TRIMARANS 1965

A.Y.R.S. PUBLICATION No. 55

PIVER'S STILETTO—A pretty trimaran

CONTENTS

PRICE $1.00

PRICE 5/-

THE AMATEUR YACHT RESEARCH SOCIETY

(Founded June, 1955)

April, 1966.

The A.Y.R.S. Cruising Yacht Design Competition. We have now changed the title of our competition to the preceding. The races of the models we had at the Boat Show had to be postponed because the Round Pond was frozen but they will take place on April 3rd. We have 9 entries, though only 6 were ready for our Stand at the Show. Catamarans, trimarans, single hullers and hydrofoil stabilized boats were all entered and we will see how they all go.

The A.Y.R.S. Cruising Yacht Design Competition (1966). The A.Y.R.S. Committee feel that our competition this year was a success and that, if run every year, its greatest value would appear. We will therefore hold the competition again this year. We have not fully decided the rules as yet but any model built to the rules of last year will be eligible. The only major alteration is likely to be that the full size yacht can be of any size but the appropriate scaling factor has to be used to bring the model to 36 ins. L.O.A. A copy of the last year's rules will be sent to anyone on request, and the full rules will be published in July.

Diddington Reservoir. Inland members who wish to sail on the new Diddington Reservoir, alias Grafham Water, are advised to write for particulars to the Hon. Sec. of the Grafham Water Sailing Club, Mr. F. R. Parson, O.B.E., D.F.C., whose address is Aldermans House, Farndish, Wellingborough, Northants. When full, there will be an area of 1500 acres, and sailing is expected to commence in 1966. The Reservoir lies a few miles to the west of the A1 about 55 miles north of London.

The Great Ouse Water Authority are willing to provide the necessary amenities for the new club, who will bear the charge for these at an economic rent. The subscription for membership of the G.W.S.C. is understood to be £4 per person and those aged 18 or over pay an entrance fee of £4. The boat fees are understood to be at the rate of £1 per foot length overall. The cost of these amenities, including clubhouse, slipways, safety boat and car parking facilities, has been estimated at £60,000.

The International Boat Racing Association, 39, Steppingstone Lane, Kings Point, L.I., N.Y. will be holding the *World Multihull Championship* on September 22, 23 and 24, 1966 at the United States Merchant Marine Academy, Kings Point, L.I., N.Y.

A cordial invitation is extended to all multihull sailors all over the world to participate in this historic event. The following trophies will be presented :

Daysailers. Handicaps using the modified Yachting *one of a kind rule.*

William Randolph Hearst Jr. Trophy—Catamarans under 20′-0″.

L. Francis Herreshoff Trophy—Catamarans 20′-0″ and over.

Boris V. Sergievsky, Trophy—Trimarans under 20′-0″.

Victor Tchetchet Trophy—Trimarans 20′-0″ and over.

Handicaps using the *Pacific Multihull Assoc. Rule.*

Tom Varley Memorial Trophy—Catamarans and Trimarans with permanent berths and auxiliary engines.

Dear Sir,

My wife and I both thoroughly enjoyed the Weir Wood Meeting, particularly in view of the excellent sailing weather.

Would it not be possible to arrange a meeting further north next Summer ? Lake Bala in North Wales would be a good place, within reach of Liverpool, Manchester and Birmingham (60, 75, 100 miles respectively). The lake is larger than Weir Wood and has a large camping and caravan site on the lake shore from which boats can be launched. If you could publish this suggestion, I would be glad to hear from anyone who may be interested.

DON RIGG.

5, Wilmot Avenue, Gt. Sankey, Warrington, Lancs.

TRIMARANS 1965.

This publication is a tremendously satisfying one to me. Little did I think (ten years ago) as I studied the accounts of the Indonesian outriggers in the British Museum that the result would be an entirely new concept in yachting. Victor Tchetchet, Arthur Piver and a host of other people had used double outriggers to stabilise narrow boats but the isolation in which they worked, the lack of understanding of their friends and the active hostility of the conventional yachtsman all usually made them lose heart and give up.

It was, of course, the A.Y.R.S. which forced the development by putting trimaran designers in touch with each other. It provided a forum for the exchange of ideas. The competition to be first to produce a wholly satisfactory trimaran advanced the craft [illegible] lifetimes.

The first breakthrough was the concept of the [illegible]

section (A.Y.R.S. No. 15) for the central hull and sheet plywood frames for the bottom of the hull. This was combined with the asymmetric "Box" float of square cross section set on edge (my *PARANG* design of A.Y.R.S. No. 18).

I sent this *PARANG* design to Arthur Piver who at first used the principles to build his *FROLIC* and later his *NUGGET*. However, the floats banged so Arthur redesigned them, producing the present form of these two craft. The *PARANG* stern also proved too fine and this had to be widened in the final designs.

Now came the next breakthrough, which was not so much a matter of design but of publicity. Arthur Piver turned himself into a human dynamo and built his *NIMBLE* and, with tremendous courage and confidence in his design, sailed her across the Atlantic, later building *LODESTAR*, which he sailed across the Pacific to New Zealand. These voyages proved the speed and seaworthiness of the trimaran and, through the A.Y.R.S., triggered off the stream of trimaran designs which it is our pleasure to publish today. However, the basic design principles as worked out by Arthur Piver are to be found in all of them.

The next stage in development occurred in the West Indies where Dick Newick, with his trice, showed that rounded central hull sections were really fast, while a slight modification of the bottoms of the floats to reduce wetted surface added again to the speed.

Now, we find the next jump forward comes from Australia where Hedly Nicol's *VAGABOND*, with rounded hull sections and fully streamlined cross deck, shows still more improvement. In fact, the *VAGABOND* and *WANDERER* designs might well be the ultimate in trimaran design, only being capable of very minor modifications as the result of test tank work.

Low Aspect Ratio Fins and Centreboards. Norman Cross, Louis Macouillard and Hedly Nicol all use low aspect ratio fins, while most other designers use either centreboards or fins on the floats. At the time of writing, there appears to be no speed difference between the two systems but this can be easily found out by simple trials in the racing trimarans or catamarans. A fin with an upward projection to fit into the C.B. box from below would answer our doubts in an afternoon.

Summary. The development of the trimaran is thus a fascinating process. Starting with Victor Tchetchet's designs, T 22 and *FLAMINGO* (A.Y.R.S. Nos. 6 and 10), the torch passed to Arthur Piver (*ROCKET* A.Y.R.S. No. 16) and to me with the trimaran built on an 18 foot *SHEARWATER II* hull. My *PARANG* design reacted with Arthur Piver's designs to produce *FROLIC*, *NUGGET* and *NIMBLE*. With *NIMBLE*, Arthur showed the world that the trimaran was

seaworthy in the open ocean. Dick Newick refined the simple hull in the West Indies, while Hedly Nicol refined it still further, in Australia. It is extremely interesting to me that each great step took place at some point widely separated from the previous one. Undoubtedly, the catalyst was the A.Y.R.S. in each case. Otherwise, the French would have developed both catamarans and trimarans because they were first in the field with the Ocean cruising catamaarns *COPULA* and *KAIMILOA* and the trimaran *ANANDA*. Perhaps, the French, with their national flair for elegance, will be needed to complete the exercise.

TRIMARAN *DEVIL'S ADVOCATE*

BY

JOHN MORWOOD

The A.Y.R.S. has been publishing designs of trimarans for many years now which only from time to time hint at faults in these craft. I hope to collect in this article all the nasty things that people say about trimarans so that our members can make up their minds if a trimaran would suit them.

The Catamaran Addict's Say: "A trimaran in only an inefficient catamaran with a large hull placed between the two hulls." "If two hulls will do the job, why have the added expense and extra beam of three."

In the Australian magazine SEACRAFT, when Hedly Nicol's *VAGABOND* was flown off the water and capsized (as described later), trimarans were criticised and this brought a very interesting analysis of their good and bad points from the single hullers. Perhaps the best of these was an article by Peter A. Ibold who sailed from San Francisco in a *VICTRESS* trimaran across the Pacific to Suva, Fiji Islands where they left their trimaran and continued their cruising in a single hulled yacht out of preference. They list the disadvantages of the trimaran as follows :

1. Very quick, violent motion on the wind. As a "Devil's Advocate", I quote : "In spite of discomfort, we made 167 miles one day under a club jib and double reefed main, but it just wasn't worth it." This was hard on the wind, in the Trades. If one watches yachts at moorings, the trimarans motion in roll is about three times as quick as the single hullers but only about one third of the extent. One wonders if the total motion caused to a yacht by swell is the same whatever the configuration and it therefore is merely a matter of whether a quick short motion is better than a slow long one. However, the latter has an inertial effect which hurls people and things about more.

2. Relative instability as compared with keel boats. The meaning of this is a bit obscure, to me, especially in a *VICTRESS*. The only thing I can think is that it is another way of criticising the quick motion.

3. Extremely high stresses can produce signs of excessive structural strain.

4. Unproven seaworthiness in very heavy weather.

5. No absorption of noise in the hull. This will be especially so in plywood yachts. The article is a long one and we will get back to it later to list the advantages which Peter Ibold found.

Trimaran Capsizes. This is the ultimate, and reasonable fear of yachtsmen. So far, I have heard of three trimaran capsizes. The first was described in A.Y.R.S. No. 52 where a *NUGGET* tried to cross Salcombe Bar at low water. The second was Hedly Nicol's flying capsize, described in this publication. The third was a *NIMBLE* which got in irons while putting about near the shore. She drifted backwards and a float got stuck. The sheets were pinned in and the crew were waiting for forward way to appear which never came, the yacht lying beam on to the wind. An exceptional puff came in the force 7 wind and she just rolled over. There are no recorded instances of a trimaran which was fully loaded being capsized at sea and, as Hedly Nicol says, it would take a wind of 312 knots to do this to one of his.

TRIMARAN ADVOCATE

BY

JOHN MORWOOD

The Catamaran Addicts. A trimaran has a much more "Natural" accommodation for the human frame than a catamaran. One does most of one's sailing in light winds when the main hull does nearly all the work so why have a huge hull to leeward for sailing stability. A trimaran is very far from being a "Three hulled catamaran". It is much more a modified single hulled yacht, with floats instead of ballast. On the whole the floats prove to be cheaper to make than either an extra hull to make the main hull a catamaran or than the ballast and stronger construction of the single huller.

Peter Ibold in SEACRAFT lists the advantages of trimarans as follows :

1. Very stable and comfortable off the wind.
2. Lots of space on deck and below.
3. Very comfortable at anchor, even in heavy swells.

4. Shallow draught (about 34 inches for the *VICTRESS*) is ideal for negotiating channels and coral reefs.
5. A sense of light and space which is a great advantage on long passages.
6. Ideal for day sailing or weekend sailing.

In reply to the list of disadvantages Peter Ibold lists, these can, in fact, be reduced to two only 1 : the violent motion and 2. the unproven seaworthiness. The high stresses which are produced are simply a matter of design and noise can be quietened by a layer of rubber or other paint or a sheet of foam plastic.

The Violent Motion. If anyone wants or needs to go 167 miles to windward in the Trades in one day and stay on the surface of the water while they are doing so, they may expect a lot of motion in a 40 foot yacht. After all, you cannot expect to ride a switchback fast with the same comfort as if you rode it slowly. Obviously, the answer is to slow the boat till the sea motion is what is wanted. If now, the *VICTRESS* is comfortable at anchor, it will be comfortable if hove-to at sea or only moving slowly on its course.

Unproven Seaworthiness in Very Heavy Weather. At this moment, trimarans are crossing all the oceans of the world in an ever increasing stream and none, to our knowledge, has been lost. Most certainly, losses will occur in the course of time but, if one looks through the list of causes of yachting accidents as given by Peter Tangvald in *Yacht Electrics*, A.Y.R.S. No. 48, one finds how immune trimarans will be to many of them.

Loss of Life : Drowned falling overboard : Very unlikely with trimaran. 27 lives were lost from 9 yachts which foundered. If these had been trimarans, they would not have sunk and many would have been righted and brought to port if they had capsized. The major cause in the single hulled yachts of loss at sea appears to be the weight of the ballast keel tearing off the garboard in gale conditions.

Stranding, which involved 27 yachts would not have been serious with most trimarans and would not have occurred with many due to the shallow draught. Fire is less likely due to the lesser amounts of petrol or diesel fuel carried. One can go through the whole of Pater's list and the trimaran scores each time.

Capsizing. Giant seas occur in the open ocean and, if met, could capsize a trimaran stern over bows. However, if the trimaran is running with warps from the stern, it is more likely to surf away from the advancing face than go over, the warps being carried towards the yacht by the top water. A huge beam sea of giant proportions could also capsize a trimaran but only if the advancing face was overhanging. As opposed to the single hulled yacht, the trimaran sits in the surface

water and will be carried sideways by such a sea and survive while a deep keeled yacht will be capsized by its keel gripping the deeper water.

Finally, should a trimaran capsize in deep water, a hole bashed in the bottom of the leeward float will let that float sink and allow the yacht to be righted and sailed on, whereas, in the same giant sea, the single huller could well have sprung her garboards and gone to the bottom.

Catamaran Capsizes. Small racing catamarans often capsize but capsizes of large cruising cats are rare. I only know of two but both took place while sailing or at moorings due to a sudden gust. One modern 37 foot cat was capsized last summer but I have no details. She was righted and got sailing without trouble but it would have been a different matter on the open ocean. I feel that catamarans should have some high buoyancy on the cabin tops to render them self righting.

TRIMARAN SEA MOTION

BY

ARTHUR PIVER

Box 449, Mill Valley, California, U.S.A.

We note criticism in A.Y.R.S. No. 53 in relation to the motion of trimarans at Sea. There is no doubt motion in this type can be quick at times, but overall motion remains but a fraction of that of conventional craft. The absence of roll and heel is a revelation to those accustomed to ordinary types. We have motion pictures of these boats in gale conditions which would have everyone on a ballasted boat hanging on for dear life—while the trimaran merely bobs about unconcernedly—except when lying in the Trough—where a breaking wave upon the beam can knock her sideways. Repeated blows of this sort apparently do no damage—especially if the trimaran is lightly built according to our specifications. Lack of a centreboard or fin is an advantage.

We feel a discussion concerning different types in which to cruise is meaningless unless the protagonist has actually tried different ones under varying conditions.

One welcome development in multihull sailing is their acceptance by sailors in general and by race committees. The problem now seems to be to find multihull sailors who will participate in major races. We hope to have a good representation in the forthcoming (June 18) Bermuda Race, and in the succeeding race to Denmark. Even if for one reason or another there is no formal multihull class we would like to find some multihulled boats to compete with *STILETTO* during these events.

Strangely enough, often the most hysterical opponents of trimarans are catamaran sailors—the very ones you might expect to be open-minded concerning a multihull. Some of these have been ocean racing for almost 20 years, and apparently take great delight in proclaiming the superiority in speed of their often magnificent, expensive racing machines over ordinary cruising trimarans. This is tantamount to a driver of an Indianapolis racer bragging he had beaten someone's low-powered family sedan. We would like to see some of these catamarans in the above races.

We admire the way Myers & Ewing have worked out *EUNIKE'S* lines (A.Y.R.S. No. 54) by mathematical means, but when Hugo Myer visited us some months ago we were able to show him the lines of *STILETTO*—surprisingly similar but worked out in a different manner.

This consists of using constant radii—one each for topsides and bottom of central hull, and another for the floats. The main hull thus develops into a circular section at mid-point. Laying out frames, etc., with this method is as simple as straight V shapes—with reference points of deck, chine, and keel being joined by a line traced alongside a template.

