Douglas Harrison

OUTRIGGERS 1958

A.Y.R.S. PUBLICATION No. 23

THE TRIUMPH TRIMARAN — Peter Webster

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EDITORIAL

In January to March, 1959, Erick Manners will be giving a series of twelve evening lectures entitled " Sailing Technology and Research." These will be held in two Essex adult Colleges ; on Monday evenings at 7.15 for the Essex Education Committee at Freyerns Senior Institute, Basildon New Town ; and on Tuesday evenings at the Southend Municipal College, Victoria Circus.

The series embraces :—Theory of Sailing ; Progress in Sail ; Catamaran Research ; Design, Construction and Sailing ; High-Speed Boating ; Hydrofoils ; Sailing Aerodynamics and Hydro dynamics.

A.Y.R.S. members within travelling distance who are interested in attending are invited to write, booking places. Other courses include Sailing, Seamanship and Coastal Navigation.

CORRECTION. The PATINES A VELA were designed by Luis Montje in 1944 and not by Carlos Pena, as stated. There were some forms of Patines in Barcelona since1915, at least. Sgr. F. Lagos has sent us some further details of these interesting craft as follows :

1. The idea of these Patines is to make them as simple and practical as possible. You just leave them on the beach and take the sail home with you. Sand will not get into the floats and it is so light that one person can pull it up the beach. The gear is very simple and there is no rudder, steering being by shifting the crew's weight forward or aft.

2. When cruising, they use an oar to steer and, in that way, the helmsman can always be near his girl crew. (A cheerful reason, one thinks).

3. The Patines are very fast off the wind but beating is not as good as with centreboard dinghies. The crew gets no wetter than in a Snipe or Flying Dutchman.

4. In races held in Hyere (France) with *Shearwaters*, 505, F.D., *Finns Snipes* and *Vaurriens*, the first four were *Patines*, the fifth a *Shearwater*, the sixth a *Patine* and the others followed.

INTRODUCTION

Modern multihull design began with Woody Brown's 40 foot long catamaran in Hawaii, *Manu Kai*. At present Rudy Choy, Woody Brown and others are producing smaller catamarans from the same basic design in Hawaii and the West Coast of the United States. Unfortunately, the A.Y.R.S. has not yet been able to get many accounts of these catamarans other than that of No. 10 AMERICAN CATAMARANS.

In England, the Prout brothers developed their *Shearwater I* from their paddling kayak hulls and are now producing the *Shearwater III* to roughly the same design and hence developed the first all out *Racing* catamarans of smaller size and from this point the English progress is both upwards to the cruising size of the Hawaiian catamarans and downwards to the 11 and 12 foot sizes, both in the Prout series and in that of many other designers.

Australian, French, Italian and Spanish catamarans have appeared to my knowledge and probably many other countries have now got their own designs and will soon produce more. This is all to the advantage of sailing.

However, outriggers generally have been neglected by most parts of the world except for the West Coast of the U.S.A., where some very nice examples of both the Indonesian and Polynesian configurations have appeared. This publication will therefore be of most use in all the countries where the outrigger craft have not yet been seen in any really good form.

This publication should make it amply clear that the lightest craft with the least wetted surface is the single outrigger configuration with the double outrigger only slightly inferior.

Trimarans. The development of these goes steadily on in the able hands of Arthur Piver, John Ward, Victor Tchetchet and others in America. The only British examples are those by Erick Manners, Donald Robertson and Julian Allen. Arthur Piver's *Frolic* is the only trimaran comparable to the *Shearwater* in size and is faster in light winds. The *Shearwater* is faster in strong winds.

Polynesian Canoe. The first modern version of this craft was the *Malibu* outrigger by Seaman of California which may easily be the fastest of all multihulled boats. At least, it seems to be winning in most races. We have not, unfortunately, been able to get an account of it in enough detail to have a description here but hope to have this eventually. The *Islander*, being sold for $ 995 by Emigh Bros., 660 W. 17th St., Costa Mesa, California, is a fibreglass version of the same configuration with all the same elegant features. A speed of 25 m.p.h. is claimed for it. A. E. Bierberg, of Denmark, has sent us an account of a very nice little paddling and camping Polynesian craft.

Micronesian Canoe. These are still being neglected but we have A. E. Bierberg's latest craft, *Pacific Atoll*, a development of his *Aloha*, described in Publication No. 16. T. O. Smallwood reports that recent Gilbertese craft have now got symmetrical hulls and all that is left of the asymmetry is a slight " twist " to the stems. I am now of the opinion that even the Micronesian craft should have symmetrical hulls but they may have an asymmetrical centreboard, though some reports indicate that even this is a mistake. The only point in having asymmetry was the avoiding of a centreboard and this is surely not worth while.

The fastest Non Foil Sailing Boat. I am constantly being taken to task by members for what they call " Science Fiction " by which they mean the conjecture of boats and devices which sound very nice but possibly would not work very well. I can sympathise with these people who appear to want only hard facts and mathematical details but such conjecture is fun and livens up the publications. I hope, therefore, these people will forgive me if I now describe what I think should be the fastest possible sailing craft which is not foil borne.

The Main Hull. This would be my plywood *Gemini* design simply doubled in length without altering any other dimension so it would be 30 feet long by 2 feet beam. I think I would prefer my *Gemini* design (or a similar one) to the usual types because it has more fore and aft stability than *Shearwater*, *Jumpahead*, *Mercury*, etc., and has not been proved to have a lower top speed, though its light wind performance is probably slightly worse than *Shearwater*, though not the others.

Outrigger Float and Beam. The outrigger beam would be a single streamlined light alloy pole 16 feet long stretching out only to one side in the Polynesian configuration and the float would be a normal *Gemini* hull with efficient buoyancy of about 250 lbs.

The Stability. The whole craft could surely be made to weigh not more than 250 lbs. and has a righting moment with the float to lee of 3,750 foot pounds which should easily carry about 250 square feet of sail. With the float to weather, the crew would sit on a seat like a motor cycle side car mounted on rollers on the streamlined alloy pole, and pull himself out to weather to balance the sail force, thus producing a righting moment not less than the above.

The Controls. The helmsman would sit in an open cockpit with windshield and steer with a wheel. A left hand foot pedal would release the sheet of the single sail and a right hand foot pedal, by a pumping movement, would bring it in. This craft would hardly cost £100 or $300 to build and would most certainly do 30 knots.

OUTRIGGER DESIGN FEATURES

The Main Hull. We have already been pretty fully into things like the hull sections, the flattening of the floor aft and the wetted surface. The only further consideration in the main hull design lies in the length to beam ratio. The present trend in this matter is for the hulls to get a little shorter and fatter to reduce wetted surface and improve light wind speeds. Arthur Piver's *Frolic* has now gone to a ratio of 8 : 1 and he has shown that, with this ratio, the top speeds are not significantly reduced though one catches a hint of some slight reduction. It looks, therefore, as if a ratio of 8 : 1 is about the minimum for these hulls in racing boats. However, 6 : 1 could be used in a cruiser but there would be a significant reduction of speed while 5 : 1 would be below the ratio at which the spread buoyancy of the multihull would be of any use at all. One would then be dealing with a craft whose stability would be mainly due to the shape of the main hull and floats or hydrofoils would merely be used to give a craft which sails upright.

The Floats. It appears to me to be quite obvious from the designs shown here and in the previous publication No. 16 TRIMARANS & OUTRIGGERS that all our attempts to produce *simple* floats have been misplaced. In strong winds, the resistance of short, fat and box like floats has been the major limiting factor on speed. We must simply refer to the traditional native float of a long narrow log for our protytype and make our floats similar. The photograph of the *Islander* is instructive here as it shows clearly that the float is making even less of a wave system than the main hull, and it is to lee. Surely, the ideal float is a long, slim and elegantly boat shaped thing of a length to beam ratio just a little greater than that of the main hull to conform with its shorter length. In section, it can be circular in the smaller sizes and, if the struts are stream lined, it can be allowed to " submarine " in a strong wind. Larger floats should be " sewer sectioned " or of a right angled V.

Wind Resistance. As with catamarans, it is most important to reduce the wind resistance of outriggers. Almost without exception, the outriggers which have been fast have been well streamlined and those which have not been successful have had lots of exposed struts and boards. John Ward's trimaran *Dragonfly* with platforms on either side must have had quite a lot of wind resistance and her performance improved greatly simply by reduction of beam. This may have placed the floats in a better position in relation to the bow waves of the main hull but the reduction in wind resistance must also have been of great value.

It is very noticeable that the faster native outriggers have done away with the platforms found on all the primitive craft and simply have two round roles stretching from the main hull to the float or floats. Indeed, Hornell cites a case from India and shows a photograph of a native craft with only *One* outrigger pole to the float. It would appear that we still have something to learn from traditional outrigger practice.

Outrigger Beam. The problems of spacing of outrigger floats in relation to the main hull are, I think, more complex than the spacing of catamaran hulls. The first thing to find out is the wave pattern of the main hull and floats. This could be done by towing at 15 knots in a flat calm and would show whether it is worth while to place the floats in some position near the bow waves of the main hull in order to lessen their resistance. It would also show if the wave systems of the floats were great enough to lessen the resistance of the main hull.

