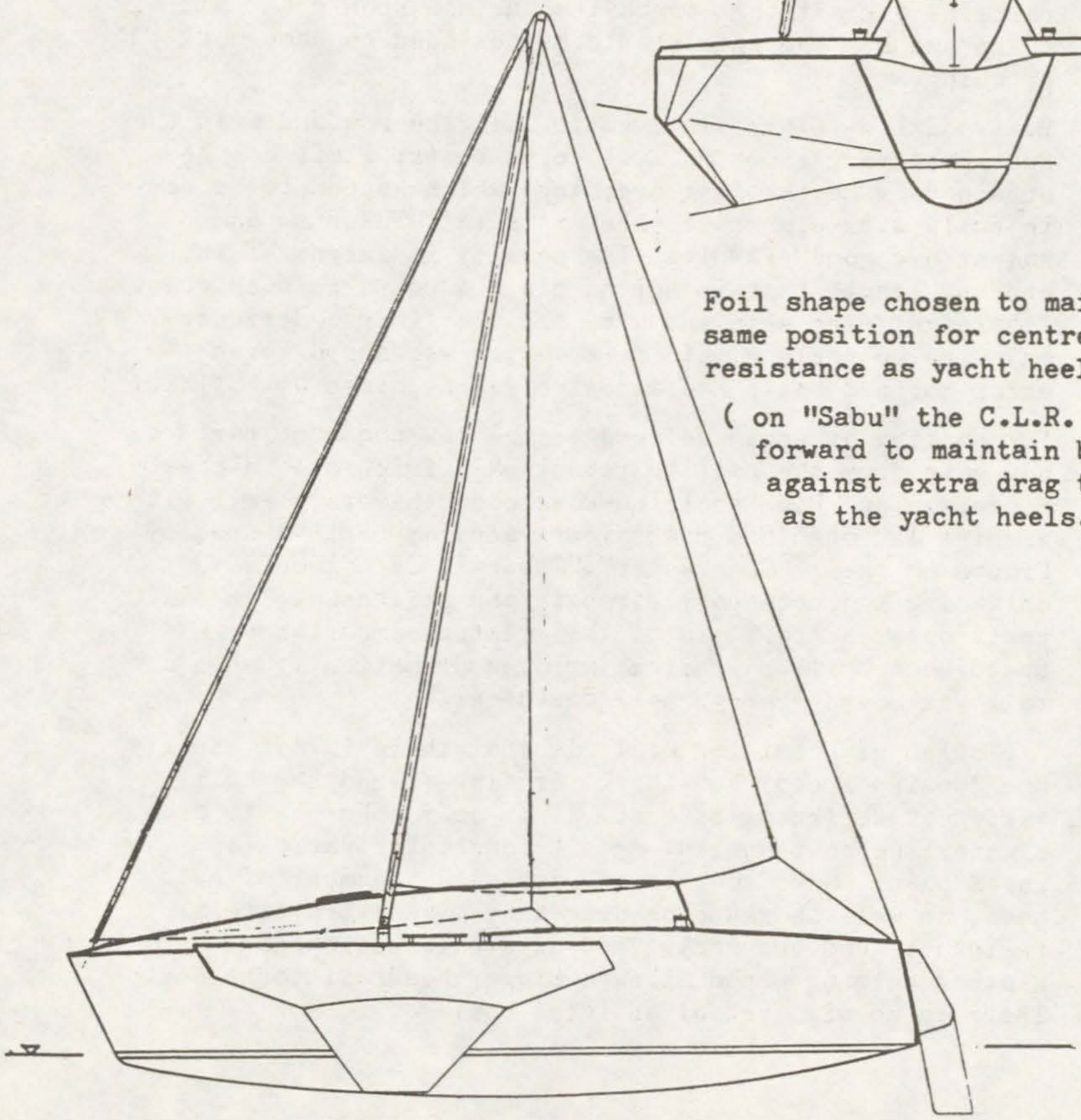


Designed and built by aeronautical engineer
R. Rampinelli, via Filelfo 9, Milano, Italy.



Foil shape chosen to maintain same position for centre of lateral resistance as yacht heels.

(on "Sabu" the C.L.R. moves forward to maintain balance against extra drag to leeward as the yacht heels.)



THE SHAPE OF BOWS

Years ago when there were a few straight-stem merchant ships still trading a question was put to masters asking if straight or raked stems are preferable at sea. I am not sure of the exact figures - some favoured one and some the other but about 70% did not know the answer.

The present knowledge of yacht design is exactly the same and the shape of the bow is dictated not only by cost and ease of construction but also as a 'trade mark' so that we know who designed that particular yacht.

Reference to our index shows in number 39 two pages in favour of flat "spade" bows by Julian Allen (like sailboards but they were not invented). The only other reference is page 35 in number 70 by John on his 'versed' sine curve which he likes for bows and keels.