BROACHING

BY

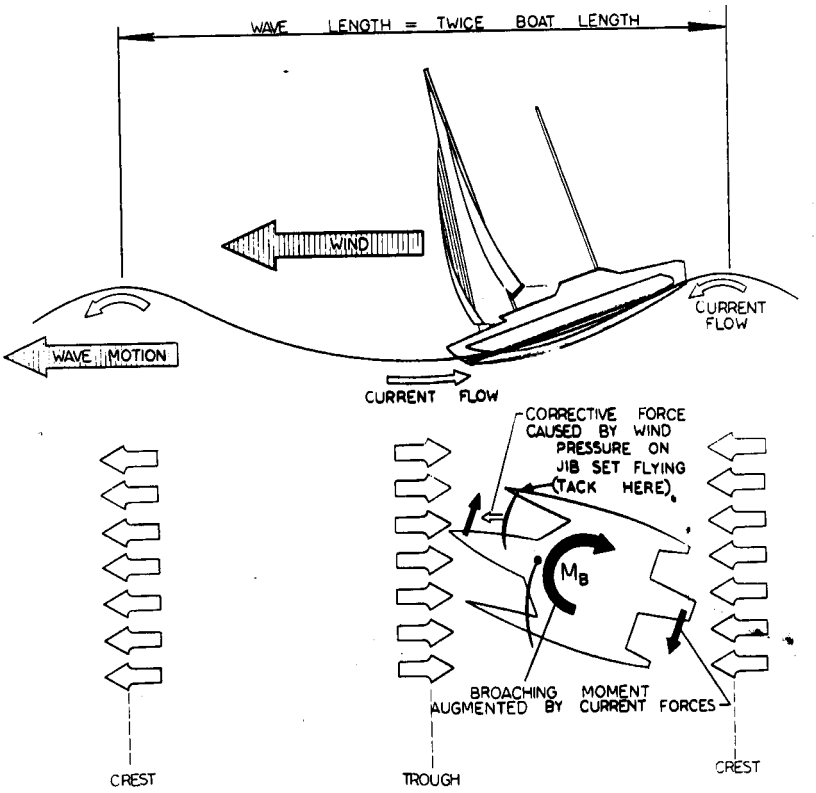
ARTHUR PIVER

Just about the most terrifying experience during a period of large waves is broaching. Because this phenomenon is little understood and because the sailor invariably blames the boat instead of his own lack of knowledge, we would like to dwell upon this subject :

Broaching is an uncontrollable swing into the wind, and in a trimaran can be particularly frightening, because speeds well in excess of 20 knots are possible, and if an already apprehensive sailor suddenly finds himself flying along entirely out of control, terror added to dread can add up to a fervent wish he had stayed home !

As far as steering is concerned, our designs with three parallel hulls just want to go straight, and non-heeling tendencies which do not change underwater shapes—have far more directional stability than the monohull.

Why then do these easily-controllable multihulls broach ? The accompanying diagram gives some idea. It is drawn showing the conditions in which broaching would be most likely. This occurs when the wave-length is twice the length of the boat so when the bow is digging into the trough the stern is being lifted.



If you will look at the current arrows in the illustration you will see that the entire surface of the Sea does not move in the same direction as the wind, but in the trough actually runs counter to the wind. This is because water particles comprising the wave itself do not move with it, but execute an orbital motion which results in their completing their orbit in just about the same place they started.

A similar reaction takes place when you flip a line or a hose—a distinct wave travels its length—but the actual particles of matter forming the line or hose do not themselves change position. Thus a wave is a reaction to a pressure disturbance caused by wind blowing over the surface of the water.

If the boat is not travelling directly down wind you can see how the counter-current at the bow pushes this sideways—aided by the following current at the wave crest pushing the stern the opposite way—combining to form a strong turning moment.

On larger waves the boat is usually in either one or the other of the currents—presenting less turning force. The following currents near the rudder further complicate matters as they are moving in the direction the boat is travelling, and so reduce the actual speed of the water passing by the rudder—which can result in a considerable decrease in steering efficiency.

Other factors contribute to the development of a broach. If the bow is indeed dug into the water ahead, the centre of lateral resistance moves forward, and the boat tends to pivot about the bow. There is also the weather-cocking effect of the wind on the sails—when running or broad-reaching the mainsail can partially blanket the jib—moving sail pressures aft and tending to turn the boat into the wind.

The jib may be fastened to the bow of the weather float—giving it maximum exposure to the wind and thus maintaining proper sailbalance.

There is a marked difference in steering skill among even experienced helmsmen. Some may practically never allow their vessels to broach—while other have this humiliation repeatedly thrust upon them.

The difference in skill lies in anticipation of an incipient broach. The sensitive helmsman will recognize the possibility, and will straighten the boat to a more direct-down-wind heading until the danger eases. He will do this perhaps instinctively, and can be amazed when the same boat broaches with another at the helm—after the first man had privately decided that particular vessel was broach-proof !

The Skipper was horrified on the completion of a deep-sea trip to hear one of his mates complain to a stranger that "the boat was fine—but she broached."

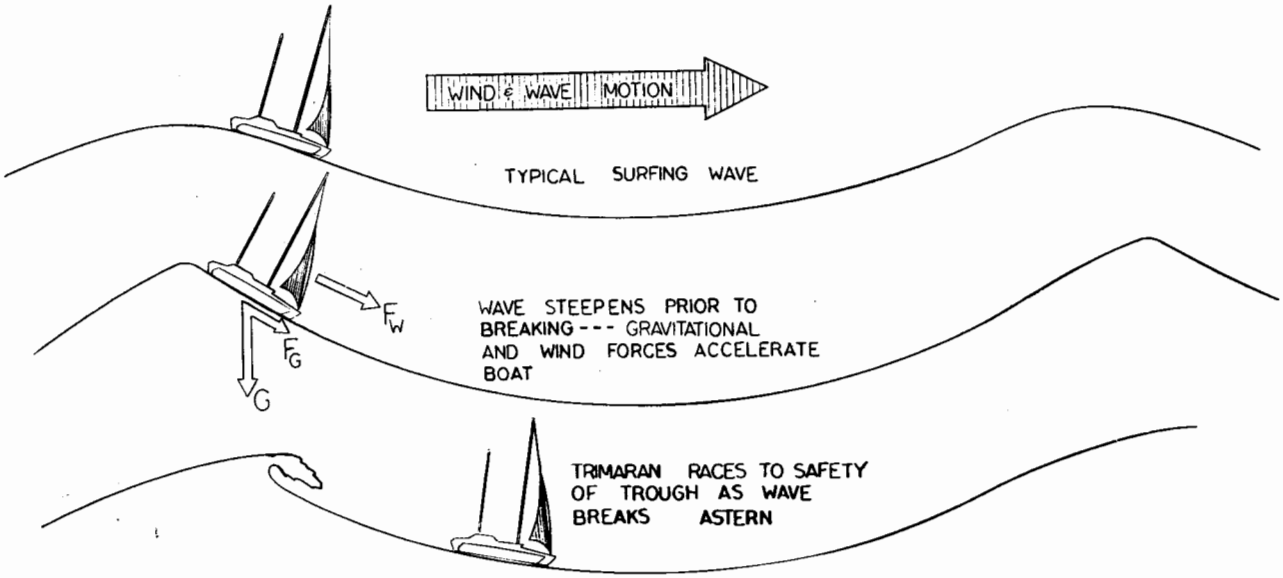
The boat had indeed broached—but only twice during the sailing of several thousands of miles—each time with the relatively inexperienced man at the tiller.

Another example of experience versus inexperience occurred during a run down the California Coast. Rich Gerling had joined the ship just North of San Francisco—and had so much fun in the surfing conditions then present he refused to surrender the wheel for five hours.

The boat was going like a train of cars—and everything was lovely. There was apparently not the slightest tendency to broach probably because as an experienced helmsman he was making the proper correction movements without even realizing it. Within several mi after he relinquished the helm to another crew member a went in a wild broach, with the helmsman white with terro

A broach in a properly designed trimaran is safer t maneuver in any other type.

Overwhelming broaches have been experienced any water on deck !


WIND & WAVE MOTION
TYPICAL SURFING WAVE
F_W
F_G
G
WAVE STEEPENS PRIOR TO BREAKING --- GRAVITATIONAL AND WIND FORCES ACCELERATE BOAT
TRIMARAN RACES TO SAFETY OF TROUGH AS WAVE BREAKS ASTERN

THE TRIMARAN IN STORM CONDITIONS.

BY

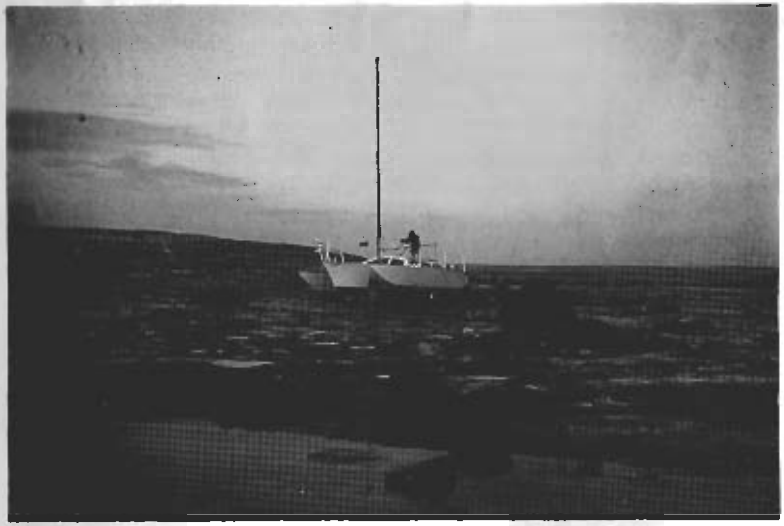
JOHN MORWOOD

Many People have, I feel, failed to appreciate Arthur Piver's "Trimaran seamanship" which he worked out on his first Atlantic crossing in *NIMBLE No.* 1. The item which appears to baffle people is the fact that a trimaran can surf away before a storm sea so as to avoid being engulfed by it. This is an entirely new concept of seamanship for small boats and it must have needed a bit of courage, as well as insight, to put it into force for the first time.

The drawing we show appears in Arthur Piver's TRIMARAN THIRD BOOK available from him at P.O. Box 449, Mill Valley, California. As it explains the procedure far better than any words, it is not necessary for it to be described. This is, however, one of the safety factors in trimarans because it allows a trimaran to escape a bad sea which a single hulled boat must accept.

A *NIMBLE* ON THE ROCKS

Fort Chimo lies at about 60° of north latitude on the north coast of Canada about halfway between Hudson's Bay and the Atlantic. Conditions there are indeed rugged. Icy winds of gale force are almost daily occurrence. Fierce tide rips, 40 foot tidal rise and fall and a wild



A NIMBLE on the rocks

rocky shore make the conditions far from what we usually think of as yachting conditions.

George Cooper edits the local newspaper in Fort Chimo and needed a boat. He chose to make a Piver *NIMBLE* but thought he had lost her on his very first trip when she was blown ashore and left to pound herself to pieces in a gale. His account of seeing her again was as follows :

"Two days later I went back at low water and my poor boat was hanging up on the rocks at an 80 degree angle. You could have knocked me over with a feather when I couldn't find any holes in her. Most of the anti-fouling was scraped off and a square inch of fibreglass mat from the bottom of the port fin. When I got her back at moorings, I could not find one bit of leaking.

"The float fin smashed pieces of rock on the shore. One picee of granite weighing several hundred pounds was chopped off as cleanly as a stone mason could have done it. My Eskimo saw it but seemed unable to believe it. In the future, I shall not worry unduly about rocks ; apparently *NIMBLE* just bounces over them."

Dear Sir,

You already have my account of my first trip down the Kodsoak River, in my home built *NIMBLE* trimaran.

I would like to tell you about another two incidents involving rocks, if I may ? The first happened on my next trip downriver. After negotiating the first twenty miles without too much trouble we were on a fairly wide stretch five miles above the narrows. My daughter had a cup of tea ready so the local Anglican Minister (first mate) and I relaxed with a cup of tea while my daughter took the wheel. At the time we had the wind on the starboard beam (strength about fifteen M.P.H.) and the log reading eight to nine, the ebb tide with us about seven knots, which was a fair speed over the ground.

Halfway through our cup of tea we were flung from the port settee on to the starboard side as the port float struck a rock and bounced over it, almost immediately the starboard float struck and threw us to the floor, I got to the wheel and we were in a veritable maze of submerged rocks running off a point. As I pulled her as hard over to starboard as possible without losing way we struck again on the main keel, slid off and smacked the rudder.

After negotiating the narrows we got aground on the first likely looking piece of bank in the mouth of the river, all floorboards were removed and the bilge was dry as a bone. As soon as the tide went out we got underneath and checked her over, both fins were a little splintered on the forward edge and the fibre glass mat stripped off

the bottom, the main hull only showed the mark of the rock running from about six feet from the bow to a little aft of amidships, the fibre glass was intact. The bottom of the rudder was polished clean and there was a slight bend which suggested a horizontal crack inside the fibreglass.

I may add here that three weeks ago a 50′ longliner strongly built and sheathed with Ironka to withstand the icepacks up here, struck a similar submerged rock and split her keel for sixteen feet, sprung both her garboards, stripped or sprung off most of her sheathing and had to run aground immediately before she sank. Even after putting a tarpaulin over her stem and stuffing the garboards with sacks, rags, pitch and mastic she had to be pumped continuously till we towed her up here to make permanent repairs. She was steaming against the tide.

I realize there are many factors involved in the above instance, weight, the angle of collision, the greater draft, shape of hull etc. but the fact remains that had the two boats been in deep water off-shore and struck deadfalls or what have you, the longliner would have gone down in twenty minutes, that is the skipper's opinion; not mine.

On my next trip, the Minister, an Eskimo pilot and I went across the Ungava Bay to the nearest settlement, some eighty miles from the mouth of our river. We had an uneventful trip except for seals which would pop up alongside to get a close look at this odd boat which did not roar like the outboards on the boats which hound them down. On one occasion we started our outboard and they immediately vanished.

On our arrival at our destination two of the local natives showed us where to anchor, I was a little dubious as my echo sounder only showed 22′ but as it is a heathkit model which goes around the dial twice and the natives said 122′, we put out two anchors and went ashore.

In an isolated settlement like this visitors are always welcome and we were given sleeping accommodation. The wind blew up to galeforce that night and rattled the shingles but we were warm and comfortable and the boat was securely anchored, it was a pleasant evening. At noon the next day the wind had dropped to around 25 M.P.H. and I took our hosts out to the boat for a sail. She looked a little low in the water and one look below confirmed this, she was full of water to the chine (which is the water line on this type). Again the sounder read 22′; we moved her another fifty feet out then the sounder went right around the dial to 150′. Naturally we kept going till we were well clear of the shelf. I tried to pump her out but couldn't get the level down, this meant taking up all floorboards and locating the leak which proved to be under the forward crossarm.

There was a crack right through the skin running from the keel to the chine. By cutting a suitable sized piece of plywood, coating it with "mastic" and fastening it with screws right through the hull the leak was reduced enough to pump out, it was not that simple actually as one can only keep their hands in Arctic water for a minute or so at a time. When she was empty the screws were tightened thoroughly and the leak reduced to a trickle.

The floats of course are half full of foam in place. Therefore a hole there would not affect her overly much. The range of tide at that location is 36′. On the low water, I walked out to the original anchorage to a sharp reef which was then exposed and found (by the white fibreglass markings) a 'V' in the reef where she had been trapped and pounded in an onshore wind of some 40 to 50 M.P.H. I estimate she must have pounded on the falling tide some two hours and the same amount on the rising tide. We sailed the 120 miles home without pumping once and only shipped about ten gallons.

You may say I am a very careless sailor. On the other hand these waters have not been surveyed and charted, plus 40′ tides are commonplace and 8 kt. ebb and flows are moderate, they can reach 14 to 16 when the spring breakup takes place. Candidly speaking it would take a very sharp salesman to get me out in anything other than a trimaran as my own experiences (mishaps) have shown me that their relative strength is phenomenal.

Just for the record this boat has logged 18 Kts. with a 45 M.P.H. wind abaft the beam and a wind against tide condition, with no heavy water on deck and a comfortable ride although she did have a pretty heavy weather helm, probably caused by the jib being reefed much more than the main, the main being only twenty-five feet up the mast.

GEORGE S. COOPER.

Fort Chimo P.O.Que. Canada.

Dear Sir,

I wish to recall an article written by Reg Miller in A.Y.R.S. publication No. 52, in which he states that "in a well designed trimaran the righting moment does not decrease to zero when the craft is sharply heeled". From this, any members might infer that such a cruising trimaran will always right itself after 90° knockdown. I maintain that this is not necessarily so, and as a basis for discussion I refer to the author's Figure 1 on Page 68.

To be realistic, all factors as listed below must be considered :

(1) It is most likely blowing a gale.
(2) The seas will be rough.