The Optimum Beam. With forward placed floats such as we used with *Jehu*, there is great latitude of beam. They are forward of the bow wave and the beam can be quite arbitrary. With floats and cross beams placed aft of the mast as in Arthur Piver's designs, however, one is in a position to put the floats either just ahead of, or exactly in the bow waves of the main hull. It would obviously be wrong to put them aft of this in the upwards slope and faster running water.

The water ahead of the bow wave starts to travel in the direction of the boat and this increases to its maximum at the crest of the wave ; to flow in the opposite direction when the crest has passed. It is therefore logical to place the floats of a trimaran exactly in the crests of the bow waves. In practice, John Ward has found this to be so and, in fact, asked me if this practical observation was capable of a theoretical explanation and the above is the result.

We now have a line on which we should place the float, i.e., the crest of the bow wave. The best fore and aft position (and therefore also the distance away from the main hull) could depend on the beam wanted for stability but, if the float itself produces any appreciable bow wave, it might be best to place it in such a position that this bow wave comes at the quarters of the main hull.

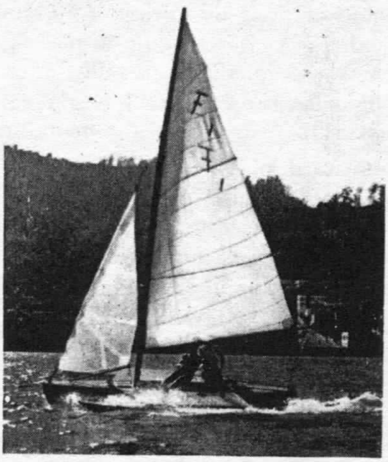
THE *FROLIC* TRIMARAN

by Arthur Piver, Mill Valley, California.

Length of Main Hull	15′ 9″	Weight	250 lbs.
Beam of Main Hull	2′	Sail Area	140
Overall Beam	8′		

The basic desire in this design was to produce a high performance, low-cost craft which could introduce the many advantages of multi-hull sailing to the largest possible number of prospective builders. This craft was to be planned especially for the amateur constructor, which indicated the use of sheet plywood.

Studies by the A.Y.R.S. have indicated that the right-angled V or Morwood section is next to the semi-circular in minimum wetted surface, and this section was chosen for this characteristic, plus the



Frolic

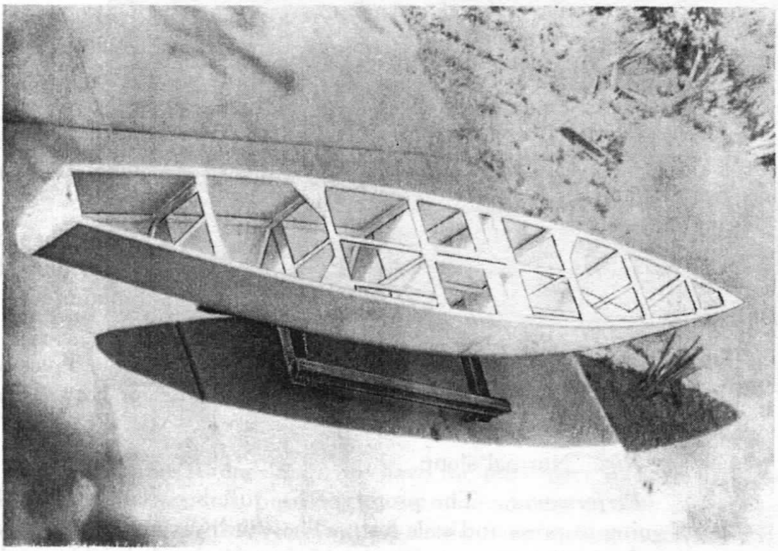
fact that it is easily constructed of plywood. With the use of this centre-section form *Frolic*, bears a resemblance to John Morwood's *Parang*, but as the two craft evolved separately otherwise, there are various differences in the overall designs.

Because of the fine ends and the small size of this boat, it was decided to place the crew directly amidships, thus putting their weight in the position for best balance. The central deck with its self-bailing foot-wells is almost 6′ long, however, which gives the crew sufficient latitude in shifting their weight according to varying needs. Another reason for having the forward cross beam well forward was its utilization as a simple, secure resting place for the mast.

The actual shape of the floats was a problem, and although diamond-shaped floats were first tried they proved to have insufficient buoyancy, although they were considered most satisfactory otherwise. Present floats are symmetrical and box-shaped, which gives maximum buoyancy for the available space between the cross arms and the water. These are not planing floats in the accepted sense, because they have a slightly negative angle of attack in usual sailing

It has been found that when *Frolic* is sailing at high speed, a formidable bow wave is thrown, but by moving the crew weight aft, this wave is eliminated, and the bottoms of the floats are then approximately parallel with the surface of the water, giving least possible resistance. It has been the experience of this designer that so-called planing floats practically never plane, due to the length-breadth ratio.

Frolic has proven to be a delightful craft from every aspect, being fast, stable, and manoeuverable. One of her most appealing



Frolic's Hull

features is the fact that materials for this two-man boat, including home-made sails and rigging, can cost approximately $200.

In an effort to keep problems at a minimum for the amateur builder, spars and cross beams are solid, with no gluing necessary. The building instructions include hints for do-it-yourself rigging, while a simplified sail-making system is also included. Plans are $15 from Arthur Piver, 344 Sacramento St., San Francisco, California.

Editor : Arthur Piver's two latest designs are a 24 foot by 4 foot cruising trimaran and a 20 foot racing type. There are two lovely boats and the cruiser with 4 berths is attracting a great deal of interest on the West Coast of America.

THE *TRIUMPH* TRIMARAN

L.O.A.	12′	Weight	Approx. 175 lbs.
Beam O.A.	6′ 5½″	Sail area	100 sq. ft.

Designer : Arthur Piver, 344 Sacramento St., San Francisco 11, California.

Builders : Peter Webster, 16, Cheapside, Barnsley, Yorkshire, England.
Price : £115 or $330.00, ex works, ex sails.
Construction : Fibreglass hulls with plywood decks.

Triumph is the first trimaran to be commercially produced to my knowledge anywhere in the world and Peter Webster is to be congratulated on his farsightedness in taking it up.

The Main Hull. This is one of Arthur Piver's shallowish round bilge designs with a canoe stern. With very easy lines, it slips through the water very easily, making small waves.

Floats. The floats of the original design were box shaped which does not lend itself to fibreglass construction so the hull shape of *Gemini* (A.Y.R.S. No. 15) was used, modified by rounding off the chines somewhat.

The Bridge Deck. This is typically that of Arthur Piver but with minor modifications by Peter Webster to allow for easy taking apart for trailing and stowage.

Rig. Normal sloop.

Performance. The prototype has just been launched at the time of going to press and sails fast. The wind was not particularly strong but she held her own with the 12 foot National dinghies and she is, of course, very stable and easily manoeuverable.

The photograph shows that both the main hull and float are running very sweetly, the float appearing to be making very little wash along its length. The cause of the stern waves and their nature will have to be investigated to see if improvement is possible.

A Triumph Class. *Triumph* is being shown at the 1959 London Boat Show and will certainly attract enough interest to form a class for racing purposes. It is hoped that any class organisation which may form, will allow some latitude in some of the design features to establish the best dimensions. For instance, improvement in speed might be obtained by alteration in the overall beam and fore and aft position of the floats. Also, the angle of attack of the floats to the water should be variable to find the best position.

Summary. I feel sure that *Triumph* is the first of many trimarans to be commercially sold in the world. It is a delightful craft which should give a tremendous amount of pleasure to very many people. Even as a prototype, it is a very successful craft and will most certainly improve in speed as the brains and skill of yachtsmen tune her up. We in the A.Y.R.S. wish her a most successful career.

DRAGONFLY

L.O.A.	22′ 1½″	Pontoons	14′ 1½″
L.W.L.	21′ 0″	Beam	9″
Beam, hull	3′ 0″		
Beam O.A.	12′ 0″	Weight	400 lbs.
Draught	3′ 0″ (7½″)	Sail Area	160 sq. ft.

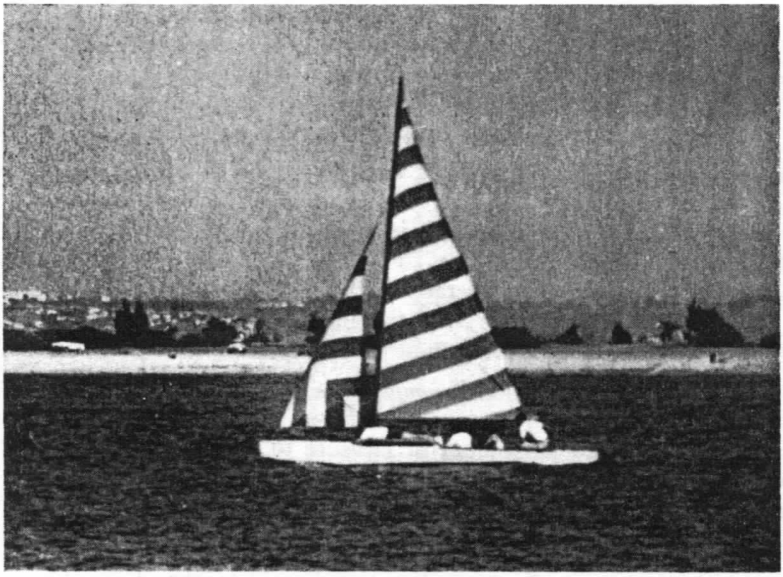
Designer : John W. Ward, 7635, Herschel Ave., La Jolla, California.