Two "facts" seem to be agreed by all: 1) The part or parts of a craft that break the surface should be razor sharp and 2) The ends should be designed to damp out pitching.

By tradition 'flair' is used to lift the bow and keep the boat dry: very important with open boats. Flair can be obtained by having long overhangs which happen to be easy to build with planks or sheet material. The dhow and sampan are good examples. The penalty is weight at the end and length that is not usable but costs in dock dues. A straight stem ship can have all the flair a designer may wish to include. Steamers, early war ships, even motor torpedo boats had almost straight stems with flair.

For sailing at speed we need a fine bow and must part the bow wave from the hull to reduce skin friction. Michael Henderson and Rod Macalpine-Downie do this very well with a chine although Rod now favours a spray rail as used by Prouts on their "Shearwater". The rail is a good way of obtaining the necessary strength and stiffness. The exact position of a 'rail' is of the greatest importance; a speed boat built by Unitex improved dramatically when a rail was moved a very small distance.

A problem with sailing craft is that there is not usually one 'design speed' and the water flow around the hull varies at different speeds. It is only possible to draw a waterline on plans, at sea it constantly varies as waves pass. Lock Crowther has designed a number of bulb bows, as well as reducing drag they give extra lateral resistance and buoyancy. Adding a bulb increases weather helm or would allow a bigger headsail to be set. There is no sign yet of an ideal bow.

BOW-BURYING And Possible Pitchpoling.

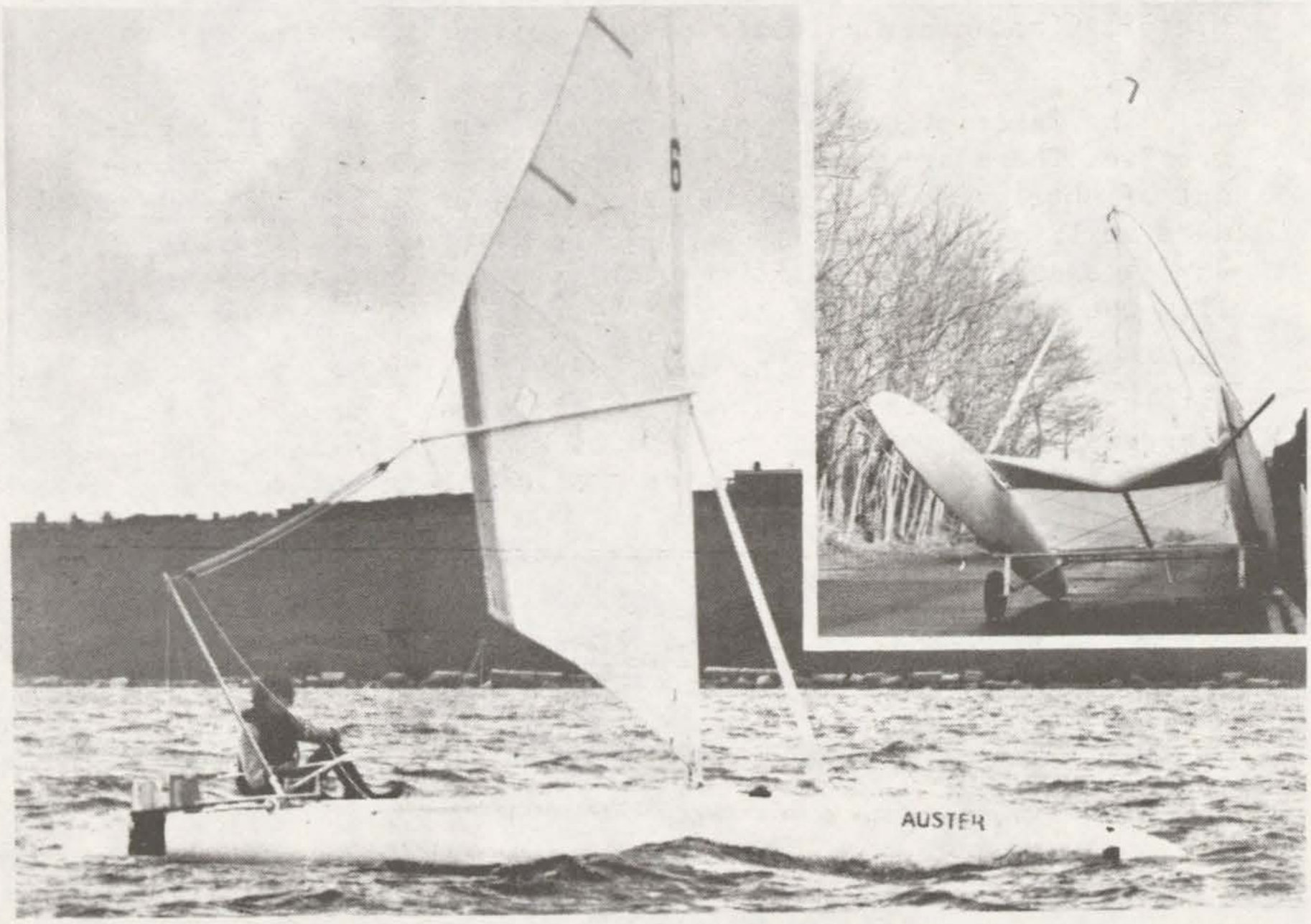
Doug Hanning (yes- the one who can draw !) wrote to report trials that he made in 1979 with a hydrofoil as a planing device to lift the lee bow of his "Sizzler-16".

