CRUISING CATAMARANS

A.Y.R.S. PUBLICATION No. 27

NUGGET — ARTHUR PIVER

CONTENTS

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EDITORIAL

October, 1959 Reprint, August 1964

THE ANNUAL SUBSCRIPTION to the A.Y.R.S. is now due. It may be a belief among members that there is a huge staff at A.Y.R.S. Headquarters to deal with all the letters and other A.Y.R.S. business as well as the collection of articles and production of the publications. In fact, of course, the Hon. Editor does the lot, including the addressing of the envelopes. It is to be hoped therefore that members will subscribe promptly and thus save the labour of reminders.

I hope that the A.Y.R.S. Editorship can be passed on to someone else for the December publication of 1960. Up to now, I have found that it is just possible to combine the work of a very busy general practice of medicine with the A.Y.R.S. editing and publisihng but since taking on the forestry of *Woodacres* which is some 4 acres of woodland to be kept clean and tidy, I find that I canot switch myself from medicine to the A.Y.R.S. and then to really hard physical work. The change from one to the other needs a few days of rest when everything gets behindhand. The only way in which I personally can survive and keep the essentials going is by someone taking on the editing work. I am willing to carry on with the publishing for some time as it is a complex business, needing only time but little real thought.

Again, as usual, it is requested that if anyone has had a misbound or faulty copy of a publication or has not had his full six, will he let me know. It has been known that publications have become separated from their envelopes in the post and been returned to me. Naturally, the name of the addressee has been lost.

We have been allotted Stand No. P3 at Earls Court for next year's Boat Show. We will be having a model of the Yacht Wind Tunnel we hope to put up next year and possibly the full sized 12 ft. 6 in. propellor which Messrs. ROTOL are reserving for us free and a

Marine Diesel engine which Messrs. LISTER think would be suitable for the power unit. These two firms are to be greatly thanked for their kind help to the A.Y.R.S. in our Yacht Wind Tunnel project. Unfortunately I will not be able to be at the Boat Show except for the Tuesdays and Saturday afternoons. Mrs. Morwood will be managing in her ususal capable manner but will need help. Will anyone available from 30th December to 9th January next please write to let me know if he can help and passes will be sent?

Publications for next year will be *Catamarans* 1959 and *Outriggers* 1959, if we have enough designs for both. Otherwise, there will be *Multihulls* 1959 to include both. Will members who know of any multihulled craft of interesting design, please send me an account of it for these publications? We have a publication by Charles Satterthwaite on *The Well Tempered Sailing Yacht.* I am afraid that I would not like to commit myself as to the titles of further publications as these never have been those which I forecast at the beginnings of previous years.

The Wind Tunnel and Test Tank. Methods of construction and siting for these proceed. A concerted attempt to get subscriptions for the money we need for the construction will now be made from members and at the Boat Show and it is hoped that actual construction can begin soon afterwards or at least early next year. The subscription leaflet for the research fund is enclosed with the A.Y.R.S. subscription leaflet.

INTRODUCTION

It seems more than likely that the large Atlantic passenger liners of about 1,000 feet in length would have adequate stability to carry sail and these craft are of a beam to length ratio of about 1 in 10 which is well within the multihulled proportions. A very small boat, on the other hand must have greater relative beam and either metal or live ballast to give it enough stability to carry sail. On this analogy, it seems probable that small multihulled boats should be double hulled catamarans, medium sized boats, outriggers or trimarans, and over a certain critical size, which appears to be about 200 feet in length though it is hard to be certain, a single unballasted hull can have enough stability to carry adequate sail.

This publication on the whole deals with larger craft than we have previously examined and the designs includes a higher proportion of trimarans. Whether this is due to the appreciation of the point mentioned in the previous paragraph or to the natural prejudice towards single hulled craft, one cannot say.

We conclude with a letter from Rudy Choy, stating his preference for deep hulls without centreboards. In the 40 foot to 50 foot range of catamaran length, his offshore catamarans seem to be very fast but I have only heard of one catamaran of this size with rounded underwater sections which has raced against them. This is the 43 foot craft *Dreamer* designed by Hugo Myers which beat 10 other catamarans all having deep sections (one presumes) in the San Pedro to Santa Monica race. Aikane though a larger boat, was only beaten on the finishing line so the rounded sections cannot be of such great value at this size as on smaller catamarans. Sail area to weight ratio may be the predominant factor for speed.

Catamaran Capsizes. To my knowledge, none of the very large catamarans has yet capsized but some of the catamarans of about 30 feet in length have gone over and have been almost impossible to right. This must be an ever present danger with cruising catamarans and for this reason, if for no other the possiblity of designing an equally fast trimaran should be investigated.

Trimaran Floats. The floats shown on Arthur Piver's cruising catamaran or those on Julian Allen's craft seem to slip through the water with the least of fuss of any I have sailed with. They should be in contact with the L.W.L. in the design to avoid flopping at moorings or in light weather. When sailing, the immersion of the lee float raises the weather one out of the water. However, this type of float seems to cause jarring in heavy seas and buoyant leeboards of a 6:1 or 8:1 thickness ratio might give better sea performance. I have

sailed in one such craft and it sat very steadily on the water. The leeboards in this case were 3 ft. fore and aft and 4½ inches thick. They were 6 feet deep in this craft which I think was excessive, though only about 4 feet were below the waterline on a level keel.

The Ryle Trimarans. This summer, Martin Ryle and his brother, Dr. Anthony Ryle have made the first two fully successful British trimarans, both weighing about 250 lbs. and both fully and adequately engineered.

Dr. Anthony Ryle's trimaran uses cigar profiled floats of a box section with a 16 ft. 6 in. *Shearwater III* hull, *Swift* rig and centreboard. It is a fast craft though slower than a *Shearwater.* It has only just been launched at the time of writing and when tuned, it should have a performance comparable with a *Shearwater III.*

Martin Ryle's trimaran, on the other hand has short floats and hydrofoil leeboards angled at 40° from the horizontal. This craft runs along, even close hauled, with the lee float out of the water, the stability and lateral resistance being provided by the hydrofoil. Speeds with the *Swift* rig are already comparable with the *Shearwater III.* though still slower and both the ideal beam and the best angle of dihedral for the hydrofoil still remain to be found. Even now, much more sail area could be carried.

Both the Ryle craft will be described in future publications but it seems to me that Martin Ryle's craft is such a jump forward in yacht design that it opens a completely new era to us only comparable with the completion of *Shearwater I.*

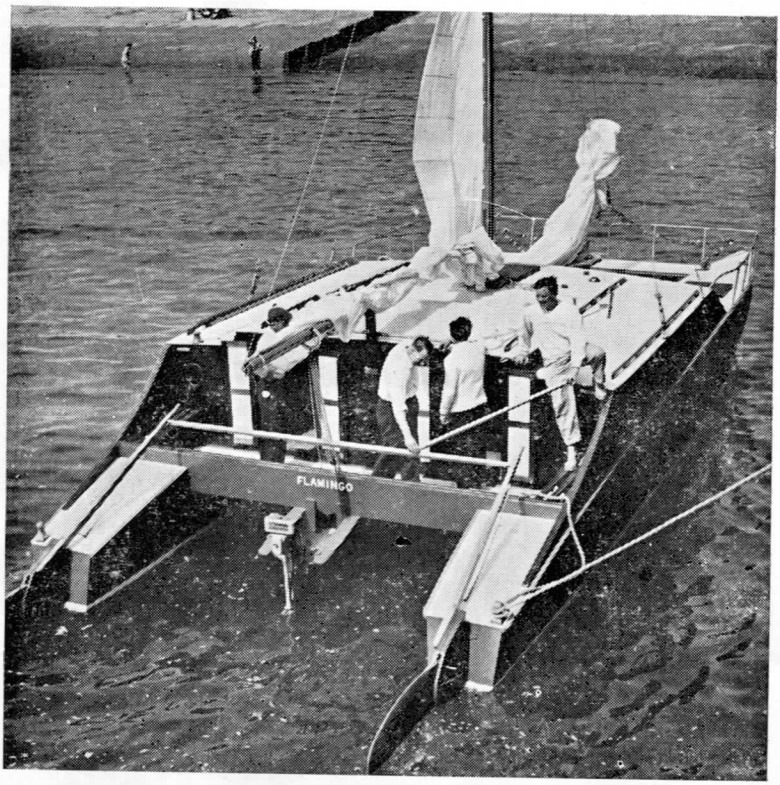
FLAMINGO

L.O.A. 36 ft.
Beam 15 ft. 6 in.
Draught 1 ft.
Draught (C.B.) 4 ft.
Displacement 4,000 lbs.
Headroom in hulls 6 ft. 6 in.
Headroom in bridge 4 ft. 4 in.
Sail Area 460 sq. ft.
Genoa 270 sq. ft.

Designers and builders: G. Prout & Sons. Owner: Don Robertson.

After developing the *Shearwater* range of catamarans, it was only natural that Roland Prout should turn his thoughts to a cruising catamaran especially as the only catamarans prior to the *Shearwaters* were the large Hawaian catamarans of Woody Brown, Rudy Choy and Hugo Myers with some of whom Roland corresponded before producing his *Shearwaters.* One can say therefore that *Flamingo* is the result of some three years' thought by Roland Prout. Because

of this, Don Robertson, the owner, feels that there is almost nothing which he would like to alter were he having another one built. The report which follows is based on information supplied by Don after about half a season's sailing.



Performance. The speed around a triangular course is slightly greater than that of a *Shearwater III.* She is much faster to windward, about the same speed down wind but slower reaching. As befits a cruising boat, she is undercanvassed in light winds but is suitably rigged for heavy weather. It is obviously foolish ever to run the risk of lifting a hull with a cruising catamaran but there is plenty of evidence that she is being overpowered when the wind is strong for her and sail should then be reduced. For a trial, a hull was lifted on one occasion but this was hard to do and it was only managed by sheeting in everything tightly and bearing away in a puff.

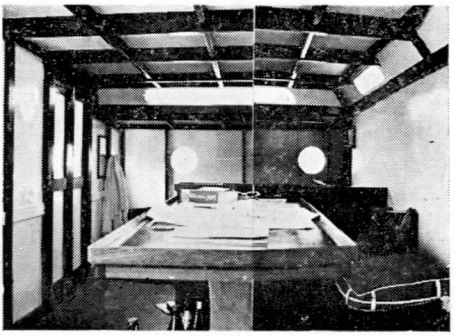
Seaworthiness. Flamingo is very seaworthy, being relatively dry due to her fine entry and very steady in roll. When meeting steep seas of a certain frequency she pitches violently due to the frequency of encounter equalling her resonance of pitch but this can be avoided by reducing canvas to slow her down. She is at her most comfortable motion when running when she is as steady as a rock.

There appears to be more than enough clearance under the bridge deck as seas seldom seem to strike there with any force.

Accommodation. Six people have cruised comfortably in *Flamingo.* There are two double berths athwartships and two single cabins

forward. As many as fifteen people have gone for a day sail in her so she is not lacking in room. The galley and saloon look most comfortable and the whole width of the ship aft of the cabins is the sailing cockpit.