Builders : John W. Ward and Whitson M. Jones.

The Conception. *Dragonfly* is designed to be a comfortable daysailer with the performance of the multihulled boat and capable of being trailered to and from the beach with the least trouble. It is the same basic principle as Dave Cluett's *Trident*, described in No. 16 but tends more to the Indonesian craft than to the " longboat " or whaler.

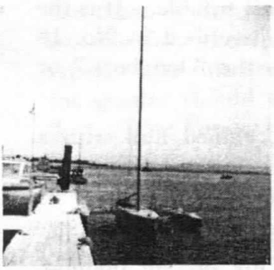
The Main Hull. This is a flat sectioned, chined hull with a canoe stern. It has some stability in itself which can be of little use for sailing but it means a lot to comfort in light winds.

The Floats. These are of the right angled V underwater section, long and narrow and also canoe sterned. To my present opinion, they are almost the best possible shape.

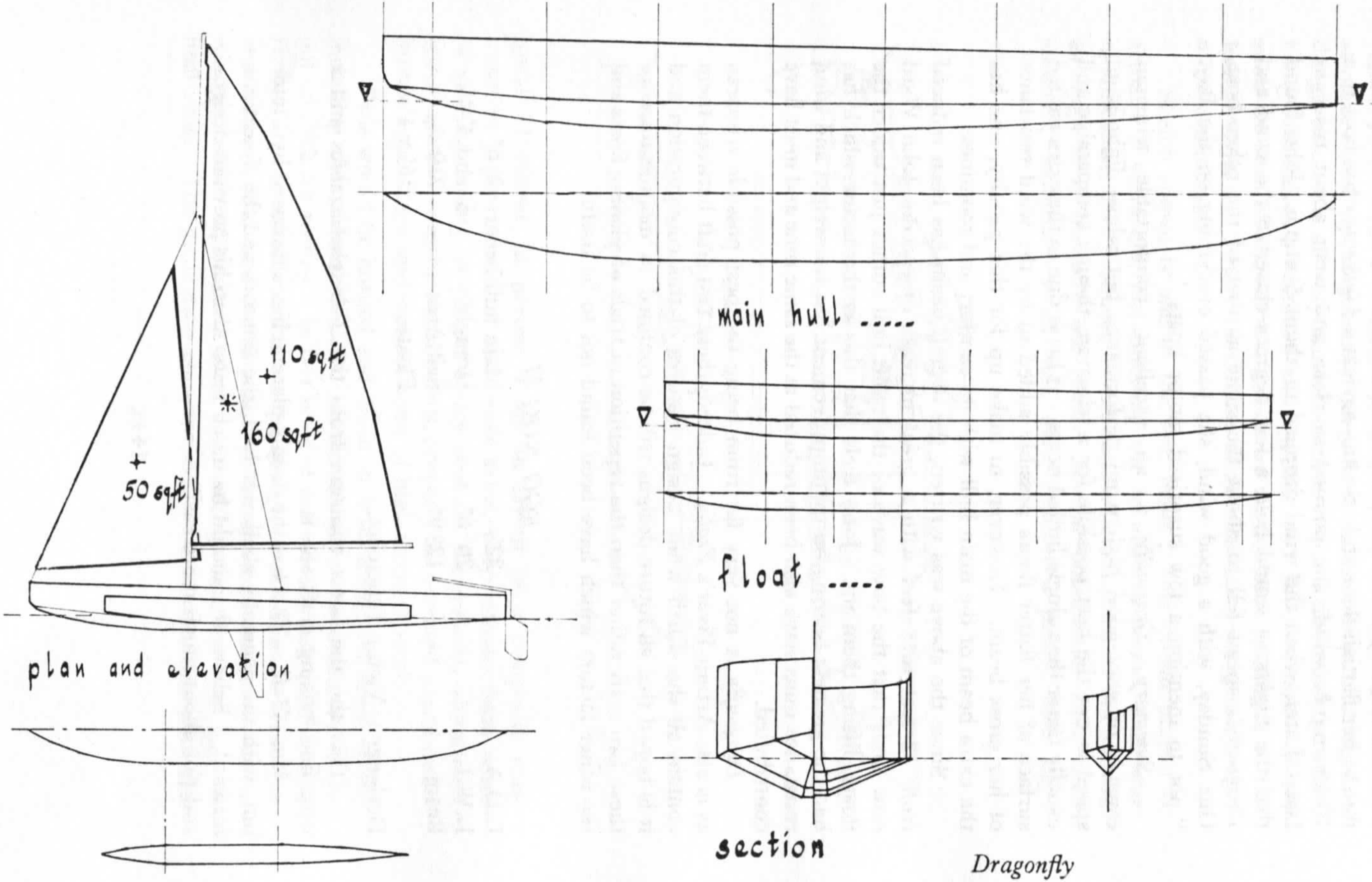


Dragonfly

The Cross Beams. As shown in the photograph, these are hinged at their inboard ends to allow retraction for trailering. Like Arthur Piver's, they are simple and strong. Possibly, they have just a shade more weight and windage than possible in order to give comfort to the crew by providing a good seat but, even so, it would help if they were a bit streamlined. With *Dragonfly*, where canoe sterns have been used both on the main hull and floats whose only virtue is their streamlined shape, it seems a pity not to have the cross beams streamlined, by expanded polystyrene for example.



Dragonfly


main hull .....
float .....
section
110 sqft
160 sqft
50 sqft
plan and elevation

Dragonfly

Performance : Dragonfly is very fast in moderate to heavy winds. She moves easily but not rapidly in light airs, coming about quickly due to her flattish floor aft. Sa.ling against a *Lightning* class boat in a 10-15 m.p.h. wind, she pointed as close and went about twice as fast. Later, when the wind dropped to about 5 m.p.h., John found that the *Lightning* would hold a few degrees closer to the wind and *Dragonfly's* speed fell to about the same as that of the other boat. One Sunday, with a good wind, she passed everything on the Bay, " not to mention a few surprised motor boats ".

Summary. Dragonfly is an excellent, comfortable trimaran capable of very good high wind performance but whose light wind speed is not the best possible for a trimaran, though comparable and usually faster than single hulled boats. This is due to the extra wetted surface of her flatter floors possibly added to by the wind resistance of her cross beam. However, to make up for this penalty, one has the extra beam of the main hull with its comfort and roominess.

Since the above was written, the overall beam has been reduced from 12 feet to 8 feet with a great increase of speed. John Ward now finds that the bow wave of the main hull comes just under the floats, lifting them up. John feels that this is the factor which has had the greatest bearing on the improvement but the weight and wind resistance must have also been reduced at the same time and must have contributed.

Dragonfly is not very far from being the best possible trimaran as is also Arthur Piver's *Frolic.* Indeed, these two craft between them contain all the worth while design features of this configuration and it is hoped that all future designs will be confined to modifications of these two craft rather than the repetition of trials of planing floats and the other factors which have been found not to be useful.