(3) The craft will have forwards momentum.
(4) The craft will have clockwise rotational momentum.
(5) The submerged float will be dragging badly.
(6) The main hull could be carrying some bilge water which would be in the cabin roof.
(7) Many of the provisions, squabs etc. will be thrown to the cabin top, not to mention the crew who may or may not be inside (and if outside may be lost overboard if not on a lifeline).
(8) The rough seas will be slamming at the main hull from somewhere to windward, I expect that green water would pile up under it and give a resultant centre of buoyancy far lower than that shown.

Bearing all these possibilities in mind, it is easy to see that the chances of survival (in open sea, if anyone foolish enough or unfortunate enough to get a trimaran into this 90° capsize position) are very small. The logical answer to this of course is never to let a trimaran heel more than say 70°, where there should be ample righting moment to cover all contingencies.

It is unfortunate that through A.Y.R.S, yachtsmen are brain-washed by the executives of big business and their New "Physicist" Approach. I like trimarans, but if some are not foolproof, members should be the first to know.

Yours faithfully,

JOHN CHAPPLE.

27, View Road, Campbells Bay, Auckland, New Zealand.

VAGABOND

BY

JOHN MORWOOD

L.O.A. 36 ft. 0 ins.	Main sail 375 sq. ft.
L.W.L. 33 ft. 3 ins.	No. 1 jib 150 sq. ft.
Beam o.a. 20 ft. 6 ins.	No. 2 jib 245 sq. ft.
Hull Beam at WL. 4 ft.	Genoa 314 sq. ft.
Hull beam OA 10ft. 6 ins.	Accommodation for 6 persons

Designer : Hedly Nicol, 43, Cambridge Pde, Manly, Queensland, Australia.

VAGABOND, with Dick Newick's *TRICE*, are the two most fascinating trimarans in the world. Both of these have beaten huge numbers of large conventional yachts in classic races. *TRICE* was only beaten by *STORMVOGEL* and the superb *NINA* in the Bermuda race while *VAGABOND* beat ALL the large Australian

yachts in the Brisbane-Gladstone races in both 1964 and 1965. Both trimarans are similar in hull and float shape, the difference between the two being the means of getting the extra lateral resistance needed . . . *TRICE* uses a centreboard (as far as I know) while *VAGABOND* uses low aspect ratio skegs on both floats and main hull. The details of *TRICE* are not known to me but I do feel that the floats of *VAGABOND* are designed in such a way that, on heeling, they will take the load with the minimum of resistance. Of course, there is much more to yacht design than such a simple assessment and, from the photograph of the construction of *WANDERER* (*VAGABOND'S* cruising version) which we show it will be seen what an attention to detail has been given in construction.

Low Aspect Ratio Skegs. These appear to have been used almost simultaneously by Norman Cross and Hedly Nicol. Both, by their continued use of the system appear to be quite satisfied that it is worth while but the point has still to be proved to the hilt.

VAGABOND's Rudder. This is placed below the main hull and is of a very low aspect ratio. Obviously, it must work, but it does seem to be placed rather far forward.

Dear Sir,

Some time ago you asked me for details of Hedly Nicol's trimaran, *VAGABOND.* I have procrastinated on this, partly because I was waiting to see how *VAGABOND* would perform in the Easter Brisbane-Gladstone ocean race, in which she was matched against several much larger keel boats as well as a variety of multi-hulls. I have asked Hedly's business partner Bruce Goodson to send you some of the literature which he has on the boat Meanwhile you might be interested in my own comments, as I have no vested interest in *VAGABOND*, and was in fact rather suspicious of multi-hulls in general until about six months ago, when I first responded to Hedly's invitation to "come shake hands with *VAGABOND*". Since then I have been on *VAGABOND* several times and have watched her race, and it would be difficult to survive these experiences without becoming a convert.

One often reads about boats that "should be capable of" doing 20 or 30 knots, but it is rare to find one that consistently lives up to expectations. We are all used to watching sailboat races in which the lead is won by a boat painfully creeping ahead into first place, often losing it several times before finally crossing the line a few minutes or a few seconds ahead of the nearest rival. *VAGABOND* can be last over the line but will pace the whole fleet within the first mile and will be well over the horizon while the other boats move along far

behind, in the usual close formation, battling for second place. In a race of any length, *VAGABOND's* winning margin is likely to be at least an hour over any other boat, and may be measured in many hours or even days over more conventional boats of similar size. She proved her superior speed at sea last year in her first Brisbane-Gladstone race, beating the 59-foot ketch *ILINA* by an hour in severe gale conditions with rough seas. She proved it again this year, beating *ILINA* by nearly 1½ hours in very light airs with smooth seas. Not bad for a 35-foot boat ! *VAGABOND's* performance against the other multi-hulls in the area, including a sloop-rigged *VICTRESS* design, is no less spectacular. I expect that Bruce Goodson will send you the times of this years' race which will tell the full story.

It should be understood that *VAGABOND* is not merely a "machine" but is sufficiently roomy and comfortable to be a very fast and liveable cruising boat. I have been in her cabin with over a dozen people and she generally races with a crew of six. Hedly is selling plans for a heavier and beamier version of *VAGABOND* called *WANDERER*, which should be slower but a better weight carrier for long passages.

VAGABOND may well be one of the fastest sailing boats in the world today and is certainly one of the most controversial over here. Last year Hedly took her out in flat water in a 50-knot off-shore wind and succeeded in capsizing her while doing 27 knots to windward, with 500 square feet of sail sheeted flat. *VAGABOND* planes at speeds above 15 knots, and evidently under these conditions she simply became airborne and flipped. *VAGABOND's* capsize has received far more publicity than her successes, and recently has been the excuse for severe and unsubstantiated warnings about the danger of multi-hulls in some of the local yachting magazines. Those of us who know the circumstances of the "flip" on the contrary feel that it demonstrates the exceptional stability of this very light weight boat.

VAGABOND's performance must arise from a combination of factors. The narrow (4 foot maximum) beam of the main hull, the round-bilged cross section, and good aerodynamic treatment of wing and cabin structure evidently provide an almost ideal combination of factors. The wing is built as an aerofoil section without heavy cross beams. Hedly claims the wing provides additional lift, and this may well be true at least to windward. The floats are round-bilged with graceful rocker and low angle of entry. They are very fine in section but apparently provide considerable dynamic lift at planing speeds, as *VAGABOND* develops her best speed sailing almost upright even in a good press of wind. Planing ability is evidently enhanced by the round-bilged main hull section, which is slightly flattened aft. The

round-bilged section must also improve light air performance by giving minimum wetted surface and draft for the weight carried. From the cruising point of view, this hull form also offers much better accommodation and weight carrying ability as compared to deep-v section.

In this year's race the multi-hulls were definitely in the doghouse and had to start one hour after the keel boats, without the blessing of royalty.

With best regards,

WILFRED B. BRYAN.

280 Indooroopilly Road, Indooroopilly, Brisbane, Australia.

QUEENSLAND TRI EXPERIMENTS

BY

HEDLY NICOL

From TRIMARAN, Box 4820 G.P.O. Sydney N.S.W., Australia.

Over the past few years we have been working on the development of a range of trimarans incorporating the soft round bilge with simple double diagonal skins, and the aircraft-like aerofoil wing deck to impart lift. Up to the 1964 Brisbane to Gladstone Race, the major portion of practical work was devoted to the construction of *VAGABOND*, which is 35′ by 20′ by 15½″—a straight out ocean-going speed machine. The race itself, in full gale conditions, thoroughly demonstrated the soundness and seaworthiness of the design, and proved that *VAGABOND*, handled with commonsense and due respect for "Sea Lore", can be driven across raging, breaking seas at full pelt, in perfect safety and comfort and with no anxiety at all.

After a "Paradise Islands" cruise home to Brisbane we went all out on the development of the cruising trimarans.

By using *VAGABOND* as a trial horse and test bed we have been experimenting to incorporate the spacious comfort needed for family cruising whilst maintaining the wondrously successful features of *VAGABOND*, and preserving her abundant speed as far as possible. Most experiments we recorded on movie film.

One of our most important points was to preserve the *VAGABOND* two finger steering which is feather-light and positive at all times, even under the most trying conditions of wind and sea and on any angle of the breeze. This feature seems rare in trimaran designs, but we consider it of major importance. Our success in this field is achieved with a rudder less than two square feet in area. A real trump card.

The secret of this easy steering will go into all our designs.

Another point we met was the complete absence of reliable data as to the extremes to which a trimaran can be driven in safety, and this being the case we decided to go all out after this information ourselves. As far as we know, we are the only ones to go to these lengths.

We commenced practical heeling tests aimed at calculating maximum sail-carrying ability. For this purpose we crammed on huge sails broadside to heavy winds and by restricting our speed by drogue to 3-4 knots we were able to accurately observe the effects of heeling moment and righting moment without the complications of planing surfaces, the dynamic lift which is incorporated in our float design, or the considerable lift imparted by our aerofoil wings. These observations vindicated the common theories of heeling moment-righting moment and we concluded that the enormous reserves of righting moment far exceed the maximum heeling moment which can be developed and thus the possibility of a capsize is eliminated unless other factors are introduced.

We decided to introduce these factors and measure their effects.

Firstly we removed the drogue and found the stability factor greatly increased by the dynamic lift of the lee float. The gale run to Gladstone had already proved that so little water comes on deck that it need not be considered. It also proved that buffeting by waves and breaking seas such as met with at notorious Breaksea Spit also provided no problem. We found that *VAGABOND* planes along at 15 knots, riding 5 inches above her static position, and that at 22 knots her static waterline is 8 inches out of the water all around. These speeds were attained across and down wind, as necessary wind speed normally created seas not conducive to these speeds upwind. For this reason, the high planing position was no cause for concern and added greatly to speed. For the same reason, the aerodynamic lift of the wings was a factor of calculation we were till then unable to assess, in the absence of these speeds in head winds.

The promotion of our experiments took another step with the arrival of the seasonal mid-winter westerly gale. This was an offshore wind, and within one mile of the flat shoreline the 55 knot wind blasted across perfectly flat water 4 to 5 feet deep. This rare combination provided the conditions needed. We stripped out all cruising gear, water, fuel and stores to leave the trimaran virtually an empty shell. The cameras £700 worth, went aboard and cameramen Barry Dunn and Ian MacTaggert took their stations. Up went the largest sails we could hoist and out we went. Back and forth we went and in three runs we had three valuable reels of 16mm film.

On the fourth run the surface of the water was flat, and wind at 55 knots and gusty. *VAGABOND* was tearing along close hauled

and pointing between 50 and 55 degrees to the wind with sheets tight on. She was clocking 22 knots and planing 8 inches high. A tremendously hard gust hit and she accelerated to 27 knots, rose higher on the water, then gently rose clear, borne by her aerofoil wings alone. She went up several feet, then, robbed of the stability imparted by the water, she arched over and executed a perfect "victory roll" till the tip of the mast ploughed into the water. The mast exploded and *VAGABOND* crashed down on her back with a thunderous roar.

It was absolutely fantastic—a once a lifetime experience, witnessed by numerous persons on the shore nearby and recorded on the tripod-mounted 16mm camera, but alas, this grand film was destroyed by the salt water.

VAGABOND floated high upside down and crew had no difficulty working on the under-wing decking. She was righted easily but slowly by submerging one float and flipping her over. Inspection showed that although the mast was broken, no other damage of any description was done. The fact that *VAGABOND* stood up without a scratch to the terrific crash of impact when she landed is itself reassuring proof of the strength of the wing and hull design and construction. She was sailing again a couple of days later and since has continued her race-winning career.

The camera equipment, speed recording instruments and the two way radio gear all of which is valuable and intricate equipment, though dunked, were not seriously damaged. The "Marina 60" two-way radio, though enclosed in a cupboard, was not bolted in and it battered its way out of the cupboard and went to the bottom. It was found seven days later—full of muddy sand, and the fact that it required only a simple cleansing treatment is a great tribute to its rugged nature.

Though robbed of the recording film, we are able to analyse the 'flip'.

The circumstances were :

1. Flat water—allowing high speed to w'ward.
2. 55 knot (plus) wind.
3. 500 square feet of sail.
4. Yacht stripped down to 2500 lb. weight.
5. Planing attitude 8 inches (plus) high.
6. 432 Sq. ft. aerofoil wing.
7. 27 knots attained to windward.

Our conclusions from these are that a capsize is to all intents and purposes impossible. An 'airborne flip' such as occurred in this case can take place only with these seven points existing. Removal or reduction of any one of them eliminates the possibility.

This is the factual basis for calculation which we have sought for so long, and it is proving of priceless value. For instance, it proves that one of our cruiser designs can be expected to flip with full sail when the wind velocity reaches 312 knots.

Our latest design, the family cruiser *WANDERER* now incorporates all the knowledge gained from our extensive experiments and the benefit of our experiences. Being a cruiser, she is a little heavier, much roomier inside with accommodation to spare, and has a comfortable sail plan.

She has all the sterling features of *VAGABOND*, however, she forgoes the spirited scintillation of high speed racing spray for the docility, safety and comfort of the family saloon cruiser.

Dear Sir,

I am building Hedly Nicol's *VAGABOND*, Mark II, and plan to enter the Round Britain Race this summer. I would appreciate any information you have on the location of the race, the date, the entrance fee and the final date of entry. Hedly Nicol and myself will be sharing the helm.

J. WARD GRANT.

Trimaran Consultants, 4230 Glencoe Avenue, Venice, California.

ED. ; Details of the race can be got from the Hon. Sec. Royal Western Yacht Club of England, West Hoe, Plymouth, England. From the information I have had, several really fast trimarans and catamarans as well as a huge entry of single hullers will be entering. If the catamarans and trimarans do well, it will finally establish them as seaworthy boats in the minds of yachtsmen.

WANDERER

Designer : Hedly Nicol, 43 Cambridge Pde, Manly, Queensland, Australia.

WANDERER is the cruising version of *VAGABOND*. The same dimensions, the same principles of design and a slightly heavier construction make a cruising yacht with a high performance and comfortable accommodation. The drawings and photographs show the trimaran in course of construction and in the finished state. Plans are for sale which are drawn for amateur construction and this, though undoubtedly taking far more time than the person who tries to make such a craft expects, will be quite possible for any semi-skilled man to do.

The end result will be a boat of which the builder and owner can be proud and which will have an exceptional performance.
Price of plans £59 Australian, £48 Sterling, from Hedly Nicol at Multi Hull Pty., Ltd., 43 Cambridge Pde., Manly, Queensland, Australia.

35 *ft. WANDERER*

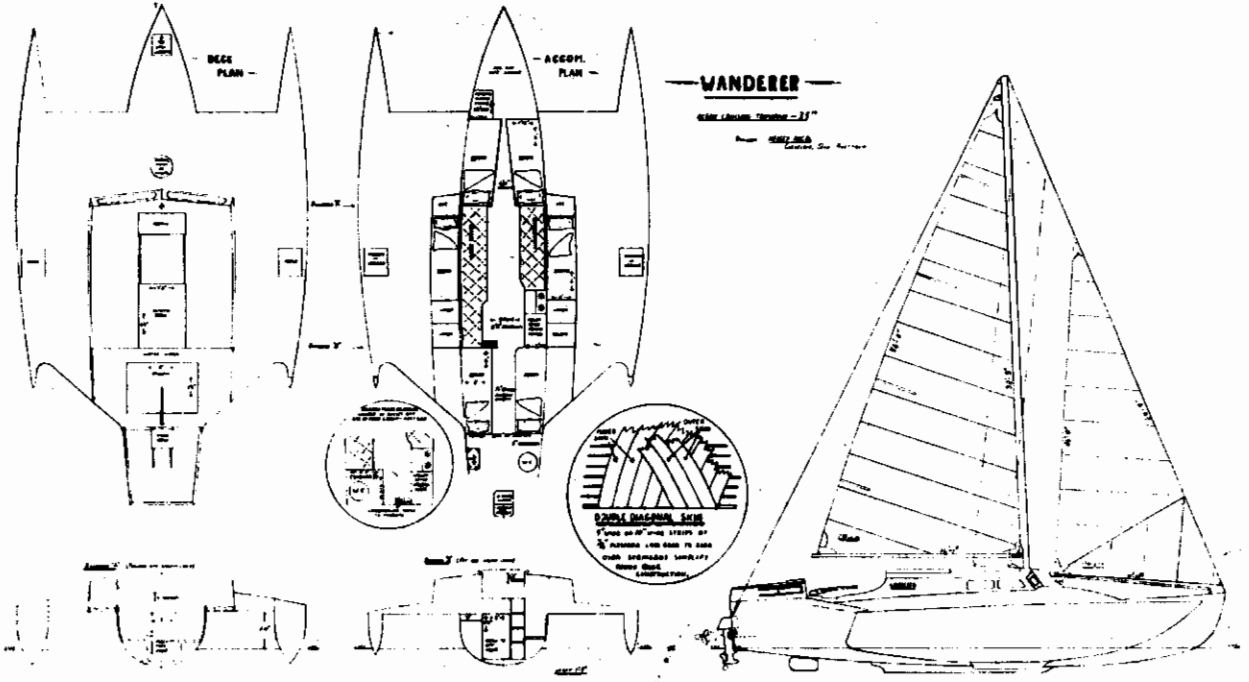
Simplicity is the keynote. No heavy machinery is needed. This design calls for none of the skills of the tradesman shipwright, so that no previous experience is required. The designer supplies full size patterns, by the use of which the builder marks out three sheet-plywood bulkheads and the stern or transom. These are set up to simple directions, bottom uppermost, and around them is wrapped the keel and stringers. The stem, constructed to the pattern shape supplied by glueing together five thin strips of oregon bent around blocks nailed to the floor, is then added. This completes the simple skeleton of the hull.