After failure to 'fly' with a set of DAK foils for a Hobie 16 Doug moved the main lifting foil to the bow and increased the angle so that the ladder of foils planed rather than foiled. In this configuration with the rudder they seemed to balance with the rudder for lateral resistance and the sail balance was little effected. Steering at speed seemed at a balance point that was favourable as well.

Doug reported that the boat porpised wildly until he began to move his weight forward. It seemed to have little effect as the bow planed highly on the lee bow foil. Finally he found himself leaning far forward over the front beam at full speed. The bow depressed slightly with an increase of speed as a result.

Reg Bratt has also used foils on the bows of "Auster" for a number of years to keep the boat level during speed runs at Portland. Use of the foils right forward also enables him to use a fine bow sloping down to the water as there is no need for buoyancy or flair to give lift. He has therefore greatly reduced windage and weight as well as water drag.

Photo shows the foil tip just clear of the surface, the foil is angled at about 45 degrees and extends clear of and under the bow/keel for an equal distance on the inside of its strut.



Book Review by Walter Schofield.

WANGKA - Edwin Doran Jr. Texas A & M University Press.

This is a book about the relative seaworthyness of ancient Pacific multihulls. At the same time it is a work of scholarship written by an academic historian. However the book is not a dusty read. The auther is an experienced seaman and an enthusiastic member of AYRS.

Prof. Doran challenges the theory that Tri's came before Proas which came before Cats. He argues that man's development is progressive i.e. that more effective devices come later than less effective ones. He analysis the qualities of double canoes,(cats of approx 7' beam), single outriggers (proas) and double outriggers (tris). In eight qualities he finds the three types equally good, but in the following five he finds differences:

Construction. Stability/speed. Placing of crew weight. Rate of capsize. Sail balance.

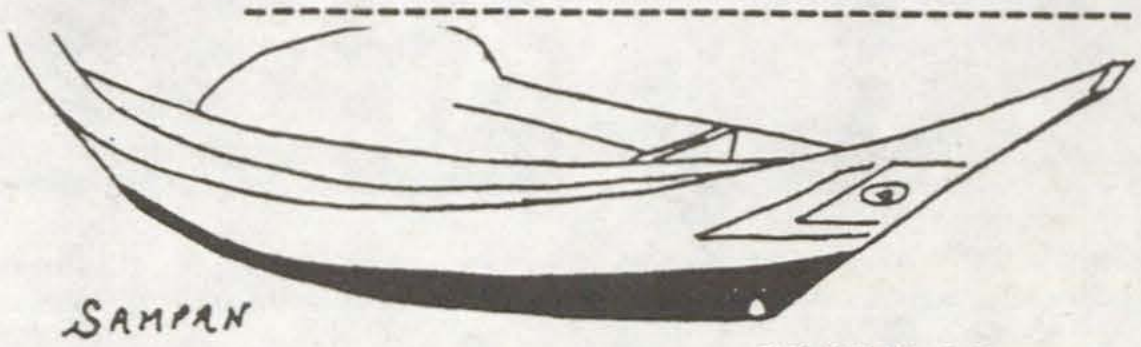
He concludes that the tri is much better than the proa which is slightly better than the cat. Thus if technology is cumulative the sequence of development is cat-proa-tri.

Other evidence suggests that the complete sequence might be : Youngest = Double outriggers - Single outriggers (shunted) - Single outrigger (tacked) - Double canoes - Dugouts - Rafts of wood or bamboo - Bark boats - Bark raft.

Nothing in life is quite that simple, especially for a historian and other evidence points to tacking giving way to shunting.

The descriptions of sail types is very clear and comprehensive. There are some interesting snippets such as the toe-out of outriggers showing that speed was preferred to windward ability in some areas. Prof. Doran explains clearly why cats can fly a hull quite stably in some situations and flip uncontrollably in others.