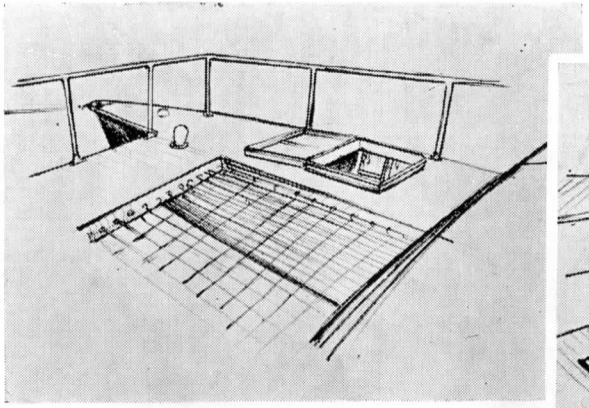
Auxiliary. The motor is a 15 H.P. British Anzani which fits onto the sternboard at the back of the cockpit. It gives 5 knots at one third throttle.

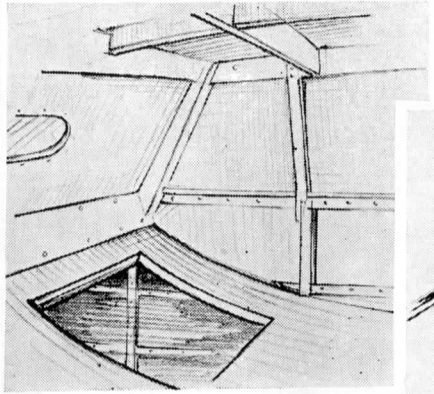


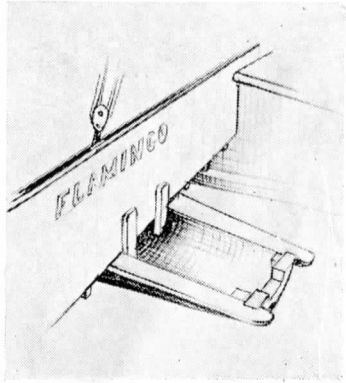
The Best Run. So far, the best long distance run is from Folkestone to Aldeburgh, a distance of 65 miles which she did in $7\frac{1}{2}$ hours, making an average speed of $6\frac{2}{3}$rds knots.

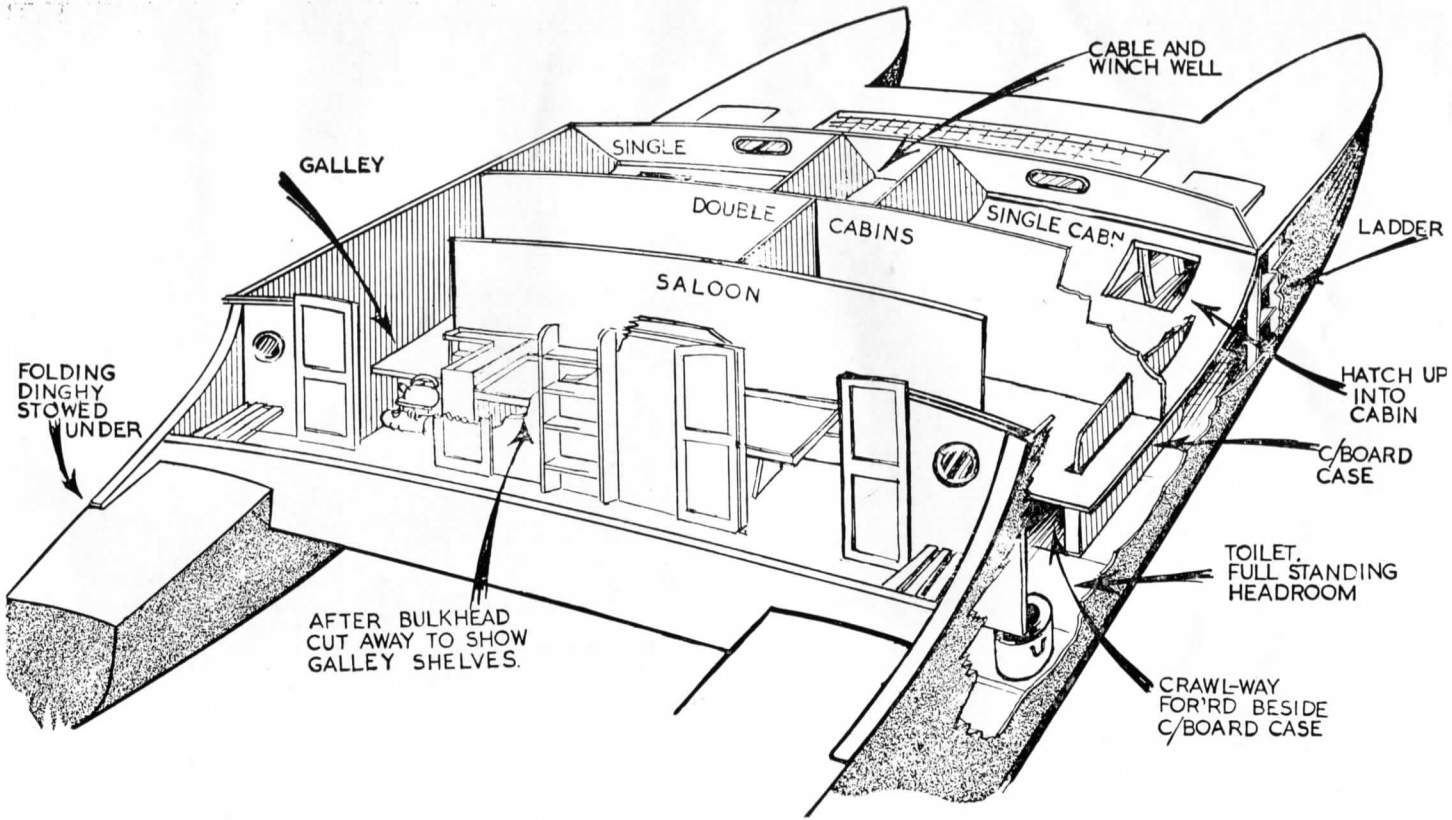
Summary. Flamingo appears to be a safe cruising catamaran with a higher speed than the majority of conventional cruising or racing yachts.

Acknowledgement. We wish to thank the Editor of *Yachts and Yachting* for the illustrations used with this article.






FLAMINGO

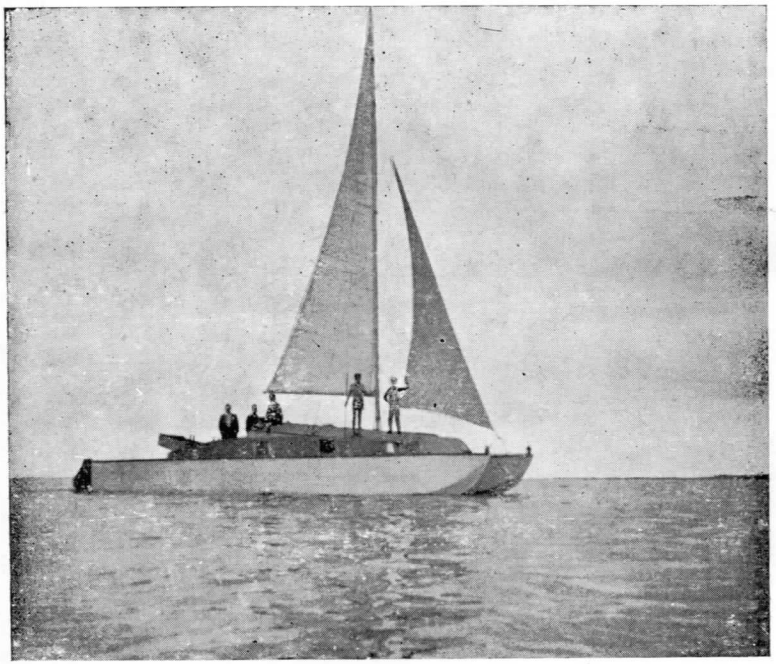

CABLE AND
WINCH WELL
SINGLE
GALLEY
DOUBLE
CABINS
SINGLE CAB.n
LADDER
SALOON
FOLDING
DINGHY
STOWED
UNDER
HATCH UP
INTO
CABIN
C/BOARD
CASE
TOILET.
FULL STANDING
HEADROOM
AFTER BULKHEAD
CUT AWAY TO SHOW
GALLEY SHELVES.
CRAWL-WAY
FOR'RD BESIDE
C/BOARD CASE

BEARKOK

L.O.A. 12 metres	Beam (hull deck) 0.90 metre
Beam O.A. 4.5 metres	Beam (hull bottom) 0.60 metre
Draught 0.5 metre and	Mast Length 12 metre
C.B. 1.6 metres	Sail area 30 sq. metres

Designer and builder: O. Koch, Vamdrupvr 10, Redovre, Denmark.

Occasionally one meets with an act of exceptional quality in a person and I think the catamaran *Bearkok* can only be compared to the original *Manu Kai* for the amount of work, thought and dogged perseverance which it has involved. To design almost without help and build a 39 foot cruising catamaran by one's own labours is quite some job.



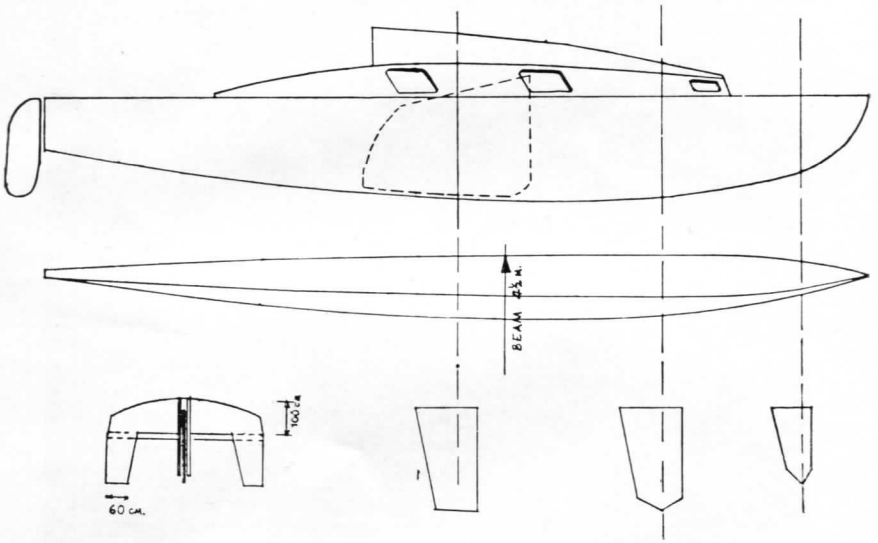
Hull design. The hulls have a nice profile with a V bow transforming to a flat floor and box section amidships and aft. They are asymmetrical with the flat sides out and shallow draught rather like the hulls of Victor Tchetchet. They are covered with polyester-fibreglass.

Bridge Deck. This consists of a streamlined cabin about 3 feet in depth which will presumably have the berths which, with 6 foot of headroom in the hulls, will make very comfortable accommodation Extra berths can be in the hulls.

The Assembled Craft. The hulls are close together and will cause some venturi effect with "rooster tail" at speed. A large centreboard is used which will improve the speed of putting about.

Expected Performance. At this size, the accommodation can be easily carried and still give the ratio of sail area to weight needed to allow a catamaran its speed. The hull shape may not be ideal according to our studies but it is not so different that high speeds cannot be obtained and somewhere about the 20 knot mark (possibly higher) may be made. Light wind performance is likely to be relatively poor.

The Sail Rig. With a mast only the length of the boat, capsize should be extremely difficult and large sails may be used in light weather.



Summary. *Bearkok* is a large cruising catamaran of good conception which should have high speeds in strong winds and be almost immune from capsize.