This skeleton is then clothed in the skin of double diagonal plywood strips. For this operation, 8′ x 3′ sheets of 3/16″ marine plywood are cut into strips 5″, 6″ or 7″ wide as desired. For this operation, a 'handyman' circular saw is desireable. The first strip is laid diagonally on the skeleton about midway between stem and stern, and glued to the keel and stringers at points of contact, and lightly nailed. The second strip is then laid alongside the first. It may be necessary to trim one edge slightly to allow it to fit snugly against the first strip. This strip is attached similarly to the first, and the process is continued till the whole skeleton is clothed in one skin. The first sheet of the second skin is then laid over the first skin at a diagonal in the opposite direction and it is fastened down to the first skin with glue and nails. To add further pressure to the glue joint, it is usual to supplement the nailing with staples between the stringers. There staples are driven in with the aid of a "Staple Gun" or "Tacker" which is a spring loaded adaption of the simple paper stapler, and which is obtainable from all packaging equipment companies for about £5. A recent development is the introduction of rustless stainless steel staples, thereby removing the necessity of removal of these staples.

The hull and floats are set up upon blocks and joined together by an immensely strong—yet simple—wing structure. This wing structure is designed to be added piece by piece, as per detailed instructions, and upon completion, the whole yacht is one stout unit. Decking is then added, and once again the protection of fibreglass is strongly recommended.

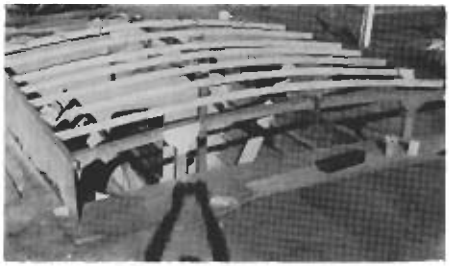
The use of light stringers and plywood in this design allows the whole unit to be light in weight, whilst provided with the fantastic strength of moulded compound curves. The designer has gone to great care to preserve the simple 'step by step' process, which completely eliminates all building 'headaches'.

Mr. Nicol's designs are the product of many years of study,



WANDERER

experiment and experience in multihull craft. He has spared no effort in perfecting his designs, and has undertaken a strenuous and expensive programme of practical testing to investigate the various problems involved. Every feature of his designs has been thoroughly tested under the most rigorous conditions to eliminate all possibility of mal-function. Tests have been varied from drifting 'mirror' calms to raging seas and blasting gales, and in the course of perfecting each feature, same has been subjected to excruciating punishment.



35ft. WANDERER under construction

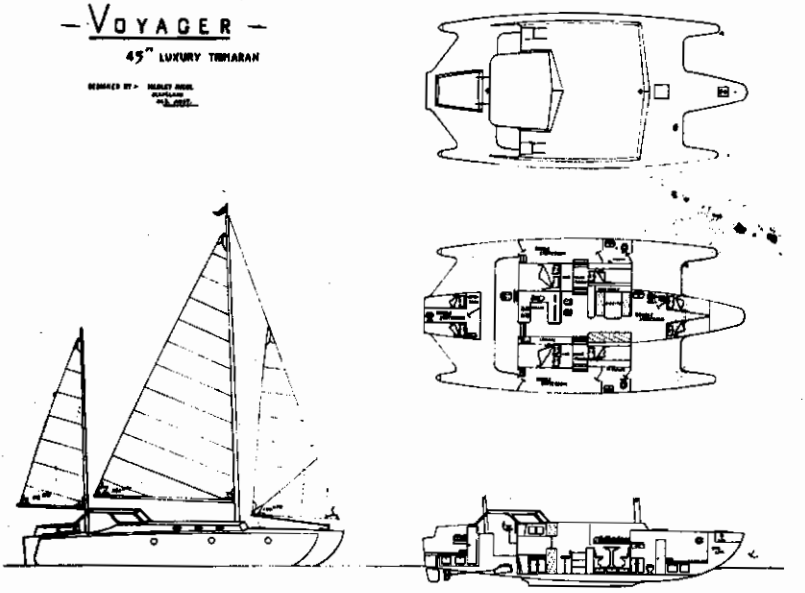
A swift mental calculation and you will realise the extremely low cost involved and the method of construction is such that materials can be purchased as and when required, so that construction can be commenced with very little cash on hand and continued out of 'pocket money' right through to conclusion.

Full plans and specifications, together with details, building instructions and helpful suggestions designed specially for inexperienced builders are available.

THE 25 FOOT *CLIPPER* AND 45 FOOT *VOYAGER*

Designer : Hedly Nicol, 43, Cambridge Pde., Manly, Queensland, Australia.

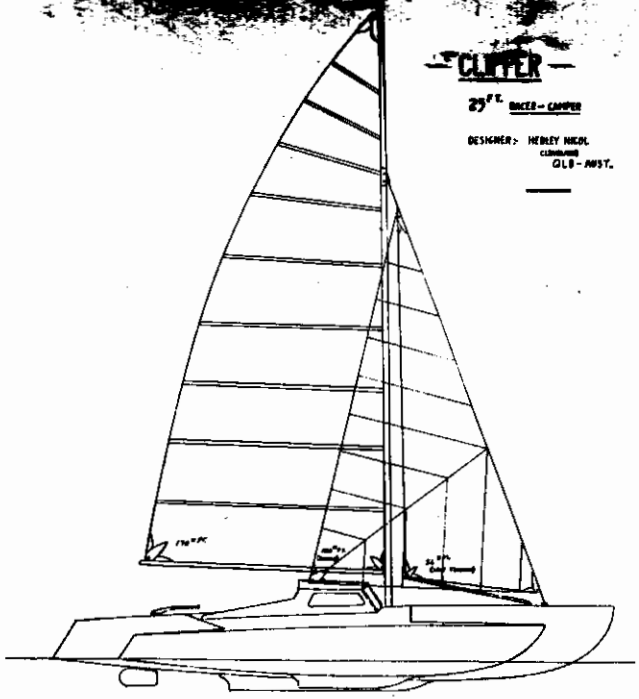
The two sheets of drawings show the general layout and design. The same hull shape and float design as *VAGABOND* are used but in the 25 foot *CLIPPER*, the hull is designed for less wetted surface. Again, the shallow rudders are placed far forward to keep them immersed in a seaway. Both have a better balance of the shapes of the three bows than *VAGABOND* or *WANDERER* which make them look more handsome.



The 25 foot *CLIPPER* looks as if it is designed for home building while the 45 foot *VOYAGER* is offered as three hulls for home completion, though this would be quite a job.

CLIPPER is advertised as a "Trailerable" Cruiser.

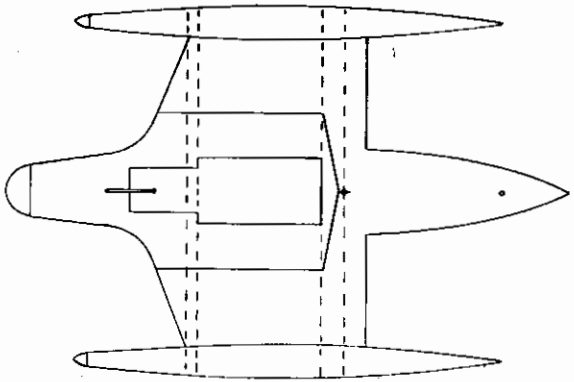
ISLANDER 2986" *CRUISER.* This is another of Hedly Nicol's designs but the drawings we have been sent are not suitable for publication. The design is similar to *WANDERER*, though slightly smaller.

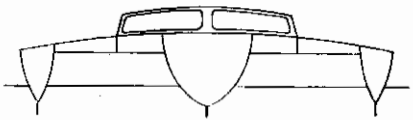


"CLIPPER"

25 FT. RACER – CAMPER

DESIGNER: HENRY HEAL
LISMORE
QLD – AUST.





PLANS for *CLIPPER* are £29 Aust. £24 Stlg. *ISLANDER* £39 Aust. £32 Stlg. *VOYAGER* £150 Aust. £125 Stlg. All are available from Hedly Nicol at Multi Hull Pty. Ltd., 43 Cambridge Pde., Manly, Queensland, Australia. This firm also sells plans of the Piver range of trimarans, those of Norman Cross and Lock Crowther.

THE CROWTHER RACING TRIMARANS

BY
LOCK CROWTHER
Barnsdale West, Victoria, Australia.

KRAKEN is the result to date of a series of four successive trimaran designs, each improving on the previous one with the ultimate aim of developing a safe and really fast ocean cruising and racing trimaran.

1959 *BUNYIP* is a two man, one trapeze boat 18′ x 10′ x 167 sq. ft. sail area, 90° hulls and floats and hydrofoil stabilisers through the floats.

Original BUNYIP (1959)

TRIO

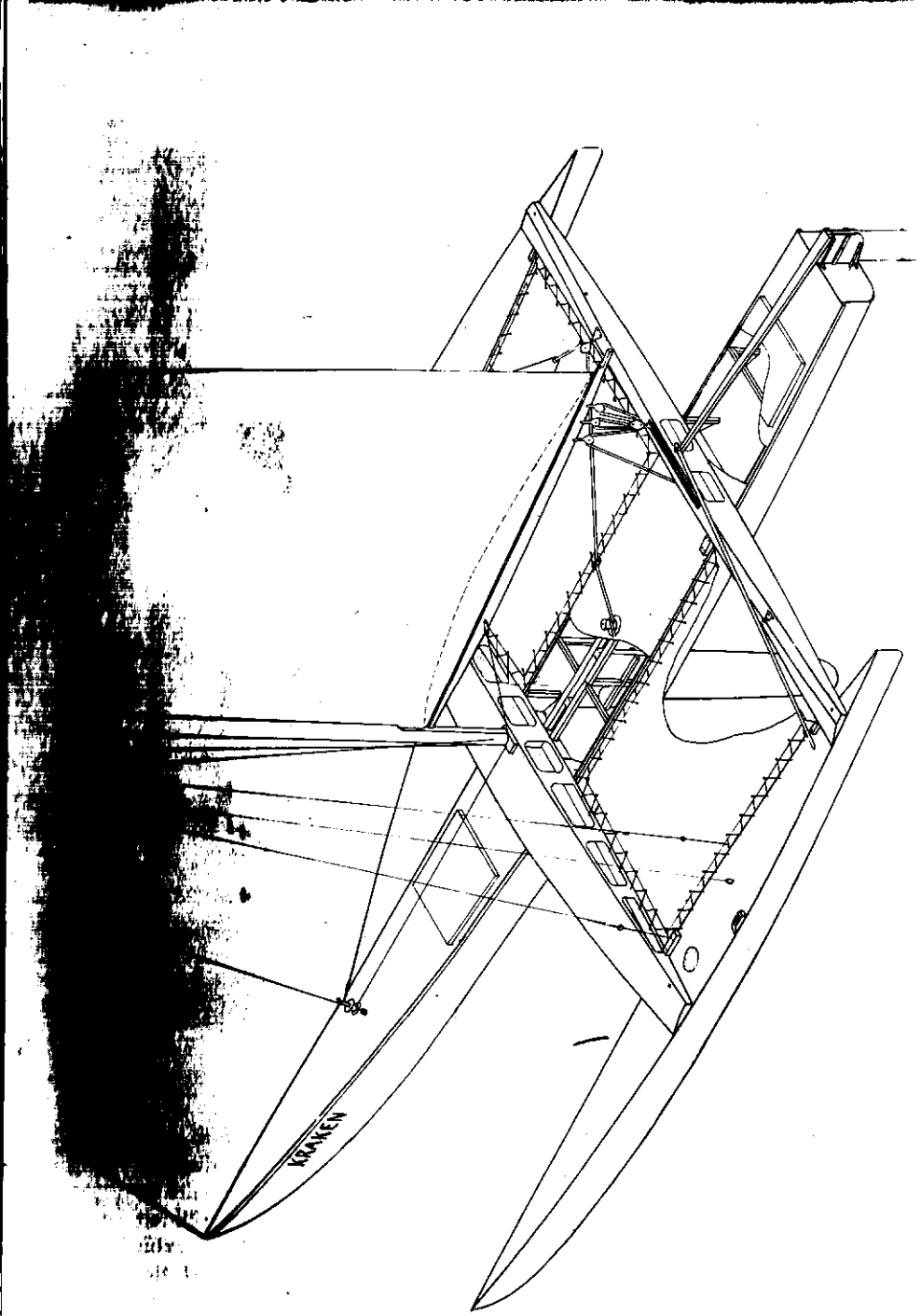
1962. *TRIO* is a two man, both on trapezes, boat 20′ x 12′ x 280 sq. ft. sail area, fibreglass *AUSTRAL* 20 catamaran hull, 60° floats and trampoline decks.

1962. *KRAKEN* is a two man, both on trapezes, boat 25′ x 14′ x 300 sq. ft. sail area, cold moulded plywood hull, 60° V floats and trampoline decks.