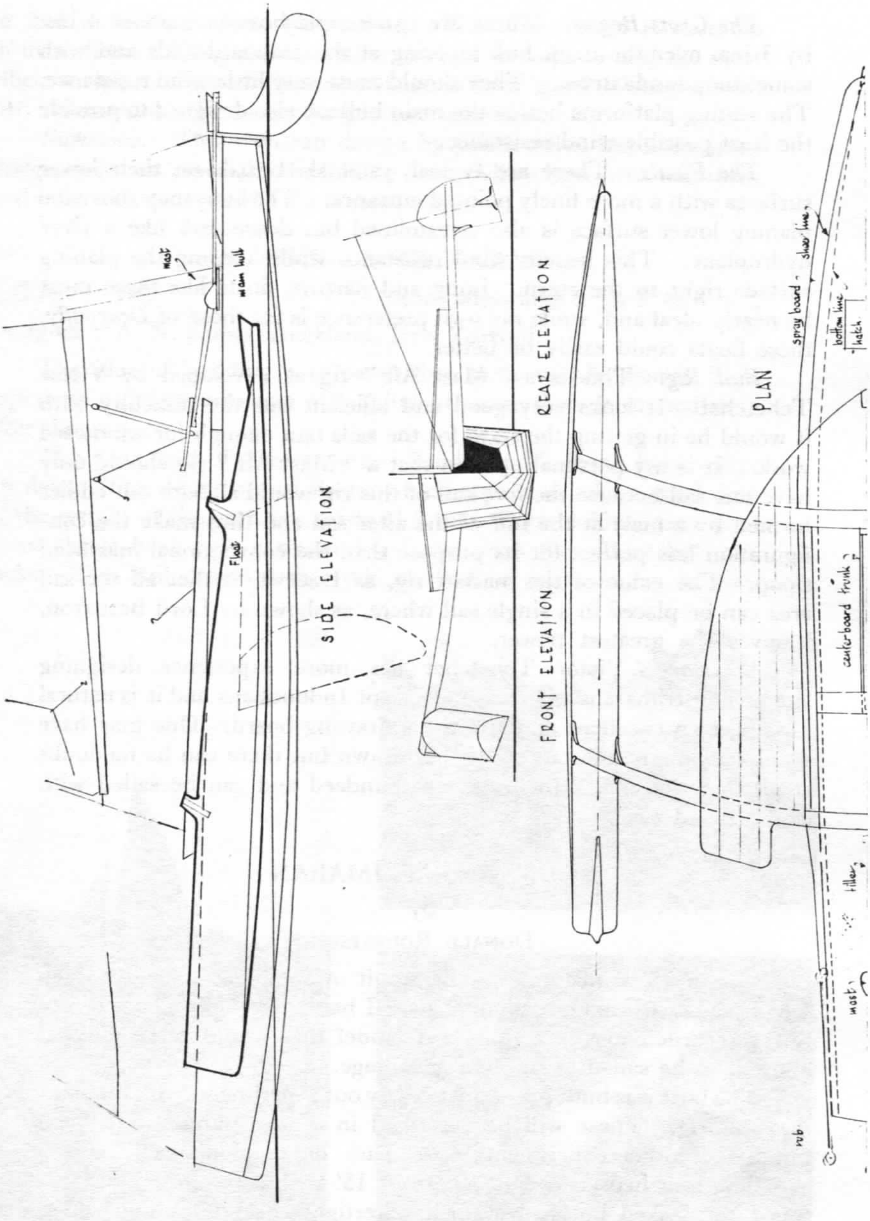
EGG NOG II

L.O.A.	22′	Main hull beam	2′ 6″
L.W.L.	20′ 6″	Draught	6′ and 3′ 3″
Beam	12′ 9″	Sail Area	210 sq. ft.
		Floats	16′ x 1′

Designer : Victor Tchetchet.

This the the latest trimaran from the Tchetchet stables and a very fine looking craft she is.

Main Hull. This has the deeply placed chines favoured by Victor but, with the generally shallower hull, the transom and the V sections forward, I believe she should be much faster than his previous designs and put about much more easily.


SIDE ELEVATION
FRONT ELEVATION
REAR ELEVATION
PLAN
mast
main hull
Float
spray board
sheer line
bottom line
hatch
center-board trunk
tiller
mast
rub

Egg Nog II

The Cross Beams. These are two simple box spars about 4 ins. by 3 ins. over the main hull tapering at the outboard ends and with some compound curves. They should cause very little wind resistance. The seating platforms beside the main hull are also designed to provide the least possible wind resistance.

The Floats. These are typical water ski boards on their lower surfaces with a more finely pointed entrance. The buoyancy above the planing lower surface is also streamlined but *downwards* like a river hydroplane. This lessens wind resistance while keeping the planing surface right to the stern. Long and narrow, floats like these must be nearly ideal and, while my own preference is for those of *Dragonfly*, these floats could easily be better.

Sail Rig. This is a " Mast Aft " rig as developed by Victor Tchetchet. It looks very good and efficient but the difficulty with it would be in getting the stays for the sails taut enough for windward work. It is my personal opinion that a " Mast Aft " rig should only have one sail because the fore sail of this rig would smooth out eddies formed by a mast at the luff of the after sail and thus make the configuration less perfect for its purpose than the conventional masthead sloop. The value of the mastaft rig, as I see it, is that all the sail area can be placed in a single sail where, as shown by Lord Brabazon, it gives the greatest power.

Summary. Victor Tchetchet has more experience designing and sailing trimarans than anyone except Indonesians and it is natural to expect an excellent craft from his drawing board. One may have doubts about the mastaft rig he has drawn but there can be no doubt at all that the craft will be very fast indeed and can be sailed with comfort and ease.

FUN, A 15′ TRIMARAN

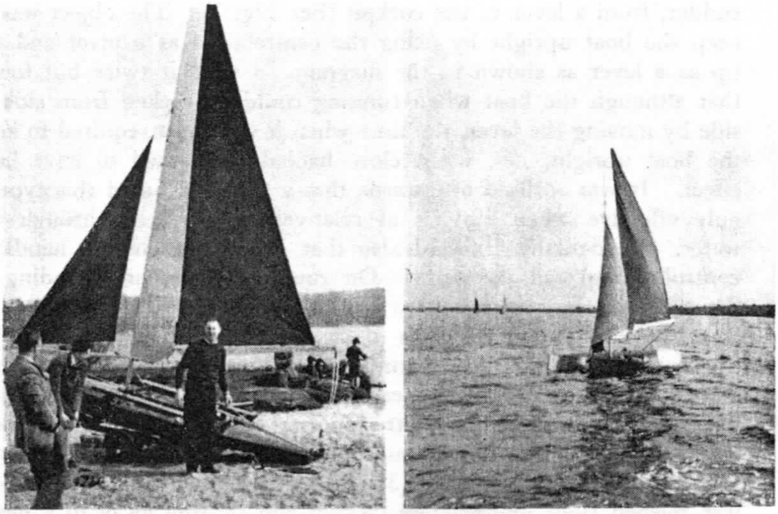
by

DONALD ROBERTSON

Fun, a 15′ trimaran, was the result of some experiments which I had made with model sailing boats. I had never built a boat before but I regarded her as a full sized model that would carry me and allow it to be sailed to the best advantage.

The boat was built primarily to carry out experiments with different types of rig. These will be described in a later publication, but a number of other experiments were made on the hull itself.

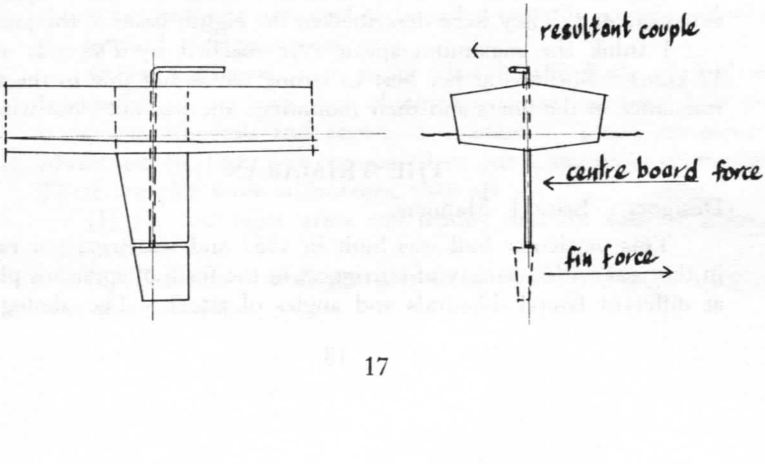
The hull had an overall length of 15′ with a beam of 3′ 6″. It was fully decked but had a small watertight cockpit for the helmsman's feet. Needless to say it was very unstable but there were two



Fun with wingsail

hollow seats which could be extended outwards on outriggers. These provided buoyancy when the boat heeled and a seat to sit her out. It required considerable agility to keep her upright but she sailed quite well. The rudder was controlled by a boom mounted across the boat pivoted at the centre and connected to the rudder head by a push pull shaft. This arrangement was used by Lew Whitman, the American canoe champion, and I found the fore and aft movement of the helm to luff up or bear away to be quite natural.

The boat had a large alloy centreboard but I tried a special wooden centreboard with a metal tip which could be turned, like a very deep



rudder, from a lever in the cockpit (See Fig. 1). The object was to keep the boat upright by using the centreboard as a pivot and the tip as a lever as shown in the diagram. I tried it twice but found that although the boat when running could be rocked from side to side by moving the lever, the time when it was most required to keep the boat upright, i.e., when close hauled, it seemed to have little effect. It was realised afterwards that a movable fin of this type is only effective when moving at relatively high speed through the water. Incidentally I found also that I had not enough hands to control it and sail the boat ! On running ashore and bending it, the problem arose as to how to sail home !

The next experiment was to fit two outboard floats in place of the seats, i.e., to make her a trimaran. These were 10′ long and had a total buoyancy of 400 lbs. each. They were boat shaped with a flat bottom 6″ wide at the centre tapering to a pointed stern. These gave all the lateral stability that could be required, in fact I immediately started breaking masts (3 in all) ! On one occasion the bow was pushed right under when tacking and bearing away in a heavy puff. Both floats were mounted high enough to be clear of the water and therefore in light winds and when going about there was no additional drag. However they added a lot of weight and air resistance and when the leeward float was effective in providing stability, the bow wave from the main hull hitting the bow wave from the float would send spray half way up the mast. In my opinion the trimaran is not a good boat as the leeward float when in use creates a lot of resistance. When the float is not in use there is no advantage in having one. For one thing the length of the float is too short and its wave making resistance is higher than the main hull, and secondly the higher the wind speed the greater the float is submerged and the resistance increases still more. It is also vulnerable from a practical point of view and tends to look messy.

The outboard floats made ideal mountings for some hydrofoil experiments. They were described in the eighth issue of the journal.

I think the maximum speed ever reached by *Fun* was about 12 knots. She was at her best in strong winds but due to the wind resistance of the floats and their mountings she was not close winded.

THE TRIMARAN

Designer : Erick J. Manners.