Sailing Trials. Since writing the above *Bearkok* has been launched and sailed. Despite the small sail area, the speed is equivalent to the

fast dinghies but she is so stable that it is intended to double the present area of canvas by using a mizzen mast and increasing the length of mainmast. The shallow draught is a great boon on the tideless Baltic where she can nuzzle into the shore anywhere and, I should think very useful to explore the islands where she sails. It is believed that she planes in strong winds but this indeed seems unlikely to me.

NUGGET TRIMARAN

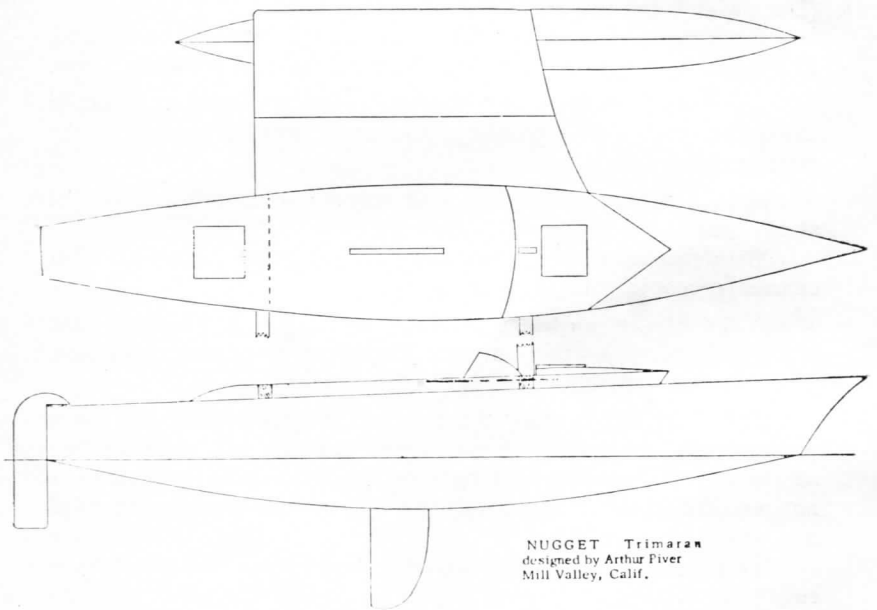
LOA 23 ft. 9 in. Beam 14 ft.

Draft (board up) 18 in.

by ARTHUR PIVER, Mill Valley, Calif.

The 24 ft. *Nugget* trimaran is the largest in a series of similar craft designed especially for the amateur builder. In its development, it was desired to have a vessel sufficiently roomy for protection from the elements and with provision for cruising accommodations.

The central hull is 3 ft. wide at the water line and 4 ft. on deck, being large enough so the crew can sit comfortably inside. The



NUGGET Trimaran
designed by Arthur Piver
Mill Valley, Calif.

4 ft. x 8 ft. central cockpit is convertible into a double bunk and there is space under the fore and after decks for single bunks. A windshield is fitted to the forward part of the cockpit. A folding or sliding top may adjoin the windshield. A bucket head may be placed under the fore deck below the hatch on the deck house.

The cross beams (4 x 4 timbers) are hinged, so the boat is easily folded for transport by trailer, with a folded width of 8 ft., or less if required.

It has been found that with a hinged mast step, the mast may be left in place, making it simple for one man to raise with the aid of the boom or similar lever. Only the fore stay needs to be disconnected in this case.

When the mast is left hinged to the step, the boat is trailered backwards, with the mast projecting over the towing automobile.

Construction is of plywood and as simple as possible, with a 90 degree V bottom on the main hull, tapering to an almost flat section at the transom.

Floats present a diamond shape in relation to the water, but are built merely as boxes for simplicity.

Spars are solid timbers. The 2 x 6 in. mast (28 ft. in length), for instance, can be made with approximately $15 worth of wood (Douglas fir), and can be shaped in about one hour.

Performance of *Nugget* apparently leaves little to be desired. She is fast in any weather, and is the only fast boat yet seen locally.

The only time spray comes aboard, even at maximum speed, is when the chop is so high it hits the upper weather surface of the raised weather float.

Helm balance is gratifying, with only finger-tip pressure needed at any time.

With the helm lashed amidships, *Nugget* steers herself on most courses, except in particularly steep seas.

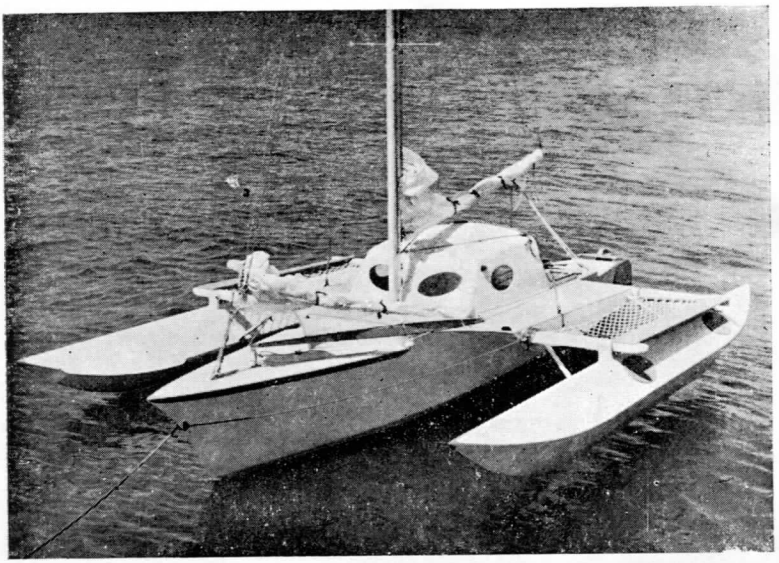
Note: Shown in the illustration is *Nugget* 3, which is now cruising Mexico, en route to the Caribbean from San Francisco. Jim Brown of Sausalito, Calif. is builder-skipper.

This boat differs from the standard *Nugget* in that she has a permanent shelter-cabin. Outer decks are left off, with netting substituted. There are no hinges on the cross arms, as trailing is not required in this instance. Floats are used for storage of articles needed only in port.

This boat is fitted with automatic sheet-release cleats in case of sudden squalls.

A self-steering wind vane was to have been installed, but the craft steered herself so well this feature was omitted.

Incidentally, the chief drawback to this type of boat for cruising is lack of storage space.



However, in larger sizes, when the side decks become deep enough for storage and sleeping area, these boats, including float area, will have far more storage space than the conventional boat.

Nugget 3 has side decks 10 in. deep and 2 ft. wide, which allows space for numerous small articles.

This boat cost approximately $1,000 to build, including professionally-made Dacron (Terylene) sails. There is $250 worth of wood in the construction. Chief cost was for fibreglass with 26 gallons of resin being used. Builder Brown, a great believer in fibreglass, glassed everything but the port-holes and tell-tales.

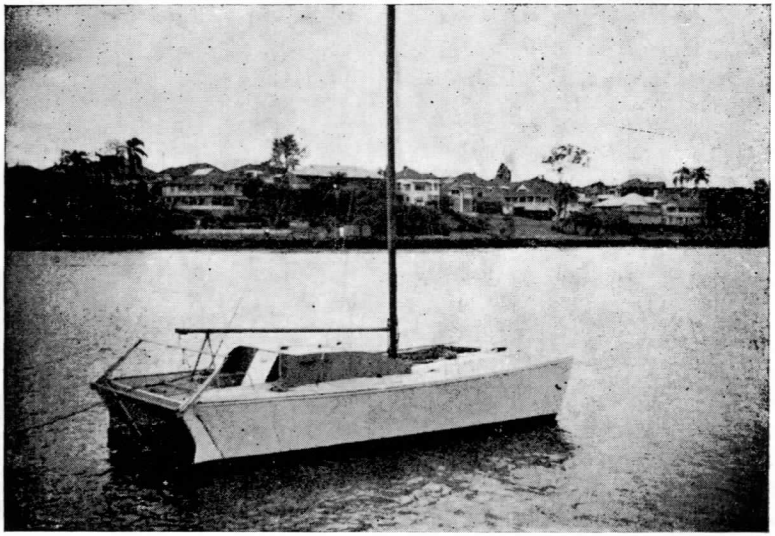
CONDA VISTA

by DOUGLAS GLANVILLE

80, Oxlade Drive, New Farm N.8, Brisbane, Australia

L.O.A. 23 ft.	Draught 12 in.
L.W.L. 20 ft.	Weight 1,200 lbs.
Beam 11 ft.	Sail Area 263 sq. ft.
Beam (hull) 1 ft. 6 in.	Small rig 179 sq. ft.

Conda Vista was designed at a time when there was no information available on catamarans. I wanted a cat with full headroom and accommodation and between 35 and 40 feet overall, but not wishing to have a failure at that size I decided to try out my ideas on a 23 foot boat first. *Conda Vista* has been so successful that I now wish I had made a 40 foot craft instead.



The Design. Conda Vista is a *Manu Kai* type with asymmetric hulls, simply made with deep box-like sections and fibreglassed to 5 in. or 6 in. above the waterline so she cannot leak. All the timber used is straight and fits together like a Meccano set.

The Asymmetric Hulls. These were chosen in order to avoid a C.B., keels or fins. The outside of the hulls are flat and create no bow wave. On the insides of the bows, waves form and collide just aft of amidships and pass across to press against the sterns, partly regaining the energy lost at the bows. The section is near enough that used by Victor Tchetchet. One could suspect eddying flow around the chines but none is apparent on *Conda Vista.*

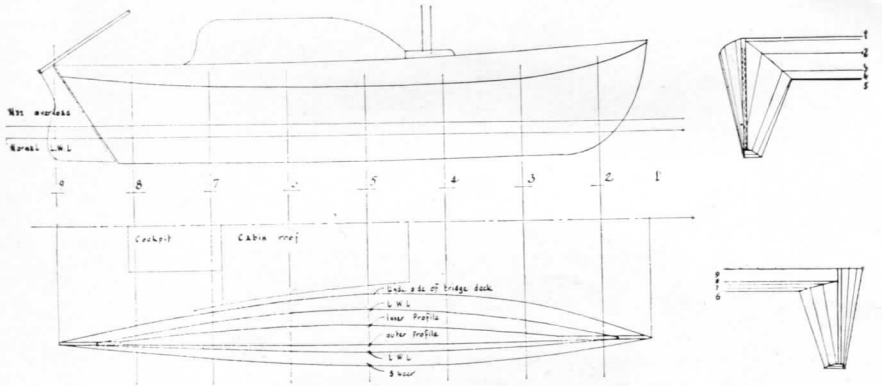
Water Flows Around Hulls

4 *knots.* No wake or other disturbance is seen.

6 *knots.* The water flows beautifully along the waterlines and

starts to show a build-up wave under the cockpit. Two feet in front of the rudders a wave, looking like a bow wave, starts to slide up the rudder and pours through the inch space between the sternpost and rudder, like a miniature waterfall. Small wakes are just visible.

8 *knots and above.* The waterfall increases to 9 inches but not higher than that. On our fastest run, we took colour movies by hanging over the bows and even at this unknown speed (our speedo stops at 16 knots) the water flow between the hulls was unbelievably undisturbed till, near the stern, the rooster tail formed and was spurting 20 to 30 feet behind us.