KRAKEN was inspired by the original *HELLCAT* C Class

KRAKEN Mark I

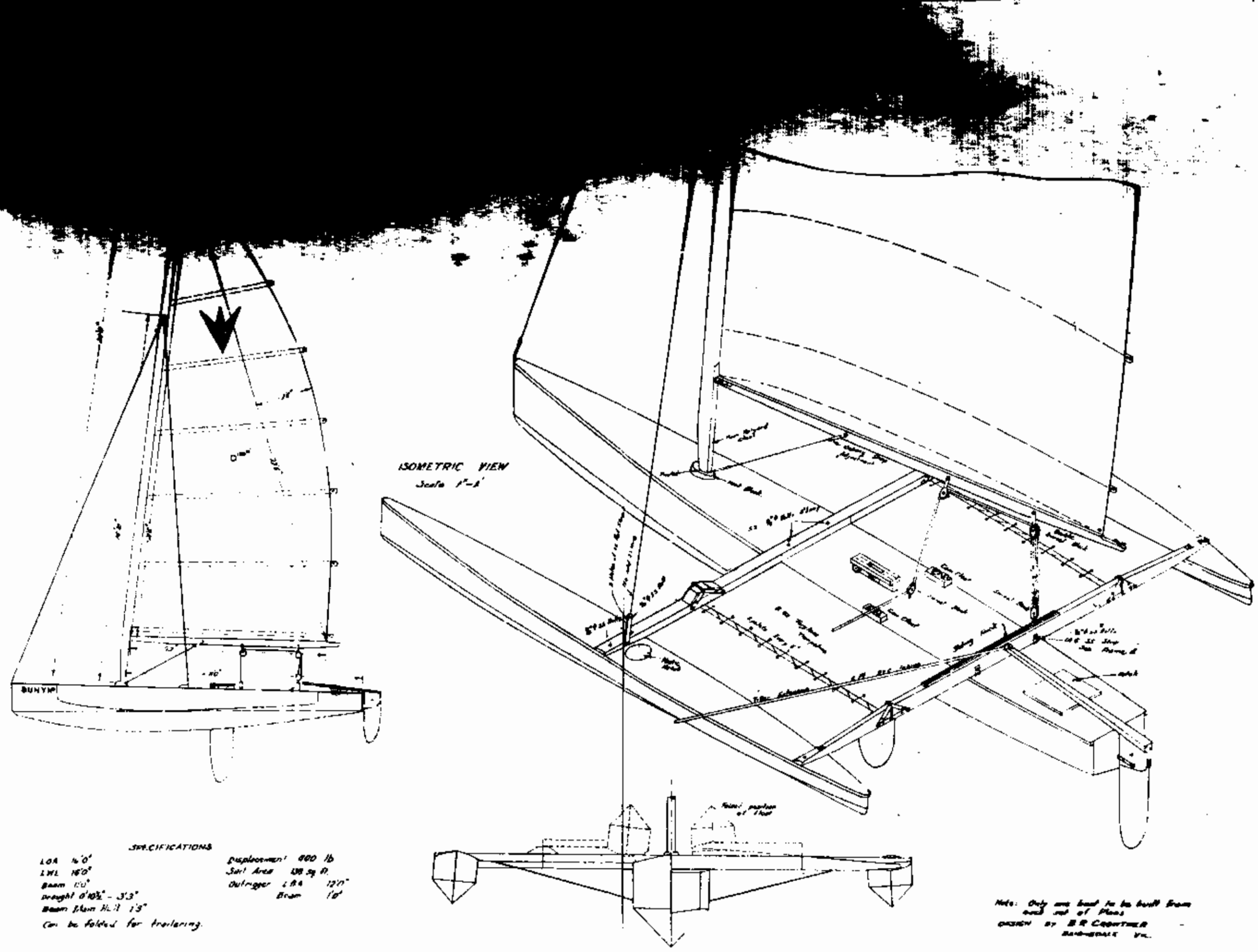
catamaran and was built to the same rules. *KRAKEN* proved to have an outstanding performance but it was felt that some improvement could be made to the floats and that the rear cross beams should be faired. The opportunity to do this was forced on us when we collided with a 60 foot cruiser (anchored) whilst gybing after a rudder gudgeon collapsed (fatigue failure). The locals thereupon re-christened the boat *BROKEN* not *KRAKEN*. Although we only grazed the cruiser


KRAKEN

JABBERWOCK—25ft. KRAKEN

with the bow of the windward outrigger, our speed of over 30 m.p.h. (estimated by bystanders) was sufficient to snap off the front half of the outrigger and split the rear crossbeam.

New moulded ply floats and a faired rear crossbeam were added to form *KRAKEN* Mk. II. She now has a much improved performance especially in strong winds and sails on a Portsmouth Yardstick figure of 55 at the Gippsland Lakes Y.C. We have had a few opportunities to


ISOMETRIC VIEW
Scale 1"-1'
BUNYIP
SPECIFICATIONS
LOA 16'0"
LWL 16'0"
Draught 0'10½" - 3'3"
Can be folded for trailering.
Displacement 900 lb
Sail Area 138 sq ft.
Outrigger LOA 12'11"
Beam 1'0"
Note: Only one boat to be built from each set of Plans
DESIGN BY B R CROWTHER
BAIRNSDALE Vic.

BUNYIP

race against C Class catamarans and, although in an untuned state due to lack of competition, we have managed to beat some, including *MATILDA*. We feel after racing our own C Class catamaran *NEMESIS* that *KRAKEN II* is potentially faster in light weather and is more fun to sail but the performance falls off slightly in rough seas compared with the catamaran. This is due to the drag of the cross beams in wave tops.

A few other *KRAKEN II*'s have been built, *JABBERWOCK* being the best to date. However, the demand for a smaller version was so great, *KRAKEN* 18 was designed on the same lines as the 25 footer. Several of these boats have been built and their performance appears to be almost as good as the larger boat and relatively better in rough seas. *KRAKEN* 18 has been adopted as a class by the Victorian Branch of the Trimaran Association of Australia.

Whilst cold moulding plywood hulls is simple, it is tedious and so we designed a sheet plywood chine version of the *KRAKEN* 18 known as *BUNYIP* 20. The first of these was launched recently and in its first race defeated the local champion (an *AUSTRAL* 20 catamaran) by 10 minutes in 1 hour.

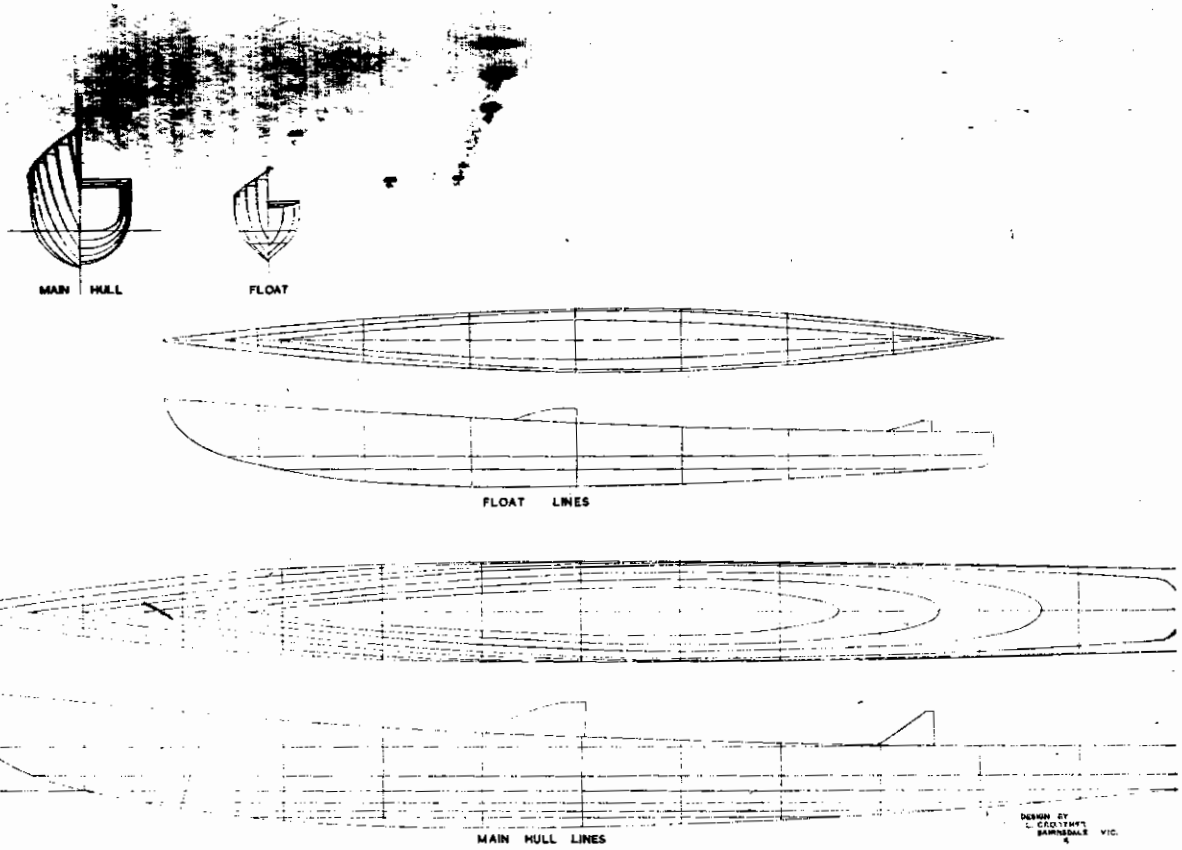
Comments on Trimaran Design.

1. Dynamic stability by means of planing floats or hydrofoils is not necessary. Displacement floats are better. Maximum stability is required when on the wind and close reaching. When on the wind, the boat travels relatively slowly and displacement floats have a higher L/D ratio. In addition, if the foils are made sufficiently large to work on the wind, they become unnecessarily large off the wind, where the crew can easily level the boat. The only direction in which dynamic stability does any good is close reaching. However, this is only a small percentage of the average racing course whereas windward distance through the water is usually 50% or greater of the total.

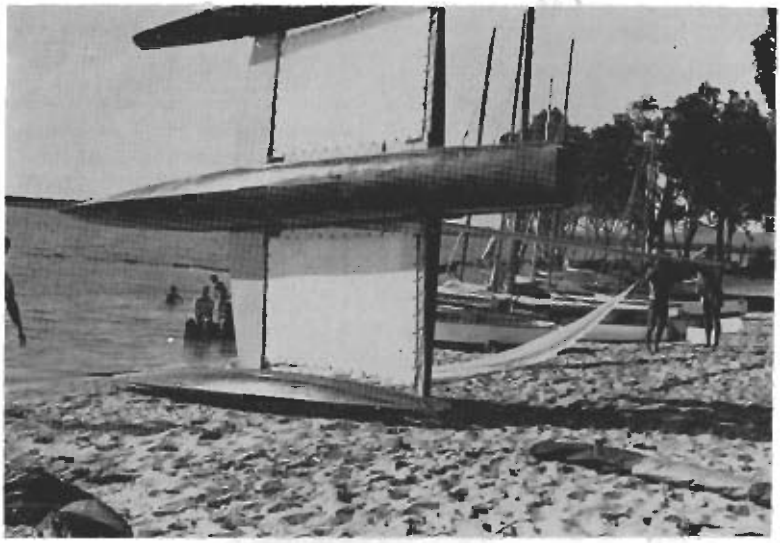
2. 60° V floats have a concentration of buoyancy close to the deck where it is least wanted as the cross beams are dragging in the wave tops before 1/3rd of the float buoyancy is used. *KRAKEN II* floats overcome this and in addition the canoe stern is much better than a transom for floats because of the wide range of depth of immersion.

3. As the floats have little fore and aft stability, the main hull has to provide this even when it is carrying almost no load, hence the wide flat stern. Flat sterns have an additional advantage that bow burying at speed is prevented by suction when the stern lifts.

4. The cross beam design has taken a lot of development. The depth of section and fairling have been made as fine as possible to reduce water and wind resistance. Water resistance on the cross



Lines and sections of KRAKEN



JABBERWOCK on her side

beams appears to be the biggest disadvantage of trimarans in rough water and hence our first ocean racing design being built in Sydney by Martin Cooper has the cross beams raised up off the decks of the floats. This boat should be launched this comming season and we are expecting a better performance than that of *KRAKEN* as it has a higher stability to weight ratio. This ocean racing trimaran is 33 feet long and 23 feet wide with accomodation for four in short distance cruising and offshore racing. It will be sloop rigged, have netting decks between the cross beams and be of moulded ply construction (two layers of 3/16 ply) with the mould frames and stringers left in the hulls.

Dear Sir,

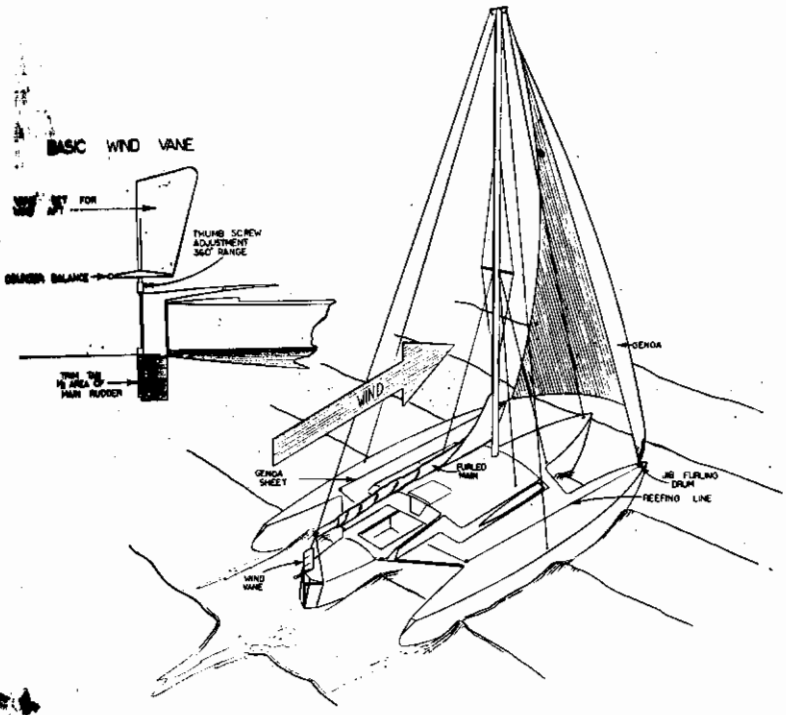
You might be interested in the enclosed drawing of our Trade-Wind rig—which will appear in my new Trimaran Third Book.

The combination of this rig—along with the Piver Trimaran —makes cruising in a conventional boat a deliberate seeking for discomfort and danger.

Regards,

ARTHUR PIVER.

P.O. Box 449 Mill Valley, California, U.S.A.



Arthur Piver's Trade-Wind rig

Dear Sir,

I had an 8 month round-trip tour (covering 11,000 miles) of Mexico, Marquesas, Tahiti & Iles sous le Vent' and Hawaii in *NIMBLE* No. 1. In all those miles, I hit no gales. Some of my passage times for the longer legs of the trip were :

Mazatlán, Mexico to Nuku Hiva, Marquesas	24 days
Nuku Hiva to Papeete, Tahiti	8 days
Bora Bora to Hilo, Hawaii	17 days
Honolulu to San Francisco	23 days

Based upon great-circle distances, port to port, this figures out to be 130 nautical miles per day. On the Honolulu to San Francisco run, we were forced to travel 2600 miles, an extra 500 miles, by unfavourable wind conditions. However, these same conditions helped the Transpac racers to set new records. You'll recall that Art Piver averaged 135 miles a day in this boat on his Atlantic crossing. Part of his

faster time may be explained by the greater working sail area that *NIMBLE* No. 1 had at that time.

In regard to *NIMBLE* No. 1's performance, I would like to go into a bit more detail to make sure that we are giving it a fair comparison to other cruising boats. So many different factors enter into the daily speed average that a comparison is difficult. First I should mention that there were only two persons aboard, and so self-steering was used when practical, especially at night and going upwind. The Genoa jib was almost always taken down at nightfall. The rather lightweight mainsail was reefed fairly early to ease strains on boat and helmsman. The best days, and there were quite a few of them, gave us 170 nautical miles of progress. The overall average for the longer legs of the trip—110 miles/day—resulted in part from weak Mexican coastal winds, two crossings of the doldrums, and tacking against light headwinds around the region of the North Pacific high pressure region. For the optimum comparison purposes, let me go into performance in the trade winds. Here the winds varied Force 2 to 5, were fairly constant in direction day after day, and the waves tended to be well developed so that surfing action was not of much importance. (Only fresh waves seem to give good surfing.)

Mazatlan to Nuku Hiva—115 miles/day average

NE Trades, Jan. 14-18, blowing from SE and ESE; boat heading SW; 4 day average: 145 mi./day

SE Trades, Jan. 26-Feb. 3, blowing from SE and NE; boat heading SW; 8 day average: 153 mi./day (aided by 10 mi/day current but reduced almost as much by 2 nights self-steering at half-speed under jib alone)

Bora Bora to Hilo—130 miles/day average

SE Trades, June 2-6, blowing E and ENE; boat heading N; 4 day average: 139 mi./day (adverse current 5-10 mi./day)

NE Trades, June 13-19, blowing from NE; boat heading NNW; 6 day average: 158 mi./day (aiding current 5-10 mi./day)

Correcting for currents, you'll notice that this comes out to be just a shade under 150 naut. mi./day. Being for typical trade wind conditions, it should not be too dificult to compare with monohull performance . . . You'll notice from the figures that upwind performance is as good as downwind performance. This happens because sail plan, mast profile, and a 5 sq. ft. centreboard all favour upwind performance. Also, *NIMBLE* No. 1 has a more slender main hull and "stiffer" floats than the standard *NIMBLE*.