This particular hull was built in 1957 and was tried out earlier in the year with a variety of outriggers in the form of sponsons placed at different lateral dihedrals and angles of attack. The photograph

E. J. Manner's Trimaran

shows her in action arranged to be sailed virtually upright and without the leeward outrigger working.

Other outriggers have been tried in the form of hydrofoils. Interesting results have been obtained with asymmetrical foils placed at various dihedrals and angles of incidence. There are some disadvantages to Trimarans compared to our Catamaran configuration. There are also some advantages, they are :—

(1) The outrigger arms can readily fold for ease of storing or transport.

(2) The central hull provides comfortable sitting with leg room even in small sizes.

(3) With some of my arrangements there is quicker turning ability.

(4) With some fast catamaran designs one hull at a tack is mainly working while the other is a parasite. Some of my Trimaran configurations have greatly reduced this situation.

(5) Although reducing drag to the minimum my Trimaran designs have retained a considerable stability safety feature.

LAPWING — TRIMARAN DESIGN.

L.O.A.	16′ 0″	Hull beam	2′ 6″
L.W.L.	16′ 0″	Floor beam	1′ 6″
Beam (arms out)	8′ 0″	Draught	6″
Beam (arms in)	5′ 0″	Sail Area	150 sq. ft.

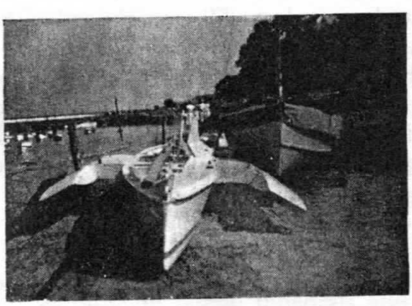
Designer : Julian Allen, Kenystyle, Penally, Tenby, Pembs.

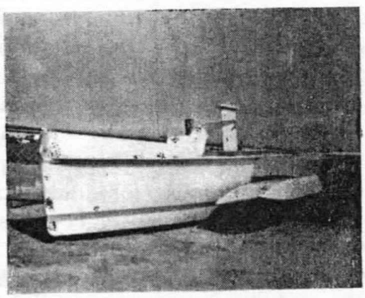
Builders : Saundersfoot Marine Ltd., Saundersfoot, Pembs.

General Features. The concept here is of a stabilised " Narrow boat ". The main hull is 2′ 6″ wide and, on most occasions, both floats will be out of the water but they will be able to deal with gusts and sudden wind faults.

The Main Hull. This has the typical box section and, though fast, is not the best possible. The skin on both sides and bottom has impressed curvature due to the interposition of stringers and floor battens between the frames and the skin. This not only pleases the eye but greatly stiffens the hull and improves the performance.

The Cross beams and floats. The cross beams are placed aft of the mast as in the Piver craft and are boxed in with plywood, thus making comfortable seats and adding considerable reserve buoyancy against capsize. They have a hinge on each side to allow the floats





Lapwing

to fold underneath them for trailing. The float design is more to fit in with the folding process rather than an attempt to find the most efficient shape. Nevertheless, the shape is fairly good. They would, Mr. Allen thinks, be better longer and narrower.

Summary. This trimaran design by Julian Allen has some good designs features, especially the folding floats, which have been modified, and now take the water in the normal way.

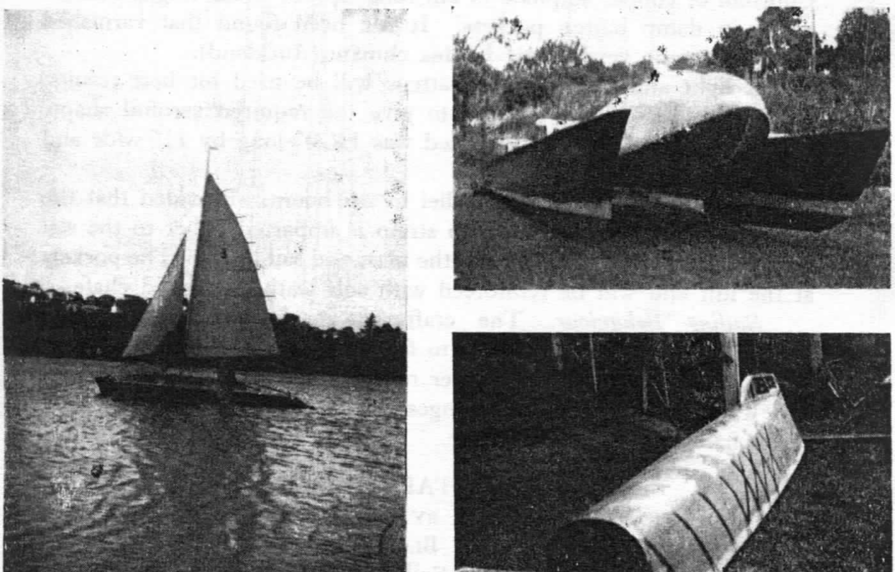
TRIDENT—A TRIMARAN

L.O.A. 18′. Beam adjustable from 7′ to 8′ 6″.

Designer : A. N. Sames, Auckland, New Zealand.

The idea of building a trimaran first came to Mr. Sames from experiences and experiments with a dugout canoe *Rowene*, immediately after the war.

The main hull of *Trident* is a " Sunderland " flying boat wing-tip float. The asymmetrical floats, which appear to take a good deal of the weight of the craft are made of 5 mm. Bryzeel Mahogany plywood sheets bent over a removable frame with the aid of hot, wet sacks. The hull design, using this method of construction, is very



Trident

limited and only narrow hulls of " U " section can be attempted. However, it is quick and cheap and if the particular design proved successful, the original hulls could be used as moulds for a lighter, stronger form of construction. Straps of fibreglass tapes were later put around the hull after completion and glued much in the manner of barrel hoops. The object of these straps is to localise any future damage to the portions between them. There is provision for fitting a centreboard in the main hull should it be necessary but this is to be a last resort in view of the number of sandbanks in the home waters.

The Sail Battens. The sails are fitted with full length battens which, from 18 years of experience, Mr. Sames considers of far more advantage than shortcomings. He feels that they give control over every section of the sail in conjunction with mast raking to increase or decrease the belly for light or heavy weather sailing. They also " tame " the sail when head to wind, whereas short leech battens cause the sail to " crack like a whip " until the battens break, jump out or seriously strain the sail.

Batten Construction. A straight grained medium to sap Kahikatea unvarnished is used but introduced to salt water for a few trips and then, when accepted, rubbed with a weak solution of fungicide Metalex, Cuprinol or copper sulphate to kill fungi spores which might become active in damp batten pockets. It has been found that varnished battens become very brittle in this climate (Auckland).

A light and heavy set of battens will be used for best results. These will be suitably tapered to give the required aerofoil shape. The largest batten previously used was 14′ 0″ long by 1½″ wide and ½″ thick at its heaviest point.

Batten pockets will be parallel to the boom. Provided that the weight of the boom is taken, no strain is imparted either to the sail (at batten pockets or leech) or to the mast and sail track. The pockets at the luff end will be reinforced with soft leather to avoid chafe.

Sailing Behaviour. The craft has performed creditably in breezes up to 45 m.p.h. with 5 to 6 foot short seas. It is hoped to obtain some accurate speedometer readings early in the new Season. The way the apparant wind changes as a consequence of the forward speed has been most noticeable.

EXPERIMENTAL TRIMARAN

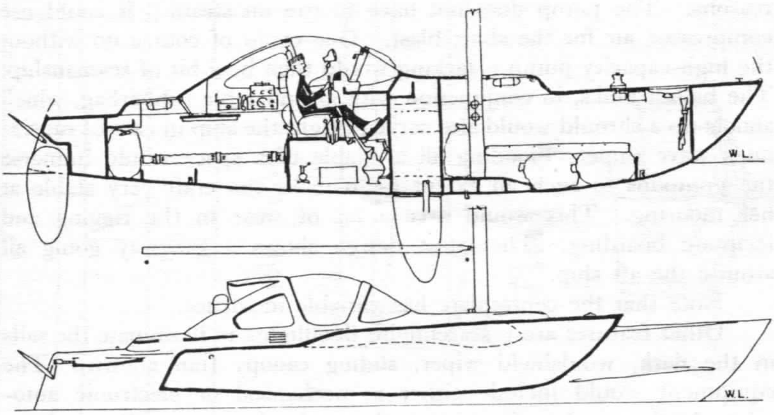
BY

WALTER BLOEMHARD

L.O.A.	33′	Sail area	500 sq. ft.
Length pontoons	19′	Displacement — 1½ to 2¼ ton	
Beam	17′ 6″	depending on equipment carried.	

This is a design study for a high-speed, all weather, fingertip control job, such as I would like to have for my own use. Let me say at once, that I would normally never have thought of publishing this design since it is all very much incomplete, and I do so only to avoid being labelled as a secretive and egotistic A.Y.R.S. member. Also, since we have all the same interests we do not have to adhere to the formal ways, and I have no qualms at all of sharing my dreams with other dreamers.