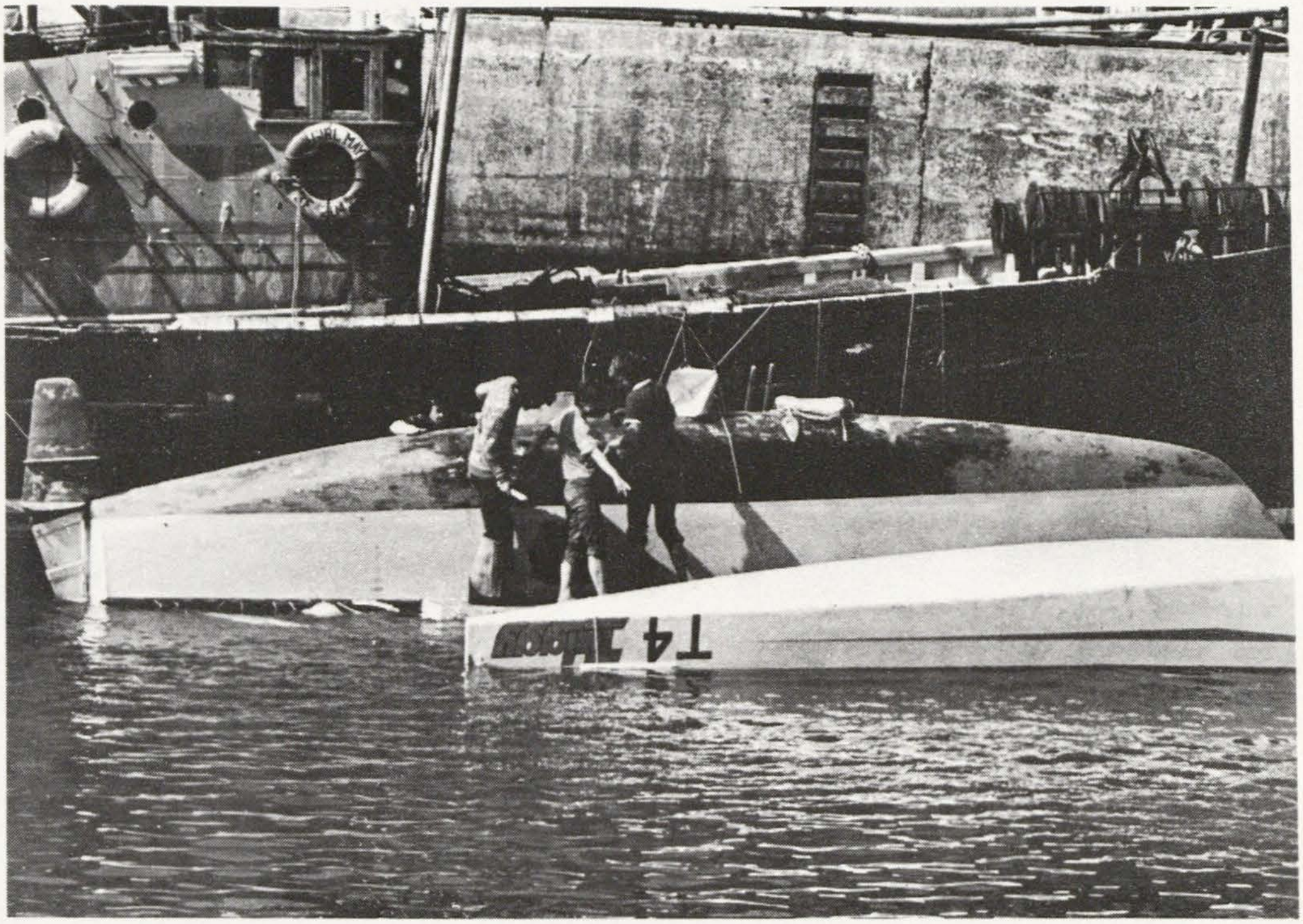
This is a fascinating book even if, like me, you know little about Pacific history. The style is impeccable, the diagrams are tasteful and the use of space is lavish. The price of £ 15 is rather high for a slim volume but your local library might oblige.



SAMPAN

THESE CRAFT HAVE A WATERTIGHT FORWARD BULKHEAD AND A HOLE BY THE STEM. WATER FLOWING IN AND OUT DAMPS PITCHING. CHINESE JONKS ARE SIMILAR. THE AUTHER BOUGHT A SAMPAN IN RANGOON. IT IS NOW IN EXETER MUSEUM.

'Twiggy'. This lock Crowther design trimaran was built in Australia and sailed to England for the 1982 'Round Britain' by Ian Johnston and Cathy Hawkins.



Preparations for capsize included cabin buoyancy. The photo by Phoenix of Kirkwall from Multihull International shows how high she floats and the escape hatch cut by Cathy from outside. When righted the hole is above water and is repairable. She was renamed "Rennie" and had a new bow for the 'Route du Rhum' but she again pitchpoled and Ian had to be rescued.

Didier Costes and "Exoplane" qualified as the 'most missed' entry at Portland in 1982. He is a keen member so look out for him at future events.

Photo by Dorset News.