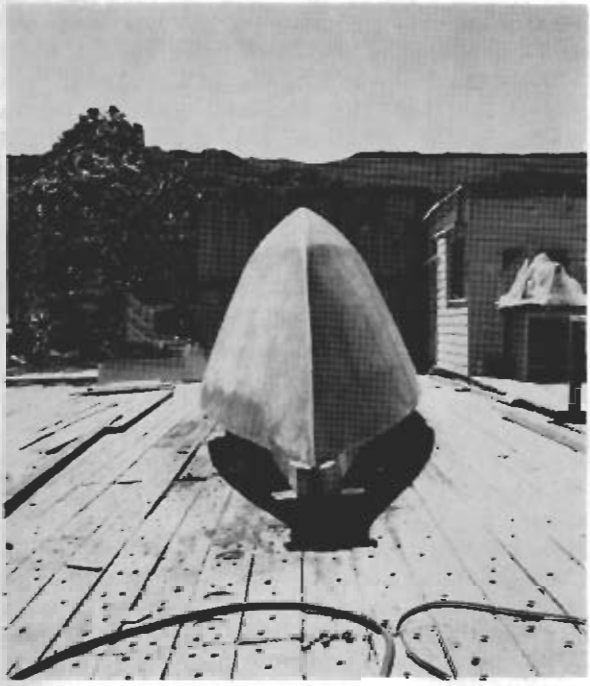
DAVID A. KEIPER.

95, Mistletoe Lane, Black Point, Novato, California 94947.

STILETTO

Length overall : 33 feet.
Designer: Arthur Piver, Box 449, Mill Valley, California.

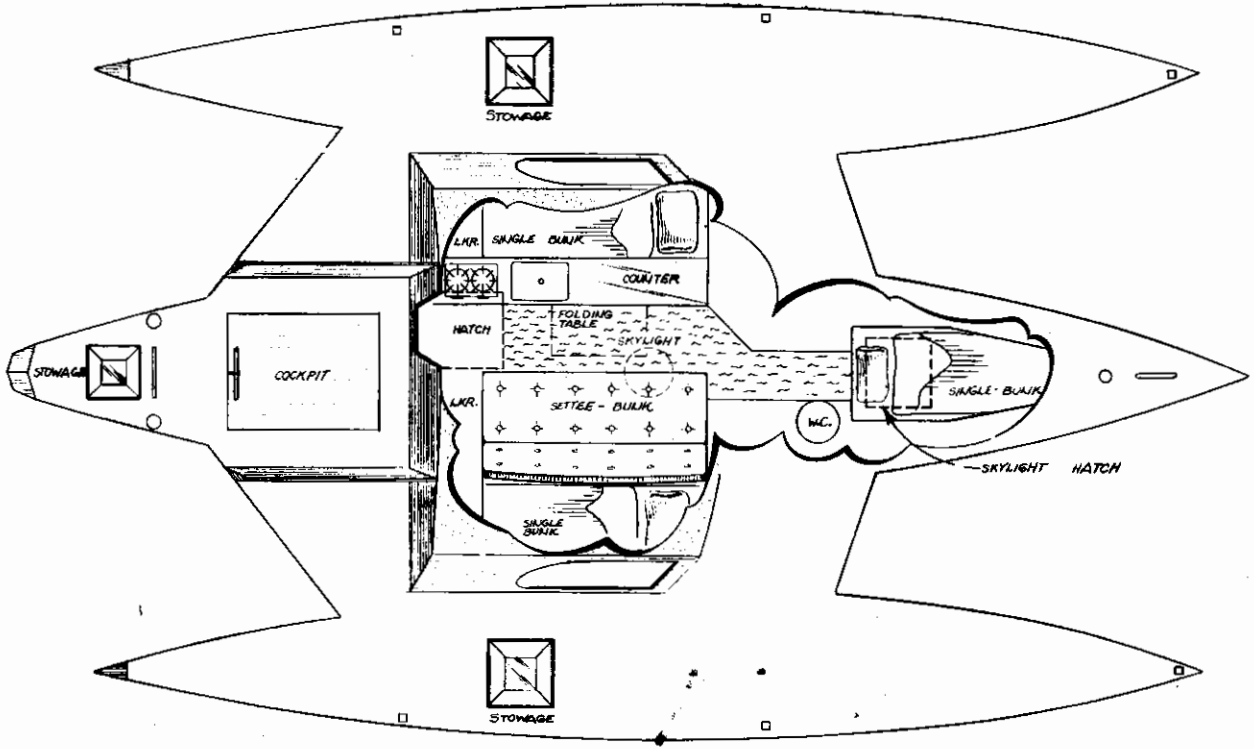
The plans and the cover photograph of this publication show the main layout of *STILETTO* which is described as an "Ocean Racing Trimaran".



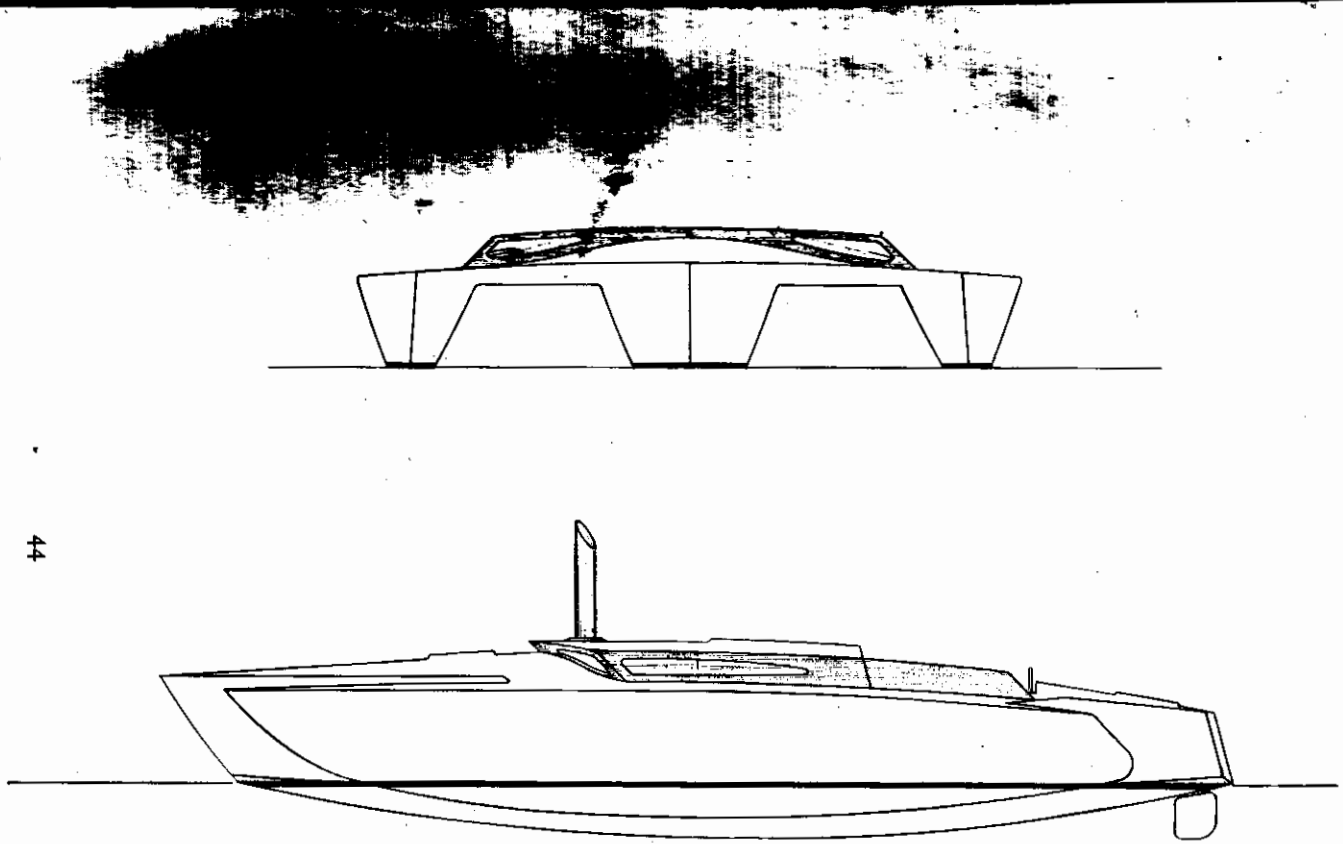
STILLETTO hull

Main Hull. This is of sheet plywood topsides and, below this, the bottom is a rounded shape though also made from sheet ply. The topsides and bottom fair into each other so well that only the least suspicion of a chine remains.

The Floats. Each float has double the buoyancy of the weight of the entire boat. Even so, they do not appear to lift the central hull when pressed. The lee float depresses more and more.


STOWAGE
L.K.R.
SINGLE BUNK
COUNTER
HATCH
FOLDING TABLE
SKYLIGHT
STOWAGE
COCKPIT
L.K.R.
SETTEE - BUNK
W.C.
SINGLE BUNK
SKYLIGHT
HATCH
SINGLE BUNK
STOWAGE

STILETTO



STILETTO

Summary. *STILETTO* is the prettiest trimaran I have yet seen, if not the prettiest yacht. She is obviously designed for maximum ocean speeds as a competitor for Dick Newick's *TRICE* and Hedly Nicol's *WANDERER.* Such competition can only do the trimaran design a whole lot of good.

AUXILIARY TRIMARAN *MATAMONA*

L.O.A. 40 ft. 9 ins.
L.W.L. 35 ft. 4 ins.
Hull Beam 11 ft. 3 ins.
Hull Beam at W.L. 6 ft. 0 ins.
Sail area 730 sq. ft.
Draft 2 ft. 6 ins.
Floats 31 ft. by 4 ft. beam
Beam Overall 28 ft. 0 ins. (17′ 0″)
Displacement 14,400 lbs.

MATAMONA (named from a Gilbert Islands goddess) was designed by John Westell of Honnor Marine Ltd., Totnes, Devon, and built by them for Commander L. G. Turner, R.N. (Retd.) of Dittisham Court, Dartmouth. Commander and Mrs Turner cruise with their four small daughters and the requirement was essentially for a spacious auxiliary cruising yacht which would sail fairly upright. That a multi-hulled yacht would have shallow draft and be capable of being beached easily was considered a valuable bonus. In a similar way, the fact that she would probably make faster passages than a conventional yacht was a useful bonus but speed was never a requirement of over-riding importance.

Designer and owner were both rather worried about the very large horizontal areas exposed to wind and wave action by the more usual type of multi-hulled craft and so it was decided at the beginning to depart from the accepted types of layout and work from a different concept. This was to have a central hull and rig making use of normal yacht practice in the main but, instead of gaining stability by hanging about five tons of lead underneath, to gain it by providing a pair of outrigger floats. It was thought that this would give several advantages such as reduced wind resistance when sailing and elimination of the possibility of damage from waves against the under surface of a "wing". There would be no tendency for the craft to lift due to wing effect, however hard the wind might blow.

Exploration of the various means of carrying the wing hulls soon raised the possibility of swinging arms which would permit them to fold back and inwards. The light all-up weight of the yacht also called for a very slim central hull with a small waterline beam and, to provide the needed internal space, it had to be flared out above the waterline.

MATAMONA

This meant that about half of the beam of the wing hull could be tucked underneath the flared topsides of the central hull and a very neat "variable geometry" configuration was arrived at, which allowed the extreme beam of 28ft. to be reduced to 17ft. in a few minutes. When the wing hulls are in the sailing position they are held rigidly in place by crossed wires tightened by rigging screws. In the harbour position the beams are secured fore-and-aft. It takes about five minutes to stow them or rig them outboard and this can be done at

rest or under power. Sailing with folded "wings" is not recommended, however.

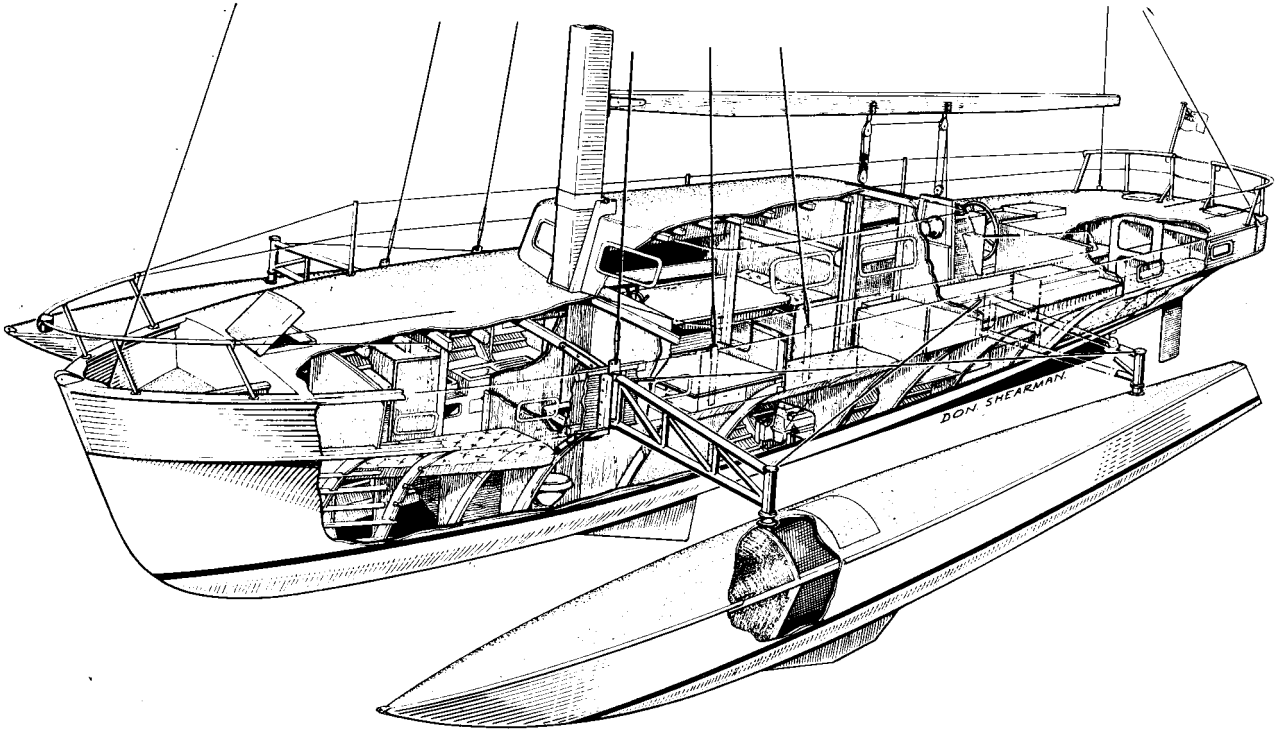
A further advantage of an unbalasted craft over a ballasted one is that the former can be made into an unsinkable life-raft without difficulty. Those who point to the theoretical possibility of the multihulled craft capsizing should bear in mind the, at least equal, possibility of the ballasted hull to sink if she should be holed or swamped. *MATAMONA* would float quite comfortably and remain stable even if fully swamped by reason of the expanded polystyrene foam which fills both ends of each wing hull, the bow and the under-cockpit space of the main hull.

From the start it was agreed that the auxiliary should be an inboard rather than an outboard and a 1500 c.c. Ford petrol engine, fully marinized by PNP-Duerr Ltd. of Burnham-on-Crouch and fitted with one of their feathering/reversing propellers, was chosen as being adequately powerful, light and not too expensive. The direct-coupled, rather small propeller would not be highly efficient under power but could be expected to do all that was required without appreciably affecting the sailing performance.

Although the two wing hulls had to be given short fins in order that the yacht would lie upright when aground, a centreplate was fitted to the centre hull to ensure good windward performance. This does not get in the way of the accommodation at all and is wound up by a winch from the cockpit. The rudder was drawn deep and narrow, going well below the keel to ensure good control in a seaway, and it has a lifting metal blade in a plywood and steel stock. Steering is normally from a large wheel in the centre of the cockpit but a second position at the fore end of the saloon can be clutched in. It is mostly useful for steering under power but has also proved fine for sailing in the rain in lightish breezes.

Only six permanent berths were called for and the resulting layout is very spacious. Forward there is a two-berth cabin with drawers, a hanging locker, and sail stowage. Abaft there is a lavatory compartment to port with w.c. and wash-basin—large enough to be used with the door shut ! Abreast this and extending aft into the saloon but at a lower level, is the galley, fitted with a Junior Star calor gas cooker, sink, draining board and ample stowage for food and crockery.