At no time does *Conda Vista* show any broken bow waves or foaming water with seas less than 2 feet high. There is no illusion of speed as in the photographs of *Shearwater* and *Gemini.* The feeling is that the water must be covered with oil, so perfect is the flow. I therefore consider it rather regrettable that these asymmetrical thoroughbred hulls have been given such a death sentence on page 13, A.Y.R.S. No. 16,

Another thing which seems queer to me and has not been mentioned in magazines is the asymmetrical hull's ability to surf down the face of a wave in light winds. The hulls are so narrow that one would expect the wave to slide harmlessly under the boat, but it doesn't. My theory is that the venturi effect between the hulls gives the waterflow terrific velocity. The following wave tries to sweep through between the hulls but strikes the high speed water. There is a big wave build up and the cat is driven forwards by the wedge action on the curved insides of the sterns.

Quite often one reads that asymmetrical hulls tend to bear away in squalls and are therefore dangerous. This is definitely not correct. The boat turns up into the wind and handles the same as a perfectly balanced yacht, except of course that larger turning arcs are necessary. Staying is slow but sure and even when deliberately put "in irons," it is no problem to run backwards, the rudders are reversed and the cat swings round like backing a car.

The Bridge Deck. The two hulls are bridged from bows to sterns. Few catamarans are built thus nowadays. The pro's and con's as are follows:

Disadvantage. Under heavy conditions close hauled into winds of 25 to 30 m.p.h., the lift from the bridge is excessive and tends to lift the cat out of the water. This gives a capsizy feeling. To prevent this, I carry the outboard motor, spare sails, anchor and chain half way between the bows and the mast. Strangely, this extra bow loading in no way tends to make the lee bow dig in.

Advantages. 1. Gives completely dry sailing deck.

2. Eliminates nose-diving or the hulls burying into the backs of waves after "planing" down a steep face. In dirty S.E.'s, we get very steep waves in the bay probably 5 feet high. The cat can then

hurtle out into space with the hulls bare up to the mast. She then drops into the next wave. She rises fast but cannot clear the crest with buoyancy alone. The fore end of the bridge deck takes over and skids her over the top. Maybe, an inch or two of water splashes over the lee bow, just wetting the corner.

3. Gives approximately an extra 100 sq. ft. of usable deck space for changing headsails and setting spinnakers.

4. Lift from the bridge deck reduces wetted surface, gives a firm anchoring base for the jib and forestay. The jib can be set low to the deck and is dry after a sail. Close hauled, the jib is not affected by the "updraught" from the hull.

Freeboard. This is approximately 36 inches and is thought by many to be excessive. However, we have had a few waves on deck and some have hit underneath. These last shake the catamaran from stem to stern and then up to the truck. The crash is terrific. One or two waves have hit together under the cockpit hard enough to lift the temporary cover over the engine hole and fill the cockpit with water which pours out at once, of course. This has only happened when driving hard under full sail into steep seas. An orthodox keel yacht would have been hove-to or flogging and pounding, making little or no headway. *Conda Vista*, with her very fine ends (prismatic coefficient 0.51) slices through at a steady 6 or 8 knots.

Accommodation. There is enough room in the cabin to crawl in and sleep. It is 8 ft. by 5 ft. by about 3 ft. high. Little thought was put into this section and the craft was designed to develop a perfect cruising catamaran. At double the size, it would be very comfortable indeed.

Engine. This is a small local outboard motor with a Villiers 147 cc. two-stroke motor and, with a small throttle setting, *Conda Vista* does 3 to 4 knots at around 20 miles per gallon. The cockpit floor is removable and the outboard drops through it. The engine must be removed before sailing as otherwise it swamps itself in the "build-up" waves.

Performance. Very roughly, we do 2/3rds the speed of the wind. In medium winds, this is about as fast as a *Dragon.* In a 30 m.p.h. wind, with the wind over the quarter, we must do 18 to 20 m.p.h. as we have averaged 13 m.p.h. across the Bay and quite a bit of the time were only clocking 10 m.p.h. In no way do I want to give the impression that this cruiser is going to keep up with a *Shearwater* or *Yvonne* 20. The latter machine has been timed at 23 m.p.h. over three miles but the ride is like going over railway sleepers; wet is

not the word and you have to sail every second or else feed the sharks. At all times *Conda Vista* sails on an even keel and ambles along around 12 to 15 m.p.h., dry as a bone and we could, if we wanted to, have our lunch on the foredeck.

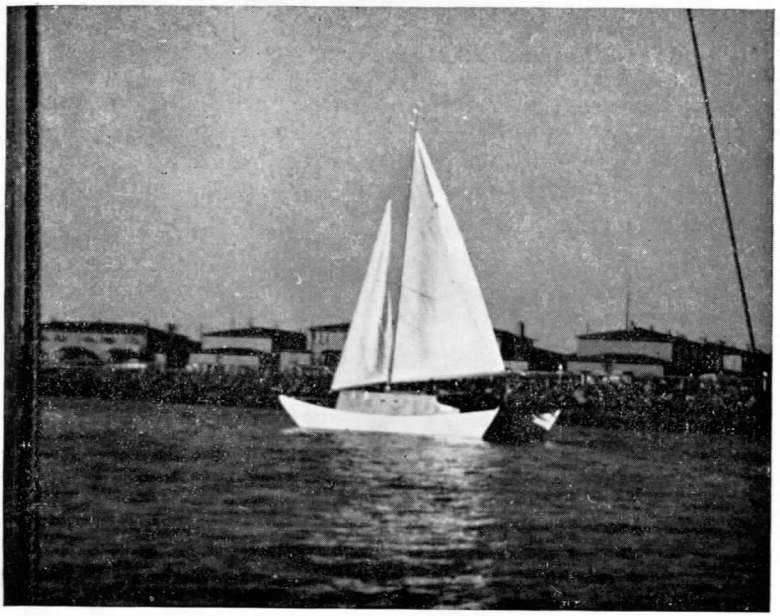
42 FOOT CATAMARAN

L.O.A. 42 ft. 5 in.
L.W.L. 33 ft. 3 in.
Beam each hull 36 in.
Draft, as present 30 in.
Disp. 7,000 lbs.
O.A. Beam 14 ft.
Height keel to cabin top 8 ft.

Designer, builder and owner, C. O. Walker.

Keel length is 30 ft. They are straight on the bottom: laminated out of two 4 x 12 Douglas fir timbers for each keel.

Frames are of $1\frac{1}{2}$ in. x $1\frac{1}{2}$ in. x 3/16 in. manganese aluminium alloy stationed on 16 in. centres.



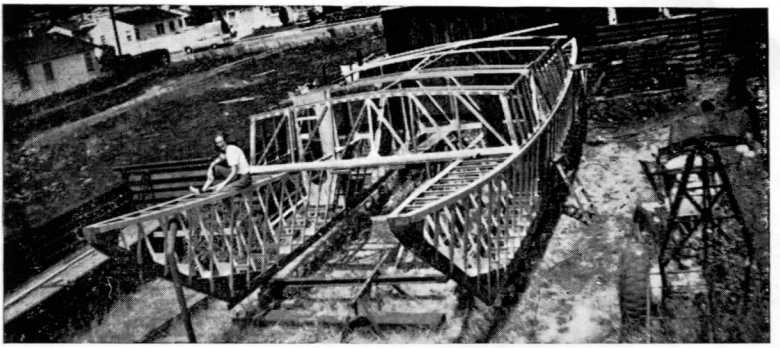
Gunwales are of $2\frac{1}{2}$ in. x $3\frac{1}{2}$ in. x $\frac{1}{4}$ in. alum. angle: same alloy, as is used throughout.

Planking is 3/8 in. DFDPA plywood fastened with $\frac{1}{4}$ in. aluminium rivets.

Completely fibreglass covered, with four laminations below waterlines.

Wing section upper and lower decks doubleplanked with $\frac{1}{4}$ in. plywood making $\frac{1}{2}$ in. moulded thickness and glassed.

Watertight bulkheads; two in each hull, double $\frac{1}{4}$ in. plywood, making three W.T. compartments in each hull. Cabin front or forward bulkhead is double planked $\frac{1}{4}$ in. plywood, and as pictures show, all bulkheads joining the two hulls are heavily truss framed.



The boat was not constructed in the usual manner, as we started from scratch and had no previous boat building experience. However, I am experienced in steel fabricating and have also had some carpentry, so the craft is soundly constructed. We used good, large galv. fastenings, as well as stainless bolts and alum. rivets on the heavier alum. alloy angles.

We were somewhat handicapped tool-wise when we started, so progress was slow. No table saw, nor band saw; just a skill saw, an electric hammer, and few hand tools. Later on, we purchase an impact wrench for putting in the many screws, small and large, and self-tapping where we were unable to rivet. We then bought a router for most of the finish work. Since then, we've added a grinder for working on the customized fittings, etc.

We had sloop rig to start with. A 40 ft. mast measured from the step on deck. Boom was 20 ft. and our sails were re-cut synthetics totalling approximately 500 sq. ft. Lacking for sail area, we then added a bridle from the two bows and rigged a flying jib of 120 sq. ft. This, of course, helped and improved performance two ways. Increased area helped in push, and moving the centre of effort from 10% to 12% lead, lessened the strong weather helm in stiff breeze.

Performance. In light airs; very poor, mainly due to lack of sail area. Wind 25 to 45 m.p.h., performance excellent. Points very well. Moderate speed 6 to 10 m.p.h. with full main and staysail (no flying jib) and with wind velocity up to 45 m.p.h., we have exceeded 12 knots in gusts in a broad reach. (We had excellent sailing on San Francisco Bay that afternoon. Conditions were also favourable as we had no seas running. Without the flying jib, however, the weather helm was quite severe, at times. After that sail, we have great confidence in *Marara's* ability with the proper rig).

We then tried one large masthead jib, and again noted an improvement in performance, in coming about and beating to windward. Also, the centre of effort was increased to 14% lead.

We then tried an experiment with adding a bowsp'rit, and moved the centre of effort to 19% lead. Experiment ended with the topping. of our mast.

14% lead was the best all-round performance.

She sails on all points with headsails alone far better than with main alone. This, to us, seemed unusual, and offers much in sail handling. We found that if the wind became suddenly violent, we could douse the mainsail completely and have excellent handling, especially if jib is of the overlapping type.

Coming about has been very poor, in fact, dangerously so in a narrow, gusty, channel, which the Oakland estuary is. Width is about $\frac{1}{4}$ mile wide, incoming tide makes a 3 knot current at times, and the prevailing wind is directly up the channel, with the incoming tide. These factors make it not too easy to navigate the big cat. Out in the bay, however, where we have ample room to enlarge our turning radius, she comes about slowly but easily.

We have been planning on re-rigging with a 46 ft. A-frame: double headstay, double backstay and luffwire for the main. Sail area: 800 sq. ft.

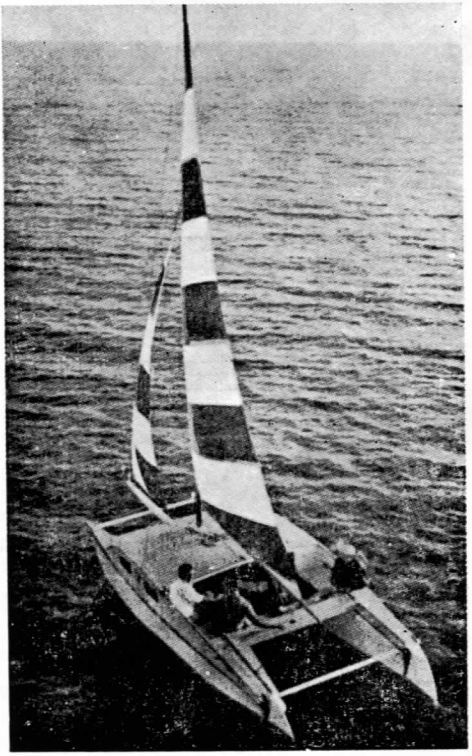
We are living aboard, and that, too, handicaps our research, especially with no auxiliary.