Sketch shown is one of the first made ; this dream project is actually 2 years old, not counting the incubation period, and later modifications have produced a craft quite different from the one shown, although it is basically the same. Several possibilities have been studied ; laminated wood hull, glass reinforced plastic hull, light



metal. However, at present I am in favour of a composite construction ; plywood inner and outer skins, polyurethane foam cores of varying density in places, epoxy coat on the outside, aluminium spars and main constructional beams, properly heat-treated, aluminium-bronze appendages and various items of high strength steel.

Sails would be hoisted and taken in from inside the main hatch, including the various foresails. It would never be necessary to go out on deck for reefing ; in fact none of the various sails planned has reefs in it. A suitable sail is set for any given condition. All sheets and halliards lead into the ship and go on specially designed electric winches, which will take in slack fast, then go into low gear for the final swig. The generating equipment will be in duplicate with the units housed in starboard and port pontoons. The gas tanks will be also in the pontoons.

A difficult problem is the water ballast. Besides 2 small trim-tanks fore and aft, containing the fresh water supply and served by a small rotary type pump, there will be waterballast tanks in the pontoons. The capacity of the tanks must be such that a total weight of 850lbs. will be transferred inside of 20 seconds. This — with certain pre-cautions and in a routine sequence — will allow tacking in the normal time. It is clear that only high capacity pumps such as ejectors or turbines, of the type as used in rockets will do the job. Pressurizing the tanks is a possibility although not such a good one for several reasons. The pump does not have to run on steam ; it could use compressed air for the short blast. One could of course do without the high-capacity pump ; tacking would then be a bit of seamanship. The ballast tanks, in conjunction with an inflatable rubberbag, which shoots up a shrould would also serve to right the ship in case of capsize on a wave slope. Flooding all available tank space would immerse the pontoons to such an extent as to make the craft very stable at her mooring. This would save a lot of wear in the rigging and facilitate boarding. The latest design shows a gangway going all around the aft ship.

Note that the centreplate has variable incidence.

Other features are : searchlight, floodlights to illuminate the sails in the dark, windshield wiper, sliding canopy (not shown). The equipment would include either a mechanical or electronic auto-pilot, depth sounder, direction finder, radiophone etc. Remember ; this is the dreamship and cost is of no import whatsoever. At one time one of my brothers and I seriously considered building the ship, and I went in for a conscientious cost estimate. It came to about $7000. — in materials alone, with only the most necessary equipment. Since then I have completely given up the idea of ever building such a ship myself. I will instead wait till I get rich enough to have it built. Boy, what a marvel it would be.

Steering can also be accomplished from either pontoon. There will be very small cockpits ; the bridge will have footrails and sockets for backrests, so that you can sit out in the open, and entertain your sailing party. I want to sound one serious warning ; I would not care a bit if somebody " stole " this design, but do not ever steal my colour scheme. The latter is terrific, anyway that is what I think. It would be a pearly grey all over, with bright orange cat-walks, white boot top and black bottom, undersides of wings sea-green, interior white and natural colour of wood, instrument panel a black crackle finish.

The flap aft is a brake, although it could better be in some other position, more forward where it will do more good when among waves.

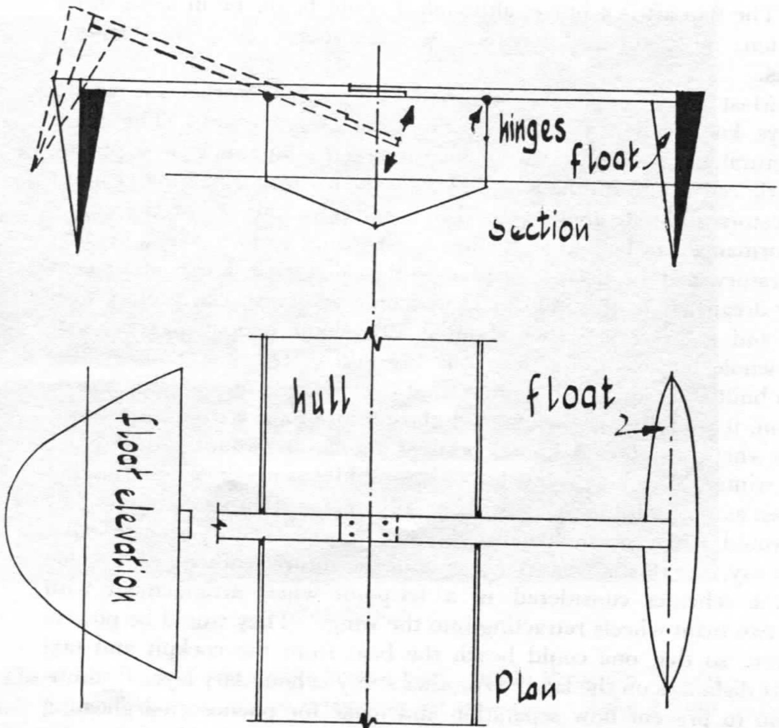
Mast and chainplates would be strain gauged, so that you would always know when you are nearing the danger point. The main structural beam would also be instrumented ; in this case a photo-electric cell would do the job. The dashboard would include position indicators and rate meters, so that a complete picture of the ship's performance can be had at all times. It would so to say be a floating laboratory and be useful. Although I realize that I can at present only dream about this ship, it has become a very special project with me, and I am very serious about it all. Some people may say that the whole idea is impractical, but I would certainly like to see this ship built sometime. It would sail at over 7 knots on the least provocation, it would be a phenomenal ghoster and have a maximum speed somewhere around 25 knots, perhaps more. It would sail summer and winter, blow high, blow low ; it would be as much at home among waves as the dolphin is, it being totally enclosed and self-contained ; it would make phenomenally short passages. I do not care what they say, but this is what our yachts of the future will look like. One of the schemes considered is a tri-point wheel arrangement with the two main wheels retracting into the wing. They would be power-driven, so that one could beach the boat from the cockpit and taxi short distances on the land. Another study is boundary layer restimulation to prevent flow separation and make for phenomenal ghosting speed ; a gas-filled spinnaker-top has also been given serious thought. And of course the idea of retractable hydrofoils naturally occurs. It would not be possible to build all these things into the boat, or would it ? The design of all these systems is enough of a hobby for years. The basic craft would have the characteristics quoted at the beginning of the article.

The weight problem is of course the most difficult of all. No matter what you do, you will never have the boat as light as you would want her to be. The name of this dream-boat is simply " Achilles."

TRIMARAN CONVERSION UNIT

Many people are interested in converting a Canadian canoe or a similar tender craft into a sailing trimaran and this would undoubtedly produce a cheap sailing craft.

Julian Allen sends us this drawing of one such conversion unit, which is self explanatory. Each cross beam is hinged at the gunwale and the float-leeboard can be retracted out of the water when not



wanted or for beaching. The cross beams can be attached together rigidly when sailing.

This shape of float might be suitable for many boats but floats like those of the *Parang* design, described in No. 18 would be more suitable for others and retractable hydrofoils would suit still more types. The rule here is that the greater the stability in the main hull, the greater should the float become like a hydrofoil and less like a float. The *Parang* hull needs floats such as are in the design, whereas a converted Montague whaler would be more happy with hydrofoil stabilisers.

This whole matter is almost an unexplored field and members would be well rewarded by studying it. I feel sure that the light cruising yacht of the future will be like a whaler with a transom and stabilised by hydrofoils.

ALOHA EXPERIMENT

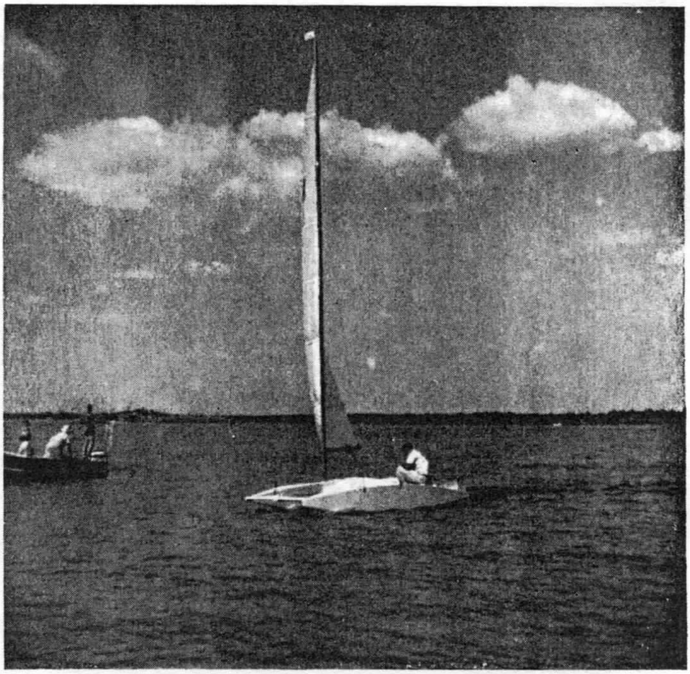
by

R. A. Schroeders,

120 Wottlin Drive, San Antonio 13, Texas.

The 1958 *Aloha* Experiment was an effort to overcome the faults of Catamarans then known, not going to windward well in light airs, and not coming about well.

Experiments were conducted on models, and it was found that one long hull and one short hull would come about almost as well as a single hull.