The most interesting feature of the saloon is the raised dining area with seats on three sides of a large fixed table. Sitting here, one can see all round through the windows in the sides and front of the house. It is very pleasant both at sea and in port and entirely eliminates the slightly claustrophobic feel of many conventional yachts. The saloon has a settee berth each side. A wine locker is fitted forward to



MATAMONA

port and the chart table is just inside the door on the port side. Here are to be found Brookes and Gatehouse radio/direction finding, echo sounding and log/speedometer instruments, together with chart stowage and other lockers. An oilskin locker is fitted inside the door to starboard. Beneath the sole and under the settees are enormous lockers, while the engine is readily accessible by lifting the sole immediately inside the cabin door.

Two levels in the cock-pit provide deep, sheltered corners forward on each side and a raised platform for the helmsman, who normally sits on the afterdeck. Dominating the cockpit is a central pylon which serves several purposes. On its after side and conveniently placed for the helmsman are the throttle and pitch controls of the power unit, together with a 6 in. Constellation compass. The after slide of the mainsheet traverses a raised length of track while its fall passes down the aft side of the track and leads through the bottom to a winch on the forward face. Also on the forward face is a massive geared sheet winch set with its axis horizontal. The jib sheets are led to it from either side and it has proved a very good arrangement to allow two men to exert the strength required to flatten a 550 sq. ft. genoa in a 20 knot wind.

Beneath the helmsman is a sail locker and abaft that a comfortable cabin with upper and lower berths to port, wash basin and dressing table to starboard and a large hanging locker right aft. The structural transom forms the after bulkhead of this cabin but the deck is carried some 16 in. further aft to form an overhanging space which houses the steering quadrant and protects the transom-hung lifting rudder. Further protection for the rudder is afforded by the stout tubular steel boarding ladder which gives access from a dinghy to the after deck. At sea an inflatable dinghy is carried on the after deck, by no means occupying all the space.

Forward of the mast is a large area of entirely unencumbered deck and forward of that a well-deck with stowage for the anchor to starboard and its chain warp in a box to port. A single roller is recessed into the stemhead, with fairleads on either side. No anchor winch is fitted but the warp can be led aft to the jib sheet winch via snatch blocks if man power should prove inadequate to get the anchor.

Performance :

Before deciding on the final arrangement of the design—relationship of wing hulls to main hull, position of centreboard, wing hull fins and sail plan—some very useful trials were carried out with a one-tenth scale sailing model. Various things were altered and adjusted during these trials until the model performed satisfactorily and there is

no doubt that without such a means of arriving at a balance of so many forces the result in the full size could not have been anything like as good.

Two characteristics shown by the model were very encouraging. It had been felt that one of the unpleasant tendencies about a trimaran arrangement might be that, if a gust of wind caused increased heeling the lee hull would dig in deeper and cause a tendency to bear away. If this happened it could be dangerous and so when it was found that the model behaved just like most conventional yachts and automatically luffed into severe squalls, this was a source of much relief. The other thing which gave pleasure was the undoubted manoeuvrability of the model, which, if the helm was lashed slightly to leeward, would tack and gybe continuously in circles until further notice.

Both these model predictions have been borne out in the full scale. In practice the stability is so great that the lee hull never tends to bury. Rather, when a squall hits, there is a slight increase of heel and she accelerates. The helm remains light, with only a slight tendency to luff up. Manoeuvrability is very good indeed under power or sail and in light to moderate winds with smooth water *MATAMONA* can be tacked under jib only. In fresh winds and a rough sea she loses way quickly and has to be tacked very firmly, like any other lightweight sailing craft. However, there is never any doubt about her coming through the wind.

Her best speeds in winds up to about fifteen knots are made with the true wind about abeam and the apparent wind well forward of the beam. On this course, up to about 8 knots, speed through the water is about equal to the true wind speed and this means that the apparent wind is about 45 degrees off the bow. Hardening in the sheets and coming close hauled means a drop in speed but the speed through the water is still high in comparison with the true wind speed and so she does not point so high as a slower craft. The optimum course for windward work in lightish breezes seems to be about 50 degrees off the wind.

Of course, as the wind increases the boat speed does not increase in proportion and at the time of writing the best speed obtained has been 13 knots in a wind estimated to be about 20 knots and slightly abaft the beam. At this time the limit of stability had nowhere near been reached and it is clear that speeds in excess of 15 knots are possible. What is more to the point is that speeds of 9, 10 and 11 knots are quite often reached in moderate conditions, while a speed of 8 to 9 knots is often averaged over a considerable distance. This opens up the cruising range. It means, for instance, that the owner can take his family aboard in the Dart after tea, put them to bed at the proper time,

and when they wake up they are in the Channel Islands or somewhere on the coast of Brittany—given a normal sort of westerly wind. In their old yacht such a passage took 24 hours and a whole day spent with everything inclined 20 or 30 degrees and spray flying all over the decks, is terribly tedious for a six-year old.

Not a few people predicted that *MATAMONA*'s separated wing hulls would prove to be wrong because they would send spray flying over the cockpit whenever the wind was before the beam. The fact is that she has proved unexpectedly dry and only when she is being driven very hard into a steep sea does any spray at all come aboard. This is intriguing as well as gratifying, the explanation seems to be that the wind sweeps over the turtle backed windward hull and is diverted downwards and aft by the flare of the main hull, carrying the spray with it. However, this may be, she is undoubtedly dry and stable. When a 30ft. launch carrying a photographer was tossing spray all over him and causing him to hang on tightly, the crew of *MATAMONA*, also making 9 knots, were walking about the decks unconcernedly and needing no oilskins at all. Motion when driving at about 8 knots into a typical Channel sea caused by a Force 4 wind is quick and irregular but anything but violent. A bottle or glass will stay on the cabin table.

Under power, with the deep, narrow rudder set in the slipstream of the propeller, *MATAMONA* will turn very sharp round if the helm is put hard over. At slow speeds and with the wind abeam, she handles best with the centreboard lowered to give her something to pivot on. She can be steered without difficulty when going astern and is generally docile in all conditions. The variable pitch propeller, worked by a hand lever near the helmsman through a hydraulic circuit, gives perfect control when picking up moorings or coming alongside and the fine variation in pitch which is possible makes for economy and efficiency under the varying conditions of motor-sailing.

At full power the maximum speed achieved is a shade under 8 knots. She settles down to comfortable and economic cruising under power at about 6 to 6½ knots. When in a hurry to make a quick passage, the engine barely more than ticking over with the propeller in fairly coarse pitch, makes a tremendous difference to windward performance in light breezes. This is genuine motor-sailing—twice as fast as under sail alone and twice as comfortable as under power alone.

The various speeds quoted above are genuine. Water speed is measured by a Brookes & Gatehouse "Harrier" log and speedometer and the distance run indicated by this instrument agrees very closely with that of a Walker log towed from the stern. The wind speeds have been checked frequently with a high quality cup anemometer which is part of the yacht's equipment. Both instruments have served

to check and modify the sometimes enthusiastic estimations of the crew and there have been occasions when *MATAMONA* with 8 or 9 knots on the "speedo" has swept bravely past a motor launch whose speed, estimated by her owner, has been 12 or 15 knots.

GOONRAKER—A SINGLE OUTRIGGER CANOE

Main Hull L.O.A. 15 ft.	Float L.O.A. 9ft.
Main Hull Beam 2 ft. 9 in.	Float Beam 6 in.
Main Hull Draught 5 in.	Float Depth 9 in.
Draught, Board down 1 ft. 10 in.	Beam O.A. 7 ft. 10 in.
Sail Area 65 sq. ft.	Total Weight Rigged 150 lb. appx.

Designed and built (mainly) by Don Rigg, 5, Wilmot Avenue, Great Sankey, Warrington, Lancs.

GOONRAKER was originally a P.B.K.20 rigid canvas covered canoe built from a kit and with sailing gear as recommended on the designer's drawings. The boat was built in and around a flat in Derby which the writer was sharing with three other Engineering Graduate Apprentices in the summer of 1958. The B.B.C. Goon Show (full of strange characters and contraptions) was then exerting a strong influence and the name *GOONRAKER* was bestowed by popular acclaim.

Much modification of the sailing gear was required before it could be said to be sailing, this not being hastened by the fact that neither of the co-owners had ever been in a sailing-boat before ! However, by the following summer, *GOONRAKER* was just about making headway to windward under three sails awfully set on main and mizzen masts at each end of the cockpit.

It was about this time that the writer became sole owner of the boat and, during an abortive attempt to sail on Hickling Broad, first saw catamarans sailing. This led to the purchase of several A.Y.R.S. publications including No. 23—Outriggers 1958—containing a description of *ISLANDER*, an American single outrigger.

The conversion to an outrigger was made in the spring of 1960. Masonite, (oil-tempered hardboard) was used for the float as it was felt that the experiment might not be successful and expense should be kept to a minimum. The float was designed to stow inside the canoe hull, which accounts for the rather boxy shape, The length of 9 ft. was fixed by the length of the Masonite, and the size and shape of the cross-section was limited by the size of the holes in the frames at the ends of the cockpit. It was expected that the float would last long enough to decide what modifications to the shape would be required and then

GOONRAKER—Don Rigg

a better one could be made of marine ply or glassfibre. The new float has not yet appeared but should definitely be built for next season !

The cross-beams, of open girder form, were made from 2" by ½" ramin. They were laid across the cockpit coaming about 30" apart and secured by ¼" hook-bolts and wing-nuts. The bolts passed right through the beams and gripped the lower edge of the coaming. To strengthen the hull for this purpose four 2" by ½" mahogany struts were added between the coaming and the bottom stringers, one adjacent to each hook-bolt position. The three corners of the coaming were fitted with reinforcing gussets. The float was also attached by hook-bolts, the idea being that, in the event of a knock, movement could take place without breaking or bending anything.

A pivoted "centre" board was hung from a stout fore-and-aft member running between the cross-beams on the float side, just clear of the hull. Slatted seats were fitted between the cross-beams for the crew and diagonally from the rear of the cockpit coaming to the rear cross-beam for the helmsman. The outer edges of the crew's seats were about 6" outboard of the gunwales and the inner edges just outboard of the coaming. Twin push-pull tillers were fitted to a transverse arm mounted on the rudder stock.

Sailing was much improved mainly because of the confidence given by the extra stability and it was decided to continue development further. The modifications are summarised under headings.

Rig. A Bermudan sloop rig of 65 sq. ft. total area was home-made from cotton tent-cloth and the $1\frac{3}{4}$" sq. solid spruce mast was stepped on the forward cross-beam.

Cross-Beams. It was found necessary to box in the forward cross-beam to take the mast thrust and this spoilt the fitting of the seats so the cross-beams were replaced by solid lengths of builders 3" by 2" deal, and the seats by solid 10" by 1" planks bolted on top of the cross-beams. The shrouds were attached to the outer edges of the seats.

Hull. At the greater speeds now achieved severe "squatting" occurred—the whole after-part of the hull submerged and a foot or so of the keel was out of the water at the bow. This was completely cured by fitting a plywood transom to widen the stern without reducing the length. 6" was the maximum width that could be accommodated by the existing canvas skin. The last frame, about 18" from the stern, was not disturbed but the sloping stern-post was removed and the vertical transom fitted in its place. The reduction in length was only about 1" at the keel. As well as widening the last 18" of the hull the opportunity was taken to curve up the line of the keel over this length and the base of the transom ended up $2\frac{1}{2}$" above the original keel line. The keel profile was originally straight for the whole length and the small amount of rocker now added produced a surprising improvement in rudder response.

Another result of the increase of speed was that the "centre" board began to scoop large quantities of water into the cockpit. It was desirable to keep the main hull suitable for paddling as a canoe so a dagger-board could not be put through the centre of the cockpit. Instead, the case was built through the side-decking outside the cockpit on the outrigger side, and the seat on that side moved outboard slightly to enable the board to be inserted and withdrawn.

All the hull modifications were carried out without removing the skin which is the original 7 year-old canvas, so far undamaged.

Sailing performance is now considered very satisfactory. There is little difference in handling on either tack but the writer prefers having the float to windward, when it is easier to keep the float running along the surface with only the vee-bottom immersed. The boat has a characteristic feel when in this condition, even in roughish water, and it is immediately apparent from this if the float lifts off or is over-depressed. Flying the float is no advantage, in fact it is difficult to

achieve for any distance as the response to rudder is not quick enough to spill wind, and heel has to be controlled by playing the main-sheet.

GOONRAKER is not particularly fast but, considering its sail area, the speed is reasonable and, with two aboard, it has beaten a Mirror dinghy round a triangular course. In normal conditions it can sail with three adults or, more often, with the writer and family of wife and two small boys. Where the single outrigger scores heavily is in ease of transport and storage and low cost. The total cost of the materials in *GOONRAKER* is about £26 and it is stored in a 19 ft by 8 ft. garage which it shares with a Dormobile van. The three main components—cross-beam and seat assembly, float, and hull—are easily lifted separately on to the roof of the van for transport.

The present ratio of sail area to stability is about right. More stability could easily be obtained by a larger float and extension of the seats outboard. Increase of sail area, however, would increase the side-load on the dagger-board case and extra stiffening would be needed in the hull.

Comparison with TABUARIKI (*A.Y.R.S.* No. 51).

It was interesting to compare *GOONRAKER* with *TABUARIKI* at Weir Wood last October.

1. When both boats were sailed single-handed *TABUARIKI* was faster and sailed closer to the wind, but with two aboard the performance was very similar. In the conditions at Weir Wood (gusty, Force 3 to 4) *GOONRAKER* required a crew to keep the float down and was something of a handful sailed solo.

2. *GOONRAKER* is longer and beamier which partly accounts for less reduction of speed with added weight.

3. *GOONRAKER* was much easier to put about mainly because of its sloop rig (backing the jib). In non-gusty conditions it will come about on main alone but both boats suffer from lack of rocker.

4. Push-pull tillers are easier to handle than the conventional tiller and extension in this type of boat. (The forward ends are threaded through rope loops on the cross-beam so they do not get "lost".)

5. *GOONRAKER* has far less alteration to the basic canoe structure, is somewhat lighter overall, and its main hull must be considerably lighter. As a paddling canoe *GOONRAKER* still handles easily. *TABUARIKI* may be rather heavy for easy paddling.

6. *TABUARIKI* is a much nicer-looking boat !

MANUREVA—1965

BY

A. JEFFREY

101, Milngavie Road, Bearsden, Glasgow.

As mentioned in my article in the April 1965 issue of the A.Y.R.S. publication (No. 51), I decided at the end of the 1964 sailing season that the original floats were too small and incorrectly shaped for anything other than smooth water and an agile crew. I also wished to provide more space for movement on board and thus I carried out the following modifications :

1. Two new floats were constructed as shewn in the attached drawing, with a total load carrying capacity (decks awash) of 800 lbs, a length of 16 ft. and a waterline beam of 10 inches, all constructed from 6 mm ply to BS 1088.

2. The area between the main hull and the floats were decked in for a distance of 8 ft. (fore and aft) with 6 mm ply.

3. The floats were given a "toe-in" of 2½ degrees with a view to decreasing the leeway drift. The total side area of a float full immersed being 20 ft. 2 in.

The disadvantages of the above relative to the previous layout were :

(a) Heavier by approx. 300 lbs.

(b) Decked portion between floats and hull tended to collect water in very heavy weather (lee side only).

(c) Decked portion tended to catch wind on windward side to a very small extent (never an embarrassment).

(d) Still insufficient lateral area to satisfactorily counteract leeway.

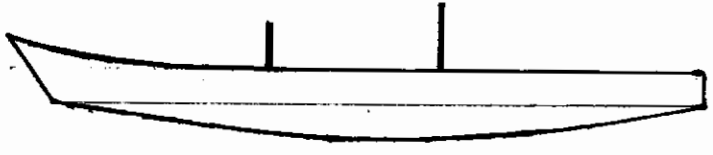
(e) Cross beams had to be considerably strengthened.