Am at present installing a Lister Diesel with drive unit which we can remove from the water while sailing. We will be able to be far more active than in the past 10 months.

THE MALIBU CATAMARAN

L.O.A. 20 ft.	Sail Area 225 sq. ft.
Beam 9 ft. 9 in.	Draught 10 in.

The *Malibu Overnighter* is a most delightful conception of a cruising catamaran sold commercially in California for $1745,00 F.O.B.



Malibu. The low cabin which appears to be about 1 ft. 6 in. in height gives sleeping accommodation for a family while it doesn't destroy the sailing performance. The spacious cockpit is ideal for day sailing and the small sail area must be very easy to handle. The toilet and galley are in the hulls.

Hull Design. This is the typical Hawaian type catamaran hull with canoe stern which doesn't need a centreboard.

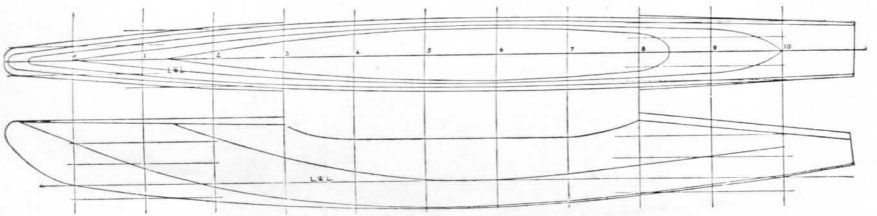
Summary. This type of catamaran daysailer-cruiser must be what many people want and it deserves to be far better known than it is.

SEATONIC

L.O.A. 30 ft.	Beam (hull) 2 ft.
L.W.L. 25 ft.	Displ. 2240 lbs.
Beam O.A. 12 ft. 4 in.	Sail area 334 sq. ft.

Designer, builder and owner: Eric Seaton, A.R.I.B.A.

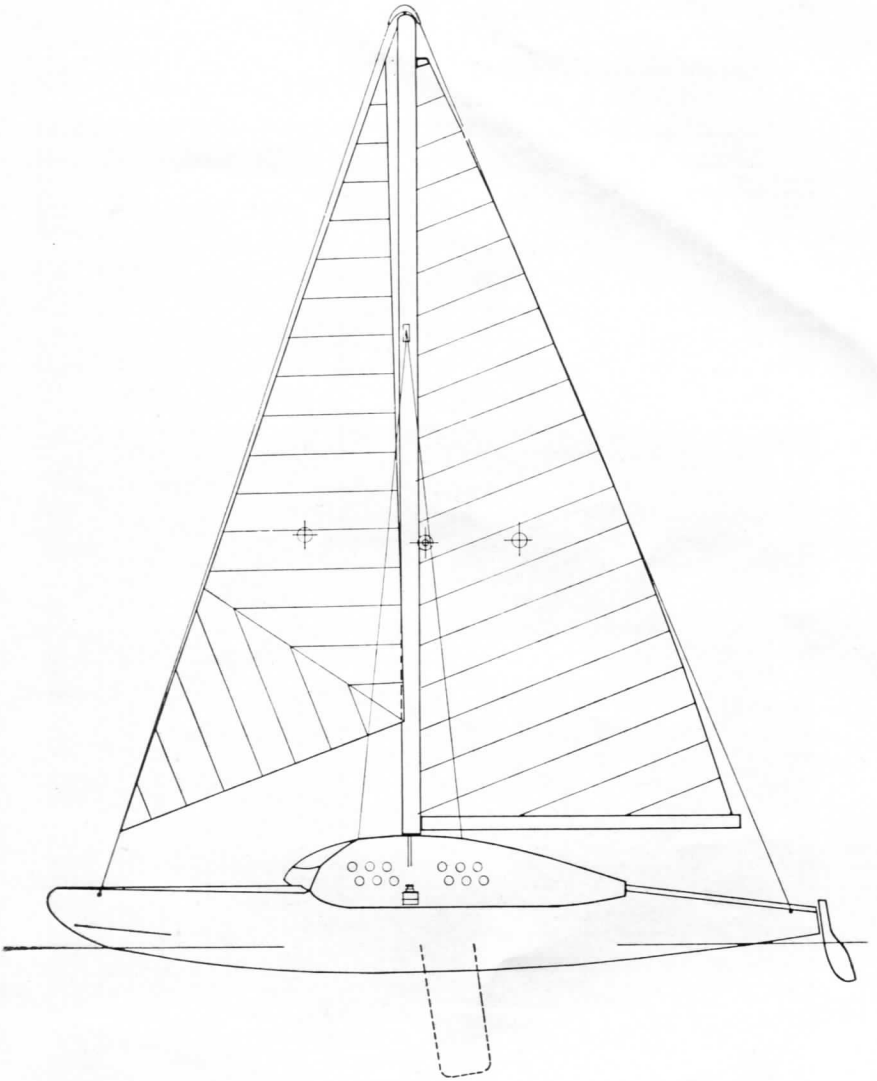
This craft is built of 6 mm. veneered mahogany with $\frac{1}{4}$ in. ply decks, cross beams and wing sections, though the base of this is of 1 in. boards. Torsion strains between the hulls are taken by an X girder which divides the wing section into four triangular shapes.



Two of these are part of the two cabins, with 5 ft. 9 in. headroom at the deepest. The forward shape (a 7 ft. triangle on plan) is a sail locker and the aft shape is open and a sailing cockpit. The hulls are connected together forward and aft by 2 in. alloy tubes, eye bolted to frames and providing points of attachment for the stays.

The mast rests on a thrust race at the base of the wing section at the intersection of the X. It is fully revolving and is jacked up and down to dispense with rigging screws.

The bows are bull nosed at deck level and give buoyancy, minimum wind resistance and maximum water shedding properties on rising from a sea.



The following characteristics are taken from A.Y.R.S. No. 18:

Single hull prismatic coefficient	78.5
Single hull L/hull beam L.W.L.	12.5
Effective L.W.L. in feet	25.0

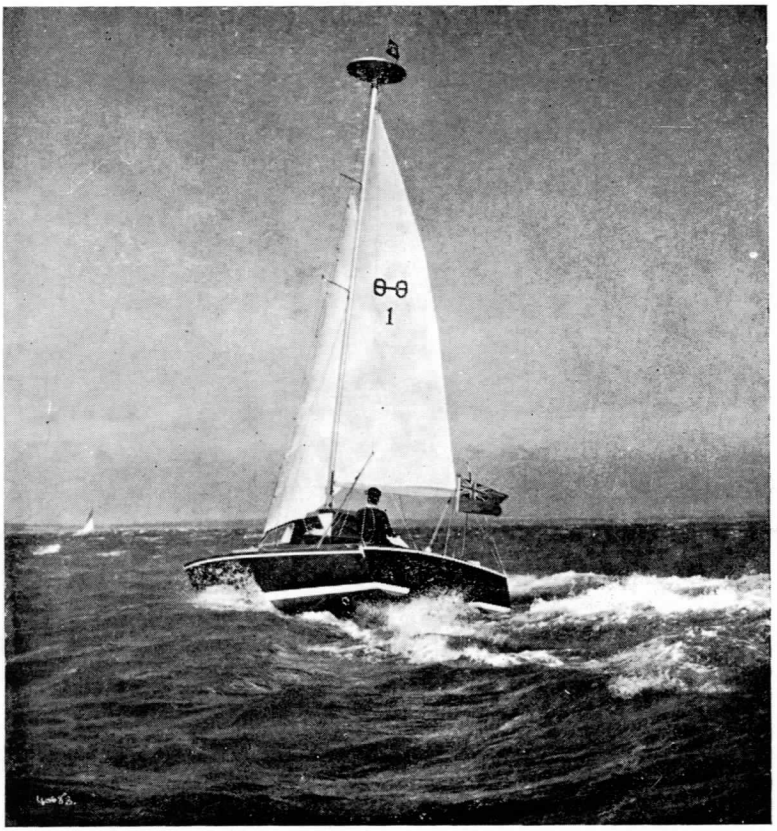
Spread of hull centrelines	.38
C.B. from bow % of L.W.L.	55%
Loaded weight in lbs. (W)	2240
Loaded weight in tons ($\triangle$)	1
Wetted surface in sq. ft. (S)	93.75

Maximum speed by (K) formula K = 2.75. Maximum speed 20.24 knots = 4.05/L.

AN OFFSHORE CATAMARAN

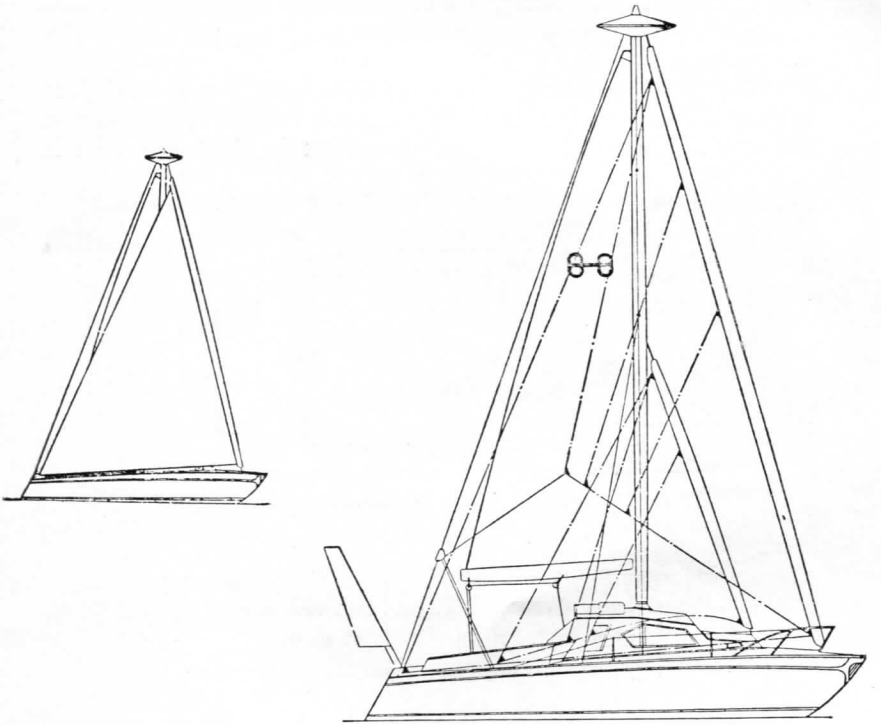
by MICHAEL HENDERSON

L.O.A. 21 ft.	Draft 3 ft. 6 in.
L.W.L. 18 ft. (R.T.)	Displ. 2,500 lbs.
Beam, O.A. 10 ft. 6 in.	Sail area 265 sq. ft.
	With light canvas 420 sq. ft.



There are, apart from questions of resistance and speed, two main problems to be solved in an offshore catamaran; (1) to prevent the thing falling apart from the large stresses likely to be encountered offshore and from the niggling, fatiguing little stresses set up when lying at moorings week after week in anything but dead smooth water, and (2) to provide full and adequate self-righting powers.

I've chosen to solve (1) by extending the deck and wing the full length and by incorporating four full and three part bulkheads along that length. This will tie the whole thing into a really rigid structure which, with reasonably careful attention to the construction, should be well able to hold together, while the extended deck and wing allow an ample platform for sails, anchors and warps.

