CATAMARANS 1959

A.Y.R.S. PUBLICATION No. 28

THAI III

CONTENTS

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EDITORIAL

December, 1959.

The A.G.M. of the British A.Y.R.S. will again be held at " The Cedars," North End Road, near Earls Court on the first Saturday of the Boat Show, the 2nd January, 1959 at 11 a.m., finishing at 1.30 p.m. Light refreshment will be available. Matters for the Agenda can be sent to Tom Herbert now. It is requested that as many of the aerodynamic and architectural members as possible will attend as the matter of greatest importance will be the structure of the wind tunnel and whether or not to have a test tank. It is most important that the Hon. Editor shall have as much advice as possible before erection starts.

THE BOAT SHOW

Members are again reminded that our stand at Earls Court is No. P3. Mrs. Morwood still needs help and offers of this will be much appreciated.

SAILING TECHNOLOGY LECTURES

Erick Manners will again be giving a series of lectures at the Municipal College, Southend, Essex, starting in January, 1960. Sixty-six people attended last year and more are likely to attend this year. The subjects include : Theory of Sailing, Progress in Sail, Outriggers, Naval Architecture, Sail Design, Catamaran Research, Design, Construction and Sailing, High Speed Boating, Trimarans, Hydrofoils, Sailing Aerodynamics and Hydro-Mechanics. Erick has made a film of eight different catamarans sailing which lasts three quarters of an hour. This will be shown and it can also be obtained by Yacht Clubs for their winter programmes.

INTRODUCTION TO CATAMARANS 1959

The fastest catamaran in the world at the moment for her size is undoubtedly THAI III, designed by Roderick Macalpine-Downie. This was shown in the British ONE-OF-A-KIND races where this craft beat Donald Robertson's larger FREEDOM in 3 of the 6 races, boat for boat with the Prouts' COUGARS 3rd and 4th. This result was achieved by extreme lightness, good design and, of course, excellent helmsmanship by John Fisk. Early this year, Roderick MacAlpine-Downie was hoping to build the present THAI III to weigh 200lbs. complete with rigging but the final figure of weight is not yet known, though this figure has nearly been achieved.

Catamaran Hull Design. This has now settled into a shape which is not likely to be much improved in the forseeable future. THAI III's hull is not greatly different from Don Robertson's FREEDOM, the main difference being a slightly lower transom and more V'd sections and an overhang forward, reminiscent of Bob Harris's Ocelot, shown in A.Y.R.S. No. 10 AMERICAN CATAMARANS.

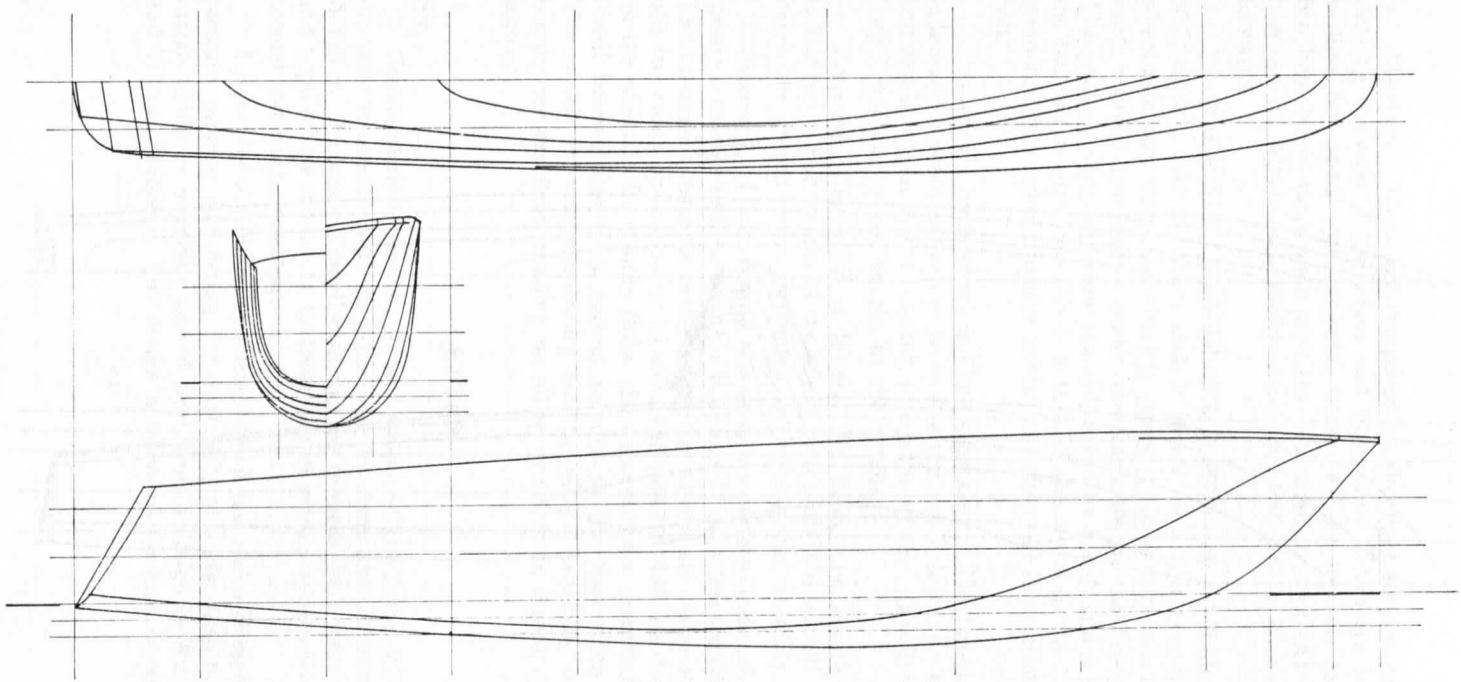
For the guidance of catamaran designers, and to give credit to the people who have not only designed nicely shaped catamaran hulls but have been public spirited enough to allow their lines to be published, the following designs seem to have all the essentials for speed : FREEDOM by Don Robertson. A.Y.R.S. No. 22, page 20. TEMPEST by J. Fenwick. A.Y.R.S. No. 22, page 44. This catamaran never has done well in any races due to her heavy weight from fibreglass construction but, if made light enough she would perform well.

GOLDEN MILLER by Michael Henderson whose lines are given opposite. This is of course, a cruising catamaran with fin and bulb keels but the hull shape is that which would give a small racing catamaran speed, if built lightly.