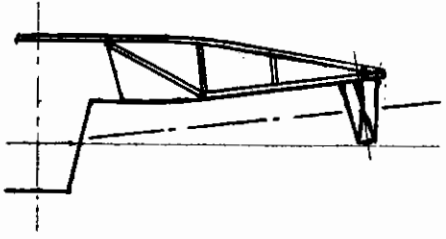
The advantages were many and the whole concept of the craft was changed as follows :

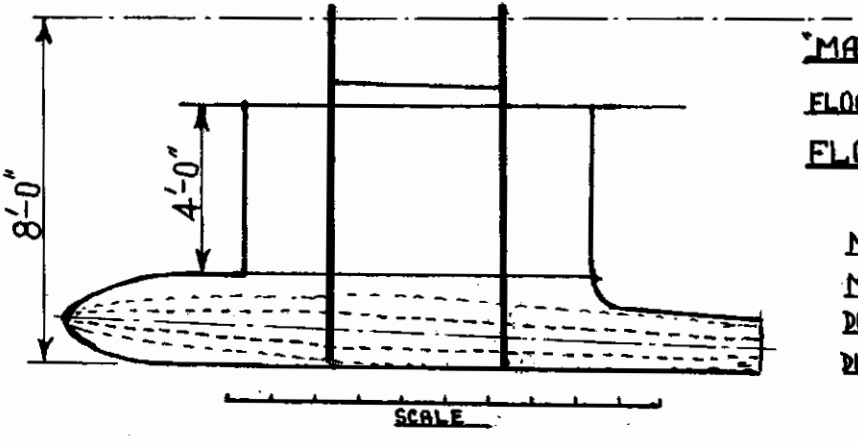
(a) Stability in heavier weather (up to force 5) was very good and on one occasion when returning to moorings in a force 7 squall under full sail we jibbed successfully (but not without some "heart in mouth" moments) (3 adults 2 children).

(b) The added convenience of movement onto decks and floats had to be experienced to be appreciated, for example, while on the first sail of the season two children (aged 7 and 5) moved about from lee float to hull with no apparent concern. The ability to transfer from dinghy to float is also a great advantage and much appreciated by all concerned.

MANUREVA







"MANUREVA" 1965

FLOAT AND DECK LAYOUT

FLOAT L.W.L. 15 FT.

L.O.A. 16 FT.

MAX BEAM W.L. 10 INCHES.

MAX BEAM BOTTOM 5 INCHES

DISPLACEMENT TO W.L. 300 LBS

DISPLACEMENT TO DECK 800 LBS.

(c) The design of the overhung deck lifted towards the bow on the main hull and on the floats has contributed very much to the sea kindliness of the whole layout (I nearly said contraption) and in my opinion is superior to the spray deflectors found just above W.L. on most cats as it keeps well out of the spray when sailing "light" yet is very powerful when a float is depressed whether by wind acting through the sails or by the action of the waves. I cannot recall any occasion when a float was washed fore and aft by a wave along the deck.

The unkind sailing weather we had in Scotland during the latter part of the season did not permit me to carry out other tests but now at the end of the 1965 season I have decided that I will try a new layout for *MANUREVA* by converting her from a Trimaran to a Catamaran on the lines of the Micronesian layout with the second float slightly shorter than the main hull and with the float lying to windward and leeward as one changes tack. I feel that this layout should be more suitable for the conditions prevalent where I sail and I also wish to experiment with various methods of counteracting leeway, when closehauled.

I was fortunate while on holiday in North Wales when I was able to meet two members of the A.Y.R.S. One member from Altrincham transported his wife, family and Catamaran to Criccieth where an enjoyable discussion and a good sail were experienced. The other member was at work in Port Maddock where again an interesting but unfortunately protracted discussion took place.

I hope that this resumé of the past year has been of interest and I shall be glad to hear from any A.Y.R.S. member interested in my experiments or up in this "Northerly Outpost" on holiday or on business and having an hour or so at their disposal.

THE CROSS 24

Dear John,

Enclosed is a photograph and drawings of the latest model of my Cross 24. A few changes were made, namely :

1. Chined floats replace the deep veed type.
2. Wider, flatter transom.
3. Reverse sheer.
4. Flush deck.

The improvements are noticeable when the old and the new are sailed together. The new boat does not heel as much, especially when close hauled. This results in it being faster than the old boat and the transition through the hull speed range is much smoother and the hump is less noticeable.

A Mr. Hibbard and his son built this trimaran in less than five

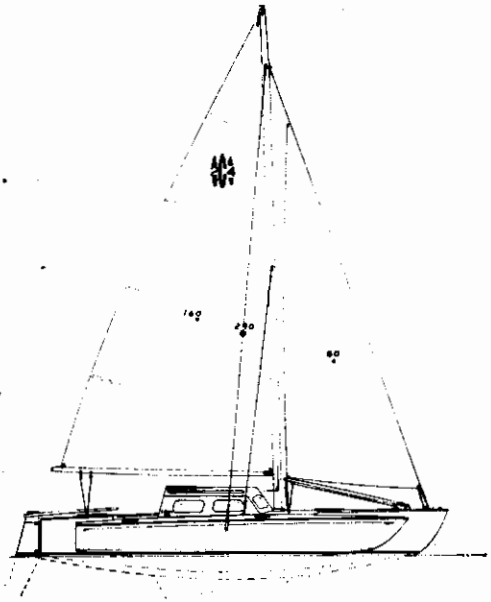
CROSS 24

months from the time he received the drawings to launching date. They worked hard, evenings and weekends. The boat sails beautifully. A slightly larger jib was added.

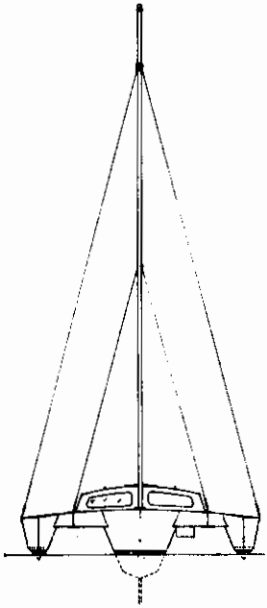
I also enclose drawings of my new Cross 26 and the redesigned Cross 30 which has now 6 feet of headroom and a slightly longer main cabin.

NORMAN CROSS.

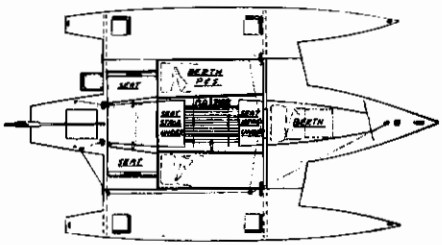
4326 Ashton, San Diego 10, California.



SIDE VIEW

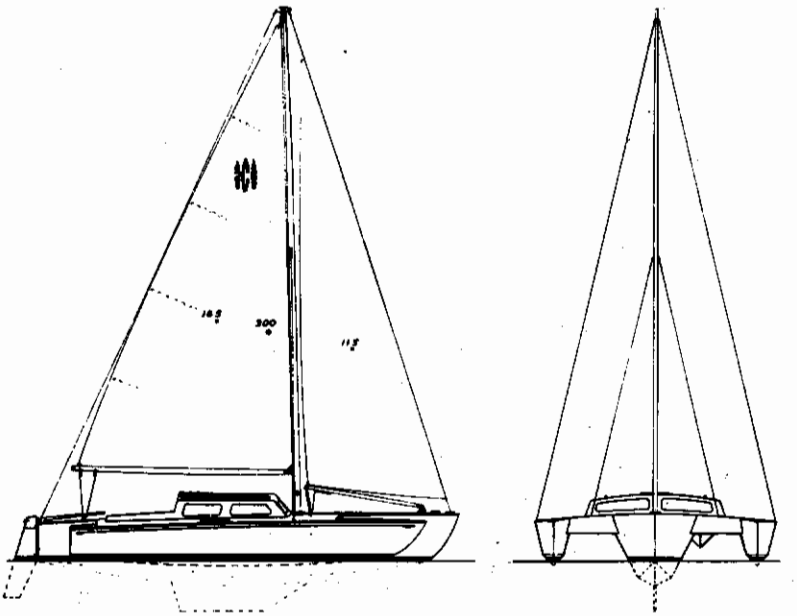


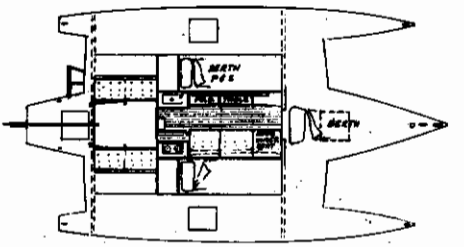
FRONT VIEW



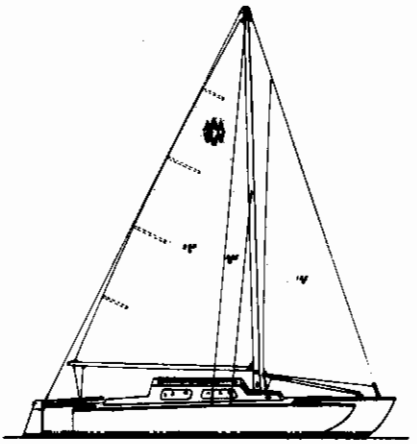
PLAN VIEW

CROSS 24

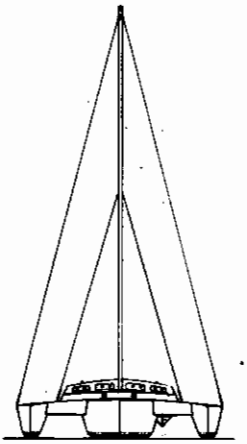




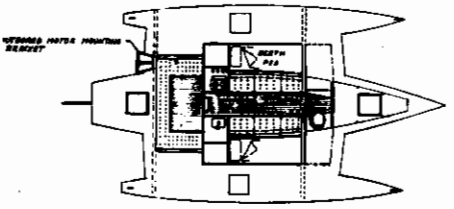
CROSS 26



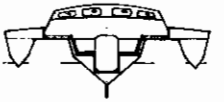
SIDE PROFILE



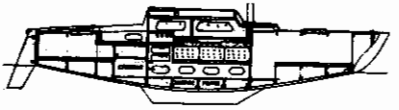
FRONT PROFILE



PLAN VIEW - GENERAL ARRANGEMENT



VIEW THRU MAIN CABIN - LOOKING FWD



SIDE VIEW - GENERAL ARRANGEMENT

CROSS 30 Plans

THE HIGH PERFORMANCE TRIMARAN

BY
JOSEPH C. DOBLER, N.A.
801, Eight Street, Manhattan Beach, California.

Conventional sailboats have a speed limitation, commonly called ***Hull Speed***, which is somewhat dependent on length, weight and shape, and which sets an effective upper limit of speed possible under sail. This is the result of wave-making by the boat as it pushes the water aside in its forward movement. Hull speed may be increased to a certain extent by making the boat light and long and slender, but the limit, though a little higher, is still there.

Below its hull speed, the conventional or *Displacement Boat* is very easily driven. The Indian canoe is an excellent example of a fine lined displacement boat. It is famous for ease of propulsion at low speed.

Single hulled sailboats have shapes which are largely determined by their need for stability to enable them to stand up to the heeling force of their sails. The result is a relatively full bodied hull with pronounced wave-making tendencies. Such a boat of, say, 25 feet waterline length will go about 8 m.p.h. at best.

The catamaran gets its stability in another way, so each of its two hulls can be made even finer than the canoe. It must be designed for good performance in light winds as well as strong, however, and the limit due to wave-making though higher, is still there.

The trimaran combines a single fine hull, to carry the load, with a smaller hull on each side to provide the stability. The wind pushes on the sails and the trimaran resists the heeling force by transferring some of its weight to the lee float, which can then push up with a force equal to the weight applied to it. This is in acccord with the ancient law that water pushes upward on a vessel with a force equal to the weight of the water displaced by the vessel. The float is shorter than the main hull and if it is canoe shaped or V bottom design its resistance to forward movement will increase rapidly with increased load, approaching a hull speed which will be lower than that of the main hull. Obviously this is not good—we expect to go faster, not slower, when the wind blows harder. What to do ?

There is another kind of boat, with a *Planing Hull*, which gets its support not by displacing the water but from dynamic lift as it gives the water a quick downward push in passing. At low speed the planing boat will behave as a displacement boat but with high resistance it is a poor shape for low speed operation. It is ideal for high speed operation, however, as the resistance increases only slightly

with increased speed and the planing hull is not caught in the hull speed trap. The lift provided increases rapidly with speed increase and is dependent on the area in contact with the water.

Planing floats—the obvious solution for our trimaran. In light winds there will be little load on the lee float, so it will plane at low speed. When the wind blows harder the faster speed will give the float more lift and we have a neat self adjusting system. As load is transferred to the float the lighter main hull has less resistance the total may actually decrease. The result—Speed. This is the high performance trimaran.

Some people will say, "I am not greatly interested in speed, I just want to cruise. Give me safety, with speed a secondary consideration". No argument there, we all want safety, first and all the time. There are various kinds of safety. Appendicitis or an infection from a trivial appearing wound may occur on any boat. Speed in reaching treatment is important here. Safety from capsizing is the area which is principally dependent on the design of the boat. A boat will capsize only when the wind forces can push it over easier than they can push it ahead. The multihull boat cannot heel to spill the wind, its ultimate safety will depend on its ability to spill the wind by spurting ahead when the knockdown gust strikes unexpectedly. I would not be so rash as to say any boat is non-capsizable, but certainly, the one with the least resistance to forward movement when the lee float is heavily loaded will be most non-capsizable. So, the planing float trimaran gives safety as the result of speed and not at the expense of it. I am sure that anyone who understands the situation will want the fastest boat under these conditions.

THE DOBLER TRIMARANS

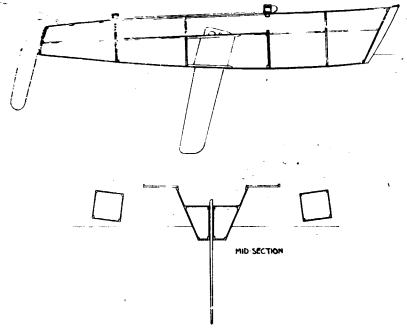
BY

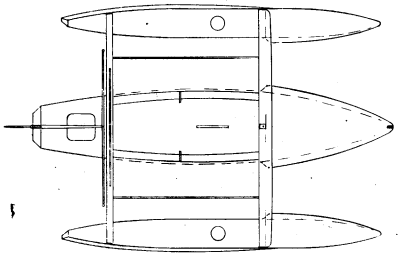
JOHN MORWOOD

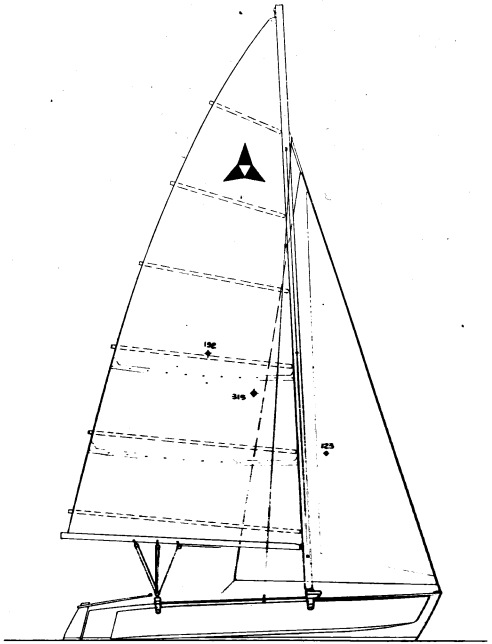
TRIAD CLASS. L.O.A. 19 ft. 0 ins. L.W.L. 17 ft. 8 ins. Beam 12 ft. 9 ins.

All the designs which Joseph Dobler has sent me are of flat bottomed trimarans with box-shaped floats, designed to plane. We know that this type of trimaran goes well and is the easiest to build. *TRIAD* is of this type and is reminiscent of Victor Tchetchet's designs but with more beam to the floats and central hull. The float bottoms of *TRIAD* slope up at the outer side as compared with the other trimarans of this series.

TRIAD—Joseph Dobler







LENGTH O.A. 19'-0"
" W.L. 17'-8"
BEAM 12'-9"

"TRIAD CLASS
RACING TRIMARAN

JOSEPH C. DOBLER – NAVAL ARCHITECT
801-8TH ST. – MANHATTAN BEACH-CALIF.-90266
©
9-64

147-1

TRIAD Trimaran—Joseph Dobler