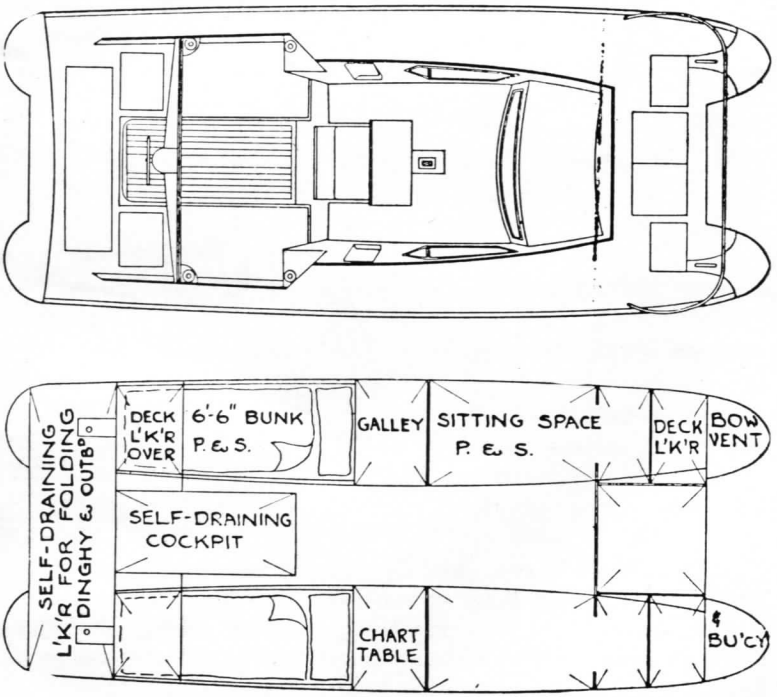


(2) is solved in two ways; by carrying ballast on fixed fins and by having a buoyant lump at the masthead. This "flying saucer," a discus-shaped fibreglass moulding, provides about 300 lbs. of buoyancy and can carry such things as a lightning conductor, navigation lights and a radar reflector, while twin racing flags, one for each hull

may be flown from its extremities. These two devices together overcome the catamaran's main disability, namely, that she is as stable upside down as right way up. True, one might run into trouble, if the mast went but that is a risk which must be accepted. It is a rather remote possibility as the mast and its gear must be very strong to cope with enormous power of the boat and the great beam allows a splendidly strong rigging layout.

The stability curve shows that the righting moment reaches a first peak of some 8,200 ft./lbs. at about 12 degrees of heel (the weight of the crew not being taken into account). Stability then falls off until, at 90 degrees, it has reached it's minimum of 1,700 but picks up sharply again to it's maximum of nearly 10,000 ft./lbs. as the masthead float immerses. Thereafter, it falls away again until it reaches zero at 180 degree, but at no time is it negative. Thus, the boat is fully self righting.

The hull form will, I hope, be suitable, tending to squat slightly at speed and having plenty of reserve buoyancy forward in full, rounded *Mick the Miller* type bows so as to counteract the tipping moment of



the sail thrust. Cutter rig is shown with a very large *Genoa* whose clew comes nearly to the stern. With such a beautifully broad sheeting base, one can set such a sail to advantage and can attain something like 330 square feet per ton displacement (400, including the Genoa staysail) without an excessively tall mast; and one can reduce sail in nicely proportioned lumps as the wind increases. Later on, I may try a more advanced sail plan, but first things first.

As to possible performance, it is very difficult to give a guess. Comparing with *Mick the Miller*, of the same length, the new boat has: 83% of *Mick's* displacement; 140% of the sail area; about the same wetted surface and just on five times the sail carrying power at the "best" angle of heel.

I hope to start building on these lines soon. The new cat will be named *Golden Miller* and I hope that she will be one of a J.O.G. cat fleet—hence the sail markings shown.

Summary. An offshore catamaran has been designed for the Junior Offshore Group which will be *safe* and have a higher *average* speed than, for example, *Mick the Miller.* This will allow weekend cruises to be extended in distance and bring Continental ports into weekend range of the South Coast of England.

REPORT BY MICHAEL HENDERSON

The boat reached a speed of around twelve knots when the photograph was taken. Keith Beken was unable to catch her in his ten knot launch. Generally speaking she has behaved exactly as predicted except that her top speed is somewhat more than I hoped for. Stability is fine — we have rolled her down both by crane and by sailing and she rights from 90 degrees unaided, without putting the masthead float into the water.

This season has been mostly dogged by light airs as you know. The boat is a bit on the undercanvassed side and so can only sail at the same sort of speeds as similar sized single hulls, in light airs, but shows increasing advantages as the Beaufort numbers increase. As a cat should be, she is exceptionally good to windward in a blow and has logged six knots close hauled in a force six offshore with dryish decks and a heel angle of 10-15 degrees. On the wind in a 3-4 breeze she will sail at four knots or so and occasionally reach five. Reaching her speed is from six knots in a 3-4 to ten to twelve in a 6.

She's quite livable too, and shows a considerable improvement over *Mick the Miller* both in speed, space and comfort. We sailed, for instance, the J.O.G. West channel series this year, viz. Southsea—Cherbourg buoy—Dartmouth and Dartmouth—St. Peter Port, mainly

in light airs and calms and in both cases were second boat home; and cruised on to St. Malo, returning thence direct to Cowes at an overall passage average of four knots, close hauled, most of the way in force 2-3. In all we sailed some 500 miles in six days of sailing.

Basically one can say that the boat sails as fast as, or perhaps a little faster than comparable single hull boats in winds up to force three, and is able to make more use of the available horse power in stronger winds. The motion, though more quick in both pitch and roll is definitely less sick-making than other boats and I believe that the small angle of heel is the most potent factor here. The helm remains light all the time, and the boat is nicely balanced at all angles of heel. The bridge slams a bit to windward—it's only 24 in. clear forward and 9 in. aft—but nothing serious and there have been no signs of failure in the structure.

I am now working up a larger version, 24 ft. waterline and 30 odd overall (for my wife and I have decided that we are now a bit too old to go to sea any more in a boat without a proper lavatory). The new boat will benefit enormously from the experience I've had with G.M. and looks like being a honey—quite a near approach to the optimum pleasure vessel, which ought to be a comfortable houseboat that is a sparkling delight to sail and also fast enough under power for water skiing—a combination of characteristics that only the multihull can give.

I would say that G.M. has also shown that, with reasonably sensible design, weight need not be too much of a limiting factor She displaces around 2800-3000 lbs. in offshore racing trim with an 18 ft. waterline so is by no means an ultra light.

MATANI

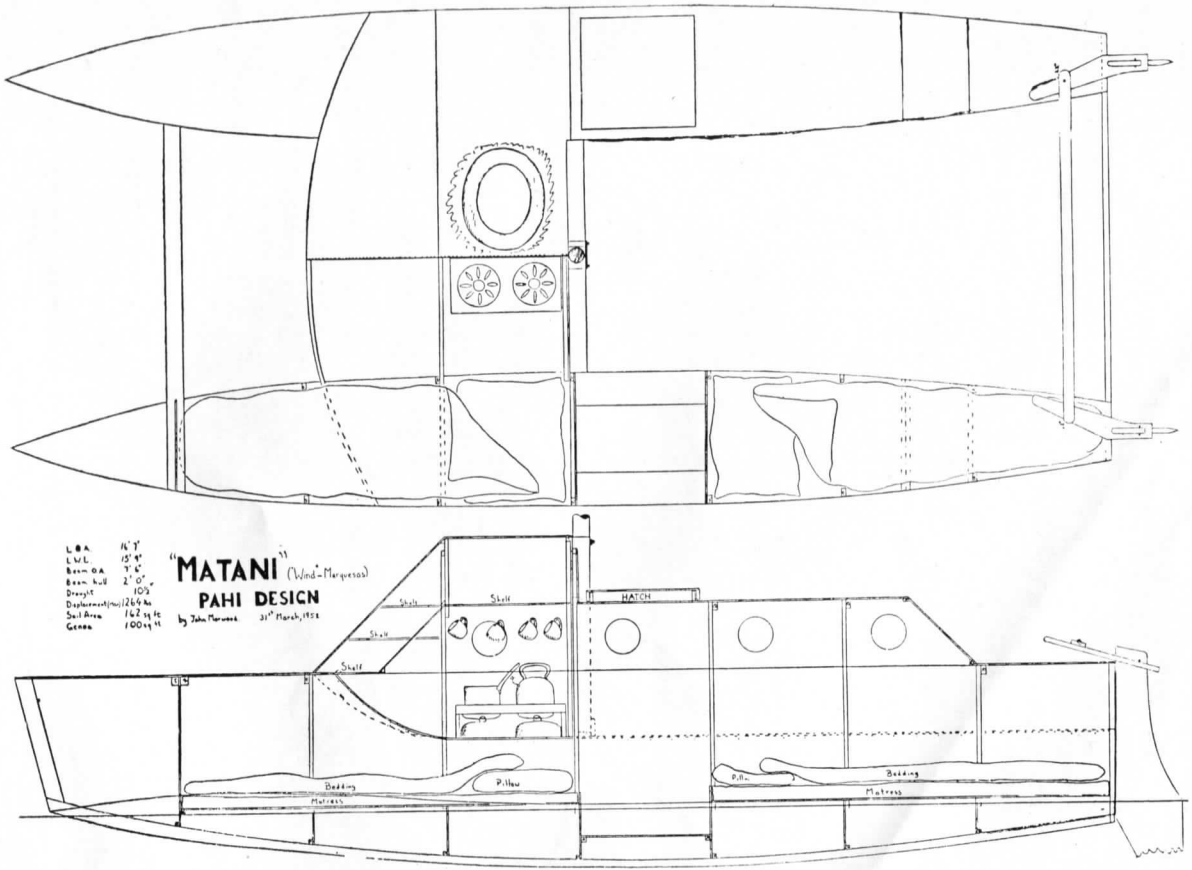
Catamaran Design

L.O.A. 16 ft. 7 in.
L.W.L. 15 ft. 9 in.
Beam O.A. 7 ft. 6 in.
Beam, hull 2 ft.
Draught 10½ in.
Displacement 1264 lbs.
Sail area 162 sq. ft.
Genoa 100 sq. ft.

Designer: John Morwood.

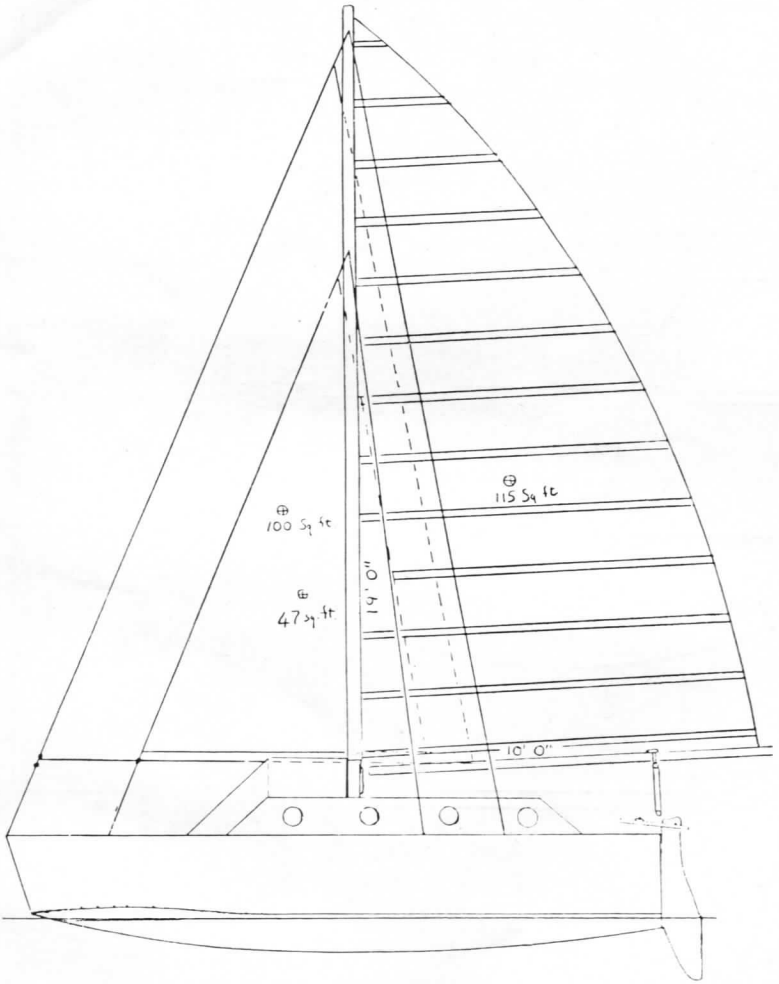
I started my yachting career at the age of 16 by designing and building a 20 foot four berth cruising canoe only 4 feet in beam. We sailed her for four years and had a lot of fun in her and, every year, three or four of us took a fortnight's cruise. We could not have had a better introduction to sailing.