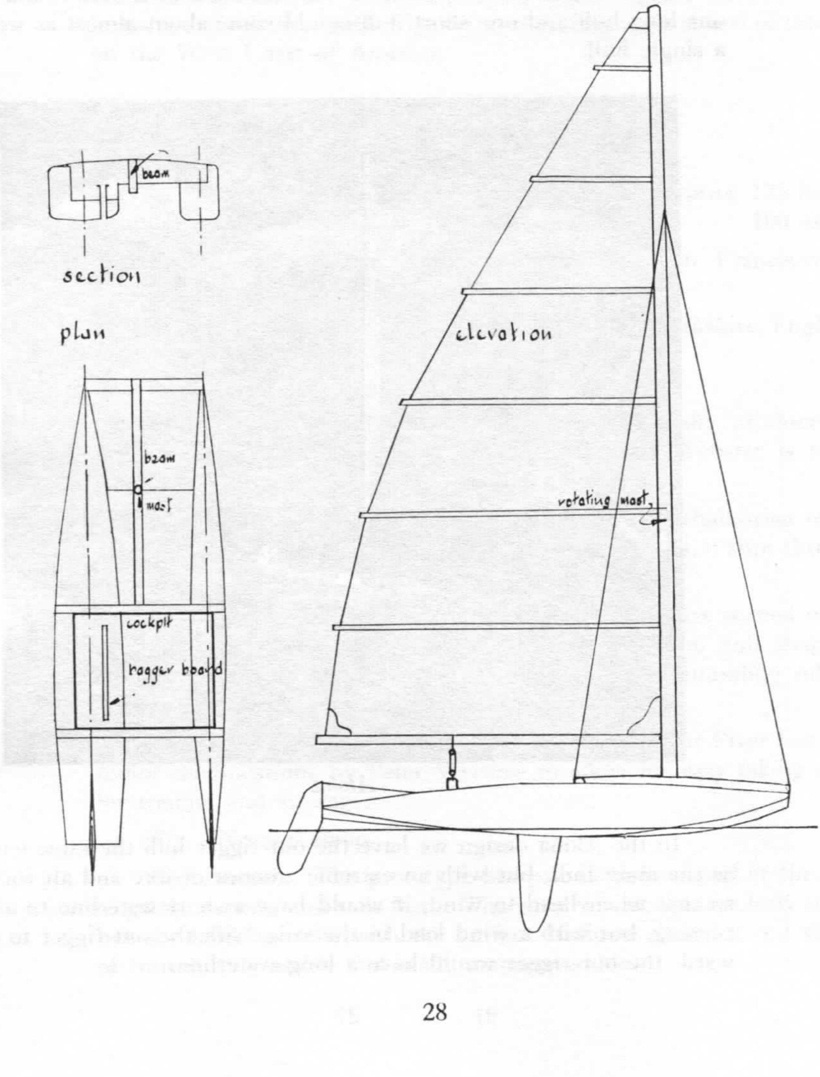


Aloha

In the Aloha design we have the out-rigger hull the same length as the main hull, but with an extreme amount of fore and aft rocker, so that when head to wind, it would have a short waterline to allow turning, but with a wind load in the sails, with the out-rigger to leeward, the out rigger would have a long waterline.

With the profile shape of the hulls as a constant, the width of each hull was calculated so that the total wetted surface was a little less than the International 505, which has about 39 sq. ft. at 680 lbs. displacement.

One dagger board through the main hull was used, as the actions of some of the catamarans suggested that they did not have enough board. It did not seem to be sound engineering to have the board come down through the centre section, as it had to go so far before it even got to the water, causing too much leverage on the trunk.



A single fully battened sail was used, containing 156 sq. ft measured and 208 sq. ft. actual, because it was thought the battened sail was more efficient, and that it would reduce flogging when coming about. An elongated rotating mast was used to make a better airfoil, and to steal sail area. The mast was placed in a position between the hulls, which was proportionate to their cross sectional area.

The weight of *Aloha* came out at 400 lbs. even though the construction was very light. This upset some of the calculations so that it had to be sailed single-handed to come within the calculated displacement.

The performance of *Aloha* was very good in light airs, the single large sail being very good from a tactical point, as it was in better wind gradients being 6 feet higher than its principle competitor at the time of testing. The speed on a triangular course was almost as good as the 505 against whom she was tested.

A surprising development was that *Aloha* was faster with the out-rigger to leeward. She would plane on this tack with ease, but would not plane at all, with the out-rigger to windward.

The cat rig did not do well in anything over 15 m.p.h. It seemed that the addition of a small jib of 40 sq. ft., and a reduction of the same amount in the main, would have been better. Wind gusts then could be parried by letting the mainsail luff, and driving with the jib, as is done in sailing a dinghy. A side benefit of the large mast was the fact that when a capsize occurs, the flotation of the mast will not let the boat turn bottom up, the mast was made watertight for this purpose, the main halyard went up in the sail grove, the sheave box was independent from the hollow of the mast. *Aloha* was capsized, and righted by the crew, no difficulty being experienced.

The performance of *Aloha* is still less than that of the International 505, but better than any slower boat. The main objectives were accomplished, mainly going to windward, and coming about.

There are two areas for improvement in this design, reduction of weight, and improvement in sail plan.

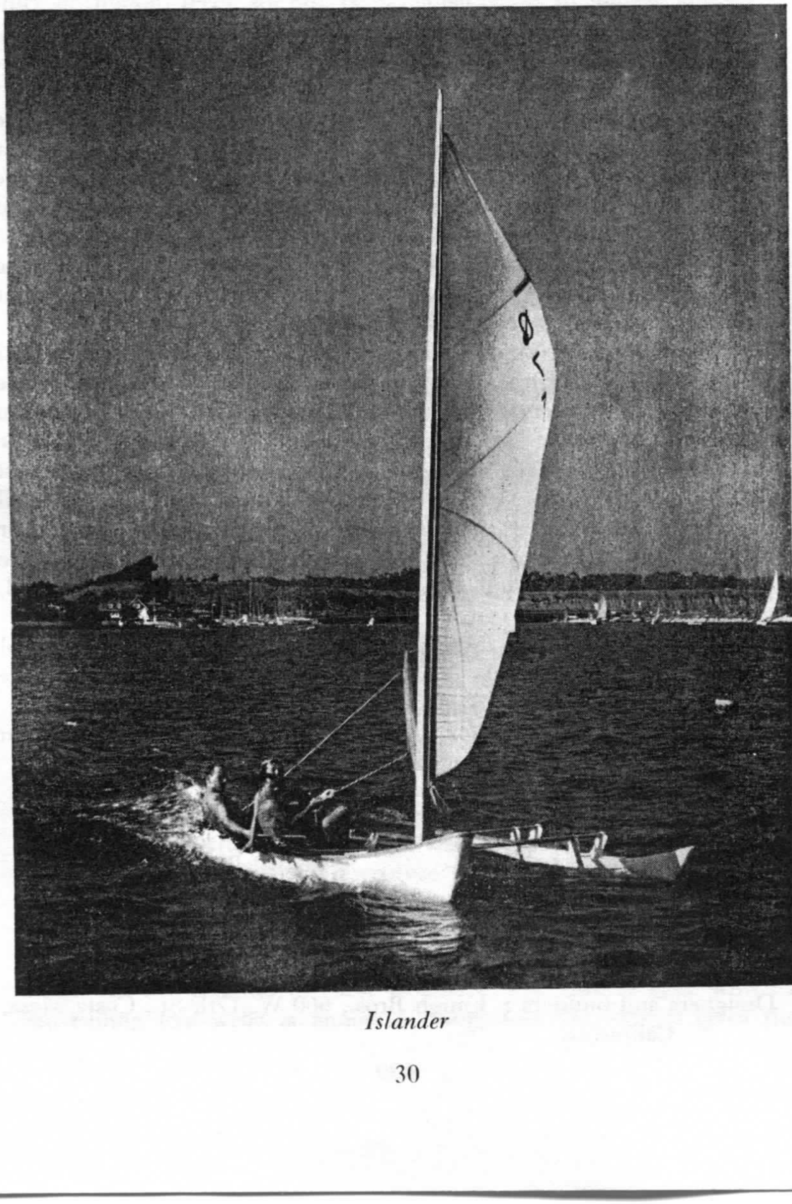
ISLANDER — A POLYNESIAN CANOE

L.O.A.	16′	Outrigger float L.O.A.	13′
Beam O.A.	11′	Weight complete	200 lbs.
Beam, hull	3′		
Draught, bare boat	4″	Sail Area	133 sq. ft.
Draught, 3 adults	10″	Price	$995.00.

Designers and builders : Emigh Bros., 660 W. 17th St., Costa Mesa, California.

If the speed of a boat were to depend on weight only, this must be the fastest 16′ boat in the world because I have yet to hear of one which is lighter than 200 lbs. Speeds of 25 knots are claimed for her.

The Main Hull. This is made of fibreglass, filled with polyurethane expanded foam. She is thus unsinkable and free of maintenance.



Islander

The craft is designed to be launched through the surf of the Californian beaches like the *Malibu* outrigger.

The Float. This is long and narrow and obviously of excellent lines because it looks from the photograph as if the shorter float is slipping more easily through the water than the main hull as opposed to the condition with shorter fatter floats.

The Outrigger Beams. These consist of two round poles, attached to the main hull with flyboats and to the float with streamlined struts. The wind resistance of this system must be about the least possible and this must be one of the greatest factors for speed with this craft.