This cruising catamaran is meant to be similar in concept to my


LOA 16'9"
LWL 15'9"
Beam OA 7'6"
Beam hull 2'0"
Draught 10"
Displacement/mt/1264 lbs
Sail Area 162 sq ft
Genoa 100sq ft
"MATANI" (Wind-Marquesas)
PAHI DESIGN
by John Marsaret 31st March, 1982
Skull
Skull
Skull
HATCH
Bedding
Mattress
Pillow
Pillow
Bedding
Mattress

original canoe as the cheapest possible cruising craft for four young men but it would also be suitable for a family man with two children.

The Design. This is basically my *Tuahine* design but the bow sections are a little fuller above the waterline which gives a curve to the chine forward. One needs this extra room to get at the end of the forward berth and to give a little more reserve buoyancy in a sea. The displacement is double that of the *Tuahine* design so great speeds cannot be expected but she will not be slow in strong winds and a



mast head Genoa will pull her along when the wind is light. The windage of the bridge deck will affect her adversely, too, in a head wind. No centreboard is shown. This is because the extra depth in the water may give enough lateral resistance and the weight should take her from one tack to the other. The full Ackerman linkage on the tiller bar will help here.

Accommodation. This is the minimum possible for four people. Three foot of headroom is provided over the head of the berths with two feet at the feet. A foot well and hatch is between the berths, allowing space to wriggle out on deck. The four berths allow even more privacy than in the two berth cruiser of conventional fin keel type and this would be convenient for families.

The Galley This contains a two burner stove with plate racks and shelves which again is the minimum. A catamaran does not pitch or roll as much as a conventional craft so it should be easy to keep pans on the stoves.

The Toilet. The catamaran is the one craft which needs no complex toilet. Indeed, the main trouble is to prevent continuous flushing while at sea. To this end, a baffle plate forward of the seat will do what is wanted and can be kept clean by spray action.

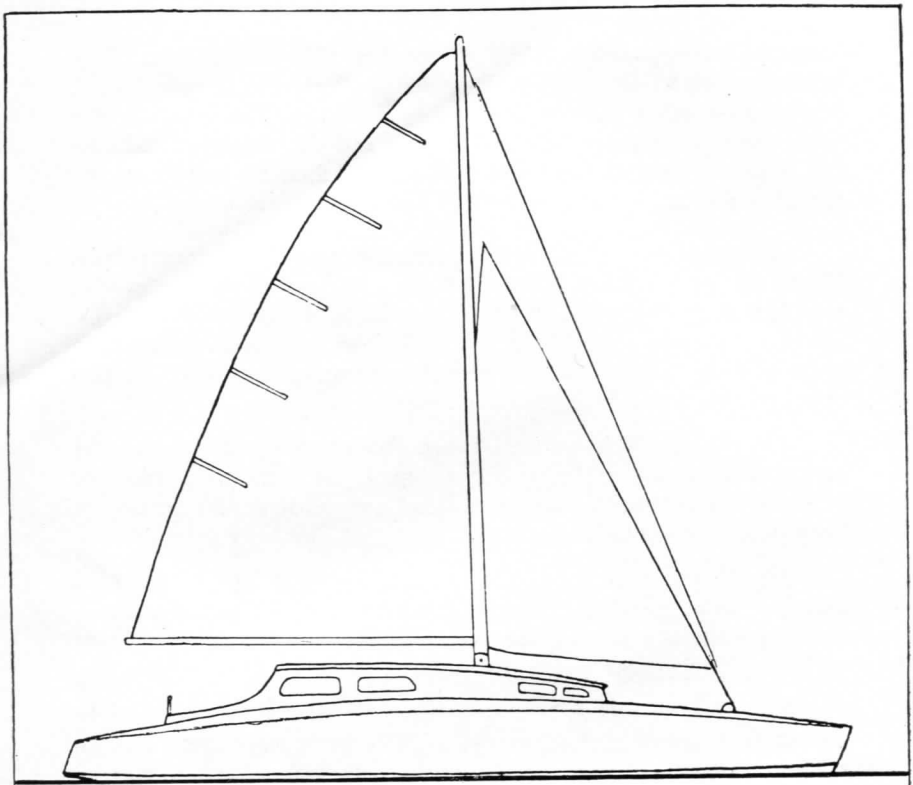
The Cockpit. This is large for comfort and to get the weight far aft with strong following winds. The heavy hulls may tend to stick in the water and bury their bows and provision for this must be present. The helmsman can sit either at the extreme stern and steer with the short tiller or, with a tiller extension can move farther forward to the cabin top which is rather far off the floor for sitting on, being about two foot high.

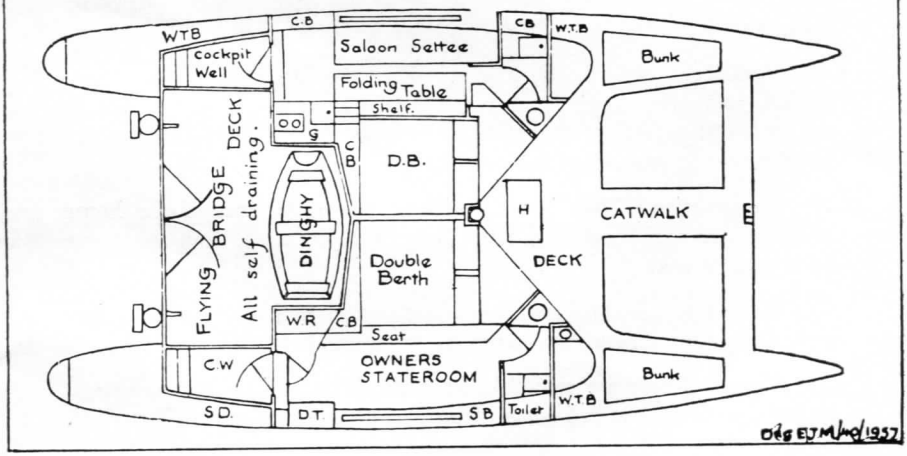
Auxiliary. An outboard of very small power would be strong enough to drive this cat along at a reasonable speed. When not in use, it could be stowed in a box at the after end of the cockpit where its stink would not affect the sleeping quarters.

Construction. This is well within the competence of the home boat builder and should be very little more complex than the chine built catamarans.

Summary. *Matani* is the smallest conceivable four berth cruiser with adequate comfort and suitable for a small family.

Plans. These are available from the Hon. Editor in two sheets, giving the sections at full scale with building instructions at £2 per set.




WTB
C.B
Saloon Settee
CB
W.T.B
Bunk
Cockpit Well
Folding Table
Shelf.
DECK
All self draining.
BRIDGE
FLYING
DINGHY
C B
D.B.
H
CATWALK
Double Berth
DECK
WR
CB
Seat
C.W
OWNERS STATEROOM
Bunk
SD.
DT
SB
Toilet
W.T.B
DES E.J.M. Jun/1957

CABINMARAN

L.O.A. 40 ft.
L.W.L. 37 ft.
Beam O.A. 21 ft.
Beam hull 5 ft. 3 in.
Draught 2 ft. 4 in.
Sail area 435 sq. ft.
Genoa 250 sq. ft.

Designer: Erick Manners, 93, Ridgeway, Westcliff-on-Sea, Essex.

This reverse sheer 40 foot catamaran cruiser looks to me just the kind of craft which many people want. She is an elegant looking craft with accommodation most comfortably placed for seven people.

The owners stateroom looks very comfortable, even palatial and the foredeck and cupboards would keep the sound of spray splashing against the forward end from disturbing the sleepers in the double berths placed athwartships.

On the port side, there is another double berth and settee in the saloon for a guest family.

Two bunks with washing facilities are in the bows of each hull, which are separated from the main staterooms by watertight bulkheads. These bulkheads are a very sensible precaution in any catamaran as a blow on the bow with even a small piece of driftwood at speed can stave it in. Indeed, I would even go further and suggest flooring the forward compartment with solid expanded polystyrene buoyancy to above the waterline.

The galley is placed at the side of the bridge deck where the cook can be in contact with the other members of the party, potato peelers and others. This is mated on the other side with a chart and navigation room. This would reduce the room for the dinghy somewhat but both chart room and galley could be built out over the dinghy stowage space, if desired.

The foredeck is spacious and would most certainly be netted between the catwalk and the hulls for security in handling the foresails.

Hull Design. No lines or sections are given but from the slight overhang aft which could well be mated with a slight overhang forward it is assumed that it is intended to have fine ends and a relatively full midships sections. This is the distribution which will give the greatest light wind speed and still give a good top speed.

The Profile. The deck and cabin top profile are very nice to my eyes and more elegant than the Hawaian catamarans with their large, bulbous deck houses, even though these give full headroom on the bridge deck.

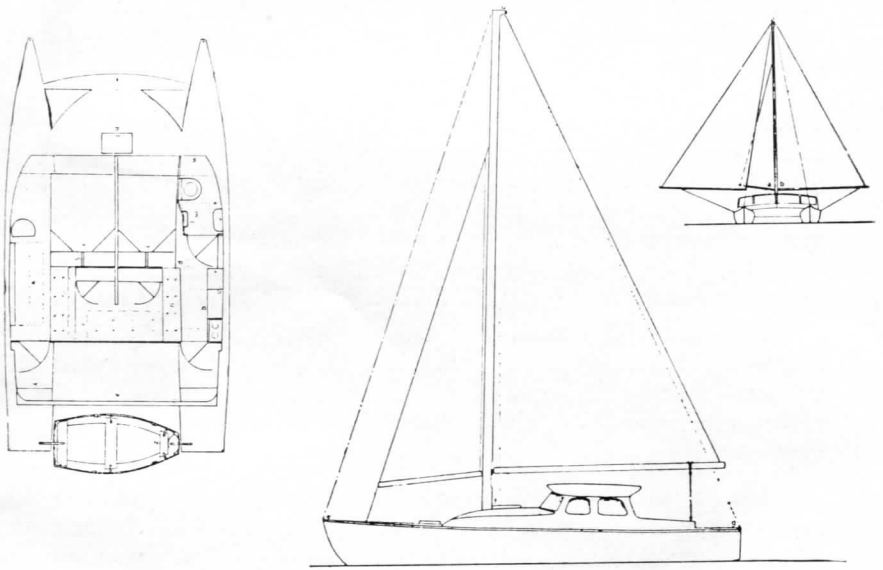
Summary. *Cabinmaran* is a nice looking craft with comfortable accommodation. If lightly constructed, and with a good hull shape, it should have a top speed well above 20 knots and do 10 knots in most ordinary weather.

27 FT. CRUISING CATAMARAN DESIGN

Designer: Erick Manners, 93, Ridgeway, Westcliff, Essex.

This design by Erick Manners seems to have some excellent features and indeed appears to be about the best internal arrangement for the size. Two double berths on either side of the centreboard case forward use this part of the ship to greatest advantage and three single berths in the saloon and one in the port hull give a total sleeping space for eight people. The galley and toilet are in the starboard hull.

The Profile. No lines are given but these are of the usual round bilge shape of this designer. The profile shows a pleasing shape with a good streamlining of the cabin which is very important on these cruising catamarans.



36 FT. "WINGFLOAT KAT" DESIGN

L.O.A. 36 ft. Beam O.A. 16 ft.

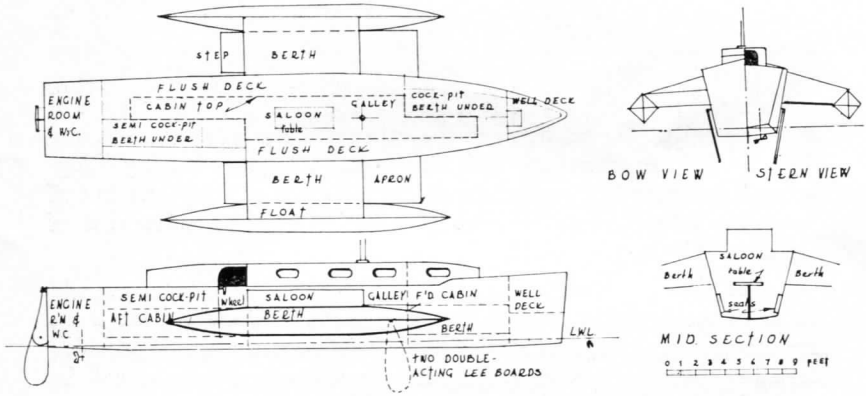
L.W.L. 35 ft. Beam, hull 6 ft.

Draught 1 ft. Beam at L.W.L. 4 ft.

Designer: Julian Allen.

This design shows a configuration which is almost the best possible in my opinion, combined with a clever accommodation plan.

The Main Hull. This is of shallow box sections which may not be ideal but goes well enough, if the weight is right. This is given as 4,000, which, if built to, should be good.



Accommodation. The saloon is 8 ft. by 5 ft., the galley 3 ft. by 5 ft. Each wing has a berth in its thickness and there are two berths fore and aft. The "semi-cockpit" aft is an unusual feature and doubtless would be quite satisfactory.

The Floats. These are of "box cigar" shape and this gives very little resistance to the water flow, but they are a little too far out of the water which may cause "flopping," though there is some stability in the main hull. The floats have 2,600 lbs. buoyancy and there is 3,400 lbs. of lift in the thick wing going out to each. This should be adequate.

Summary. A double outrigger craft is described which has very many good design features.

CEREBUS

36 Foot Trimaran Design

by William H. Baur

L.O.A. 36 ft.	Beam O.A. 20 ft.
L.W.L. 32 ft.	Beam main hull W.L. 2.5 ft.
Sail area 400-800 sq. ft. (Lapwing rig)	Displacement 3,4000-4,000 lb.

This is a first completed attempt at a yacht design and an excellent craft she is, in my opinion. The construction is to be fibreglass and foam sandwich throughout with government surplus aluminium aircraft wing tanks as floats, though sailing stability will be from hydrofoils.

Main Hull. The length-beam ratio is not what was desired but this is restricted by financial limitations as regards length and by accommodation considerations as regards beam. The accommodation plan provides for two long people, one short one and, if necessary, one very short one. There is a small chart table and bookshelves at standing height to port between the galley and the forward berth and there is full headroom for a 6 foot man. The racy-looking "dog-house" structure is a result, not of the influence of finny cars but of providing fully-sheltered louvered ventilation ports to either side of the companionway entrance.

The Floats and Foils. Primary stabilisation when underway will be from the hydrofoils rather than the floats. Also, since the floats are themselves tanks, a windward water ballast system will be provided for heavy weather where tacking is unnecessary. Provision will be made for experiments with other hydrofoil configuration.

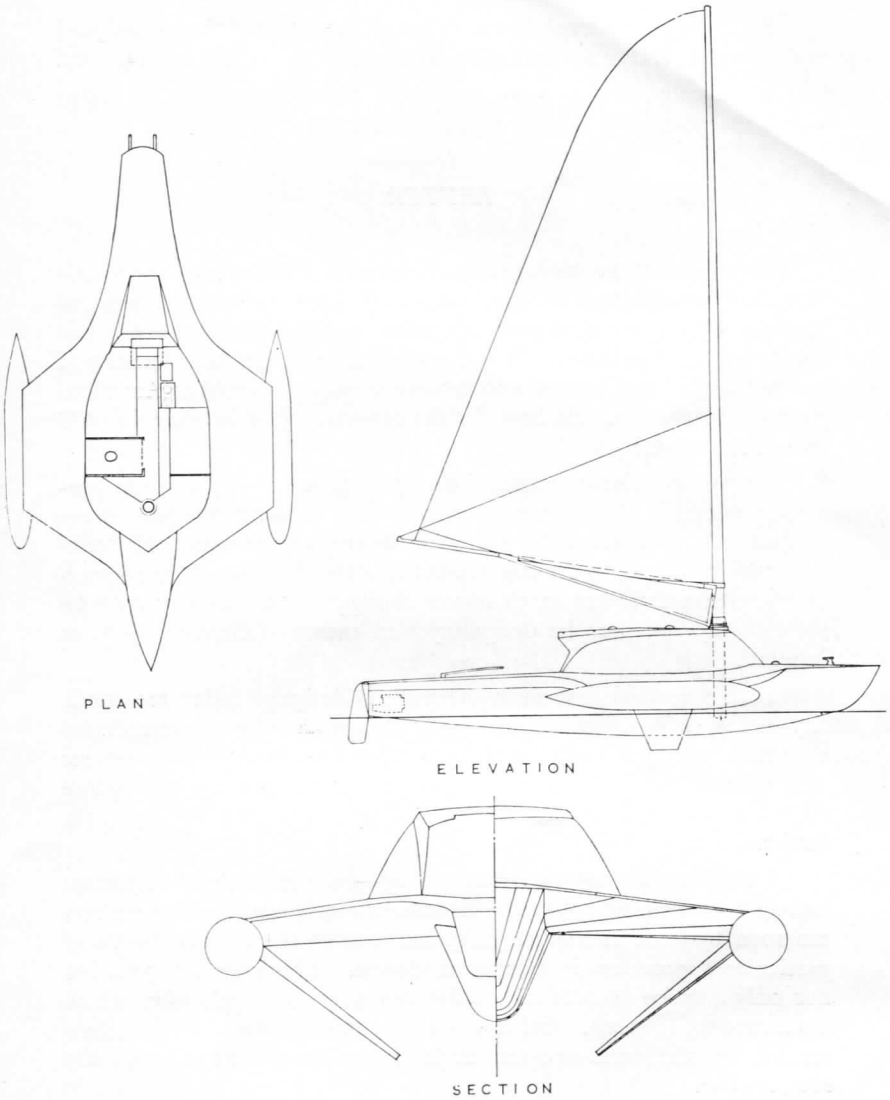
The Rig.. This is the "Lapwing" rig as devised by H. G. Hasler. The long unstayed mast presents something of a problem which is believed can be solved by the use of slightly conical extrusions, an outer shell and an inner skin separated by struts and filled between with a dense foam plastic.

Auxiliary Power. This is a lightweight 30 h.p. motor with an outboard drive which tilts up out of water when not in use, removing a large drag source.

Design Procedure. William Baur, being an amateur designer, devised his own design method and, as this may be of interest to other amateurs, an outline of it will be given. The stages are as follows:

1. An overall stage, working out the configuration to produce an aesthetically pleasing form with an adequate accommodation plan.

2. The final drawing from stage 1 was traced onto graph paper and weight and displacement estimates were made by a counting of square procedure much as was described in the design method of A.Y.R.S. publication No. 1.



3. The centre of buoyancy was then found by a sum of forces times their distances from a references point procedure.

4. A curve of areas was then drawn and, as it was lopsided, it was smoothed keeping the total buoyancy and the centre of buoyancy the same.

5. Using the curve of areas so found, the whole craft was designed with box-like sections which gave an approximate L.W.L. and profile.

6. Finally, the box sections were rounded keeping the areas about the same and the lines were faired.

LETTER

Dear Sir,

Your invitation to write a "controversial" article about my "cruising" catamarans is appreciated. I have had the pleasure of reading several issues of your magazine and feel honoured that you would want my opinions. But I must decline at this time because of heavy design commitments and articles already promised to American yachting magazines. At least for the present, will this letter do until some future date?

As you mentioned, some of my conclusions are opposite to prevailing opinions of catamaran design. Just as your conclusions are undoubtedly supported by design performance and the acid "test-tank" of the ocean, so are my points supported by more than 10 years of experience at sea in catamarans. I suggest that we may both be right though we may be designing with entirely different objectives in mind.

I have noticed that most catamarans designed today are small, day-racing catamarans. Most of my efforts have been concentrated on ocean racing-cruising catamarans where an entirely different set of conditions exist and where my design parameters sometimes ignore day-sailing conditions in order to better cope with the open-sea environment.

I think that where we stand today—on the brink of important new discoveries inherent in the catamaran configuration—it is entirely too soon to form premature judgements as to the relative merits of particular approaches in catamaran design. The known approaches not only require theoretical studies but practical application which must support research. Other undiscovered solutions to the problems created by the wind-and-sea environment should be energetically sought after.

The only emphatic comment that I wish to make now to sum up the foregoing is that it is too early to say that the arc-bottomed, center- or dagger-board configuration is superior to the asymmetric-hull (or other) configuration. What is the basis for this judgement?

Until many day races and ocean passages confirm what seems to be theoretical possibility, it is a disservice to the advance of the art-science of yacht design to say arbitrarily—as I have noticed in one recent American article on catamarans—that one approach is definitely better than another. This statement was not supported by fact.

On the other hand, all races held among catamarans thus far in California (including some of the latest English designs) show the Hawaiian catamarans winning by large margins. However, I consider these races inconclusive for two reasons: (1) my day-racing designs are 24 ft. and 26 ft. 6 in. l.o.a. Since they are larger catamarans, they should win or else something is awfully wrong; (2) there hasn't been enough racing under all-weather conditions to show definite superiority of one type over another.

We have formed a group called the Pacific Catamaran Association which will sponsor races, encourage experiments, and collect data which may show interesting results a year from now. I think that some important modifications of today's primary design approaches will result in even better catamarans tomorrow. It may be that a modified arc-bottom twin dagger-board catamaran will become the most efficient day racer; it may also be true that a modified asymmetric-hull catamaran will be the ideal ocean racer.

I want to thank you for the opportunity to sound-off a little and will look forward with interest to your future publications. Despite some differences in basic design regarding catamarans, nevertheless I am sure that we stand on common ground in having complete faith in the catamaran configuration. With this thought I must say, "more and better catamarans !"

Very truly yours,

RUDY CHOY.

2579 Oxford Lane, Costa Mesa, California.

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