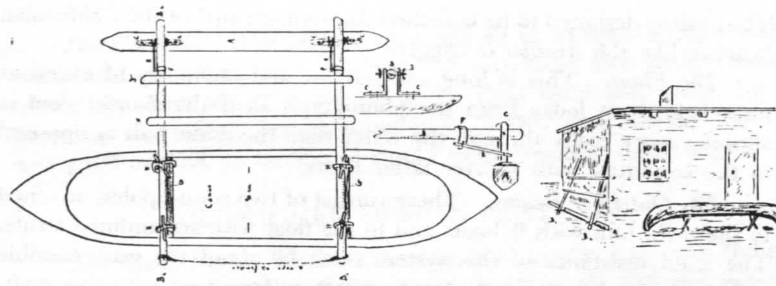
Sail Rig. The single sail on the unstayed mast is simple to handle and probably as good as the sloop rig on such a fast craft. The weight of the mast in the bow of the narrow hull seems to produce no obvious tendency to bury the bow.

Summary. The *Islander* appears to me to be a craft which is about perfect for her purpose.

STABIL — A POLYNESIAN OUTRIGGER

One of the first objectives of the A.Y.R.S. was the production of a light one-man cruising craft which could be carried up a beach

Stabil



Stabil

and provide camping facilities. Here is such a craft which is due primarily to the initiative of A. E. Bierberg, of Denmark.

The main hull is the commercial Canadian canoe, the entire outrigger being of the conventional Polynesian type of two cross beams lashed to the thwarts of the canoe with Spanish windlasses. The connectives between the cross beams and the float are small metal angle irons with an oblique stick or rod to give sideways rigidity.

The craft is a paddling canoe meant for the Danish lakes but there is no reason why it should not also be s a i l e d either as a Polynesian type or in the Micronesian fashion as described in A.Y.R.S. No. 16, Page 33. The little tent over the middle is most delightful.

One of the beauties of this craft is the ease with which it can be taken apart for towing or storage and A. E. Bierberg's sketch of the typical Danish summer house with the canoe on supports and the outrigger leant against the side shows most effectively how this can be done.

Summary. The lighest and cheapest cruising craft under sail or power is the Polynesian or Micronesian canoe such as this. Though not suitable for the larger sizes, this type should have a big future.

PACIFIC ATOLL — A MICRONESIAN CANOE

L.O.A. 5.80 m. 19′ — Float : L.O.A 3 m. 10′

Beam O.A. 3.00 m. 10′ — Beam on deck. 38 m. 17.8″

Depth .18 m. 8.5″

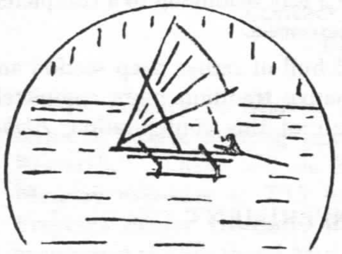
Mainhull : Beam on deck 0.60 m.

Beam on bottom 0.11 m. Outrigger boom 3 m. 10′

Depth 0.80 m.

Sail Area : 5.5 sq. meter, 55 sq. ft.

Designer : A. E. Bierberg. Builder : Carl Duus.

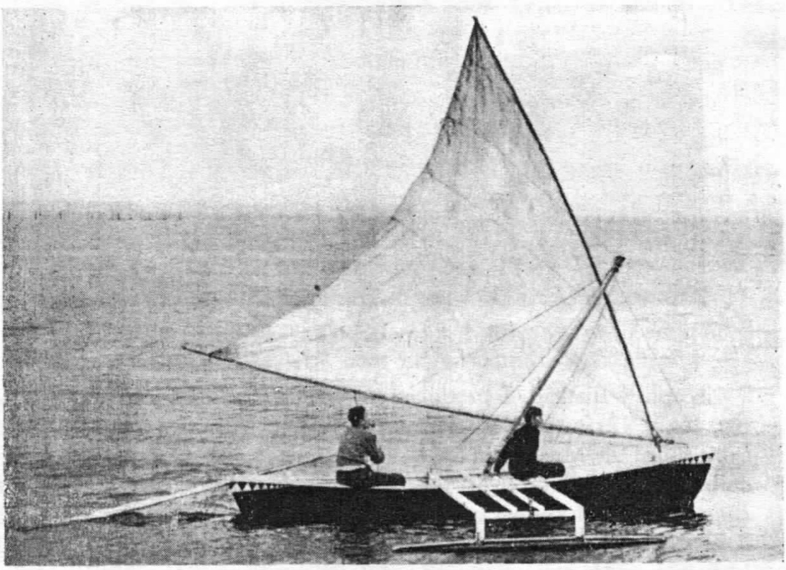


Under the auspices of our Scandinavian Correspondent A. E. Bierberg the very first single outrigger with asymmetrical hull, rigged in the Micronesian way has been made in Denmark by Mr. Carl Duus who has taken this interesting craft into the open sea.

All the details of putting about with Micronesian canoes have already been given in A.Y.R.S. No. 16 so as to keep the outrigger always to windward and how to take the tack of the isosceles sail which is the apex of the triangle from one end of the boat to the other.

For cheapness, the boat is built of pine and Masonite — a type of hardboard. The joints between the boards and the seams are caulked with hessian string and white lead.

The Micronesian Canoe has a fascination all of its own. This is mainly due to the completely new set of reflexes needed to sail it and the different concept of beating to windward. There is also the



Pacific Atoll

fascination of doing a familiar thing in a way belonging to a completely different culture ; that of distant Micronesia.

Pacific Atoll has an asymmetrical hull of rather deep section and no centreboard, thus following the native tradition more completely than in Mr. Bierberg's previous craft of this configuration *Aloha*, described in No. 16.

A TRISCAPH EXPERIMENT

by

W. J. E. Moorcroft

An article on triscaphs by Hugh Barkla in *Yachts & Yachting* several years ago started it. I was not interested in traditional types of craft and wanted an efficient sailing machine. I listened at first to the advice of a colleague who had nearly fifty years experience of sailing so that I did not start my boatbuilding by trying to produce

W. E. Moorcroft's Triscaph

a triscaph. Instead, I produced an all metal dinghy of about normal size for a 12 footer but of unusual design and steel plated. Later, I produced the Mark II in light alloy which was outstandingly successful despite the prejudice of the old school against metal craft. *Le Bidon II* is well known on the Bristol and Warwick Avons and in the Bristol Channel where she is handicapped to sail on level terms with 14 footers. Her all up weight is 130 lbs. and her sail area is 105 square feet.

I might have been content with this but still had the urge to build a triscaph. My colleague tried to discourage me by telling me that I should never be able to turn one on the Bristol Avon, where I was then sailing. That clinched it. I am a stubborn blighter and the easiest way to get me to do anything is to tell me I can't do it. I decided to design a triscaph that would turn in the 70 to 80 feet available at Saltford.

The hulls had to be kept short or the overall length would have made it awkward to turn, even without the straight line tendency of the multi hulled craft. They were made free to pivot up and down about their centres of buoyancy and the after hull was also free to turn independently, if necessary, controlled by a tiller. Normal steering was by rudder which, on account of the pivoting, had to be Bowden-wire controlled.

As her overall beam was 9 foot, she had to be made so that she could be transported in five sections viz., three hulls, the fuselage, and the spar connecting the forward hulls. I fetched her back recently from Oldbury on Severn, where I had sailed her earlier this year and it took 35 minutes to take her to pieces, ready for transport.

The Hulls are wooden framed planked with $\frac{1}{8}''$ Masonite and are of diamond section with four diaphragms dividing each into five watertight compartments. Overall length of hulls 7′ 10″. Total buoyancy 500 lbs. each and weight 40 lbs. each. The all up weight of the craft, including streamlined metal mast and sails is just over 200 lbs. The cost of all materials was just under £12.

The fuselage is approximately 14″ clear of the water and is of a wooden skeleton frame, well strutted and with gusset plates of Masonite all glued as were the hulls with Aerolite 306. Metal fastenings throughout the craft are kept to a minimum and even heavily stressed parts rely on the glue.

Up to now, the rig used has been the 105′ from my 12 footer and this is about 50 square feet short of what she wants.

Performance. I sailed her on the river and found that I could turn her in narrow waters but she is more fun in open water where she has, with her present rig, about the same speed as a 14-ft. *Dayboat.* In the sea, I found that she moved faster when the water was slightly choppy than in calm water, where she seems to drag a lot of water after her. When the wind freshens, I have occasionally to get out on the weather hull to prevent the lee hull diving. Rudder control was a " finger and thumb job," and in a light breeze, I could cleat main and jib and lie down in the cockpit with the tiller resting on my shoulder. I actually dozed off this way on one occasion and was roused by another helmsman hailing me. One could carry a tumbler of water on the floor of the cockpit all day without spilling any. After a light twelve-footer, sailing became rather tame.

Alterations. I intend to extend the hulls aft and reduce the diamond section to a horizontal knife edge. This should reduce the drag on the transoms and give a longer planing surface to the hulls which, for open water are strutted down to cut out all pivoting.

Next season, I hope to get some more practice and find out more about the "habits of the beast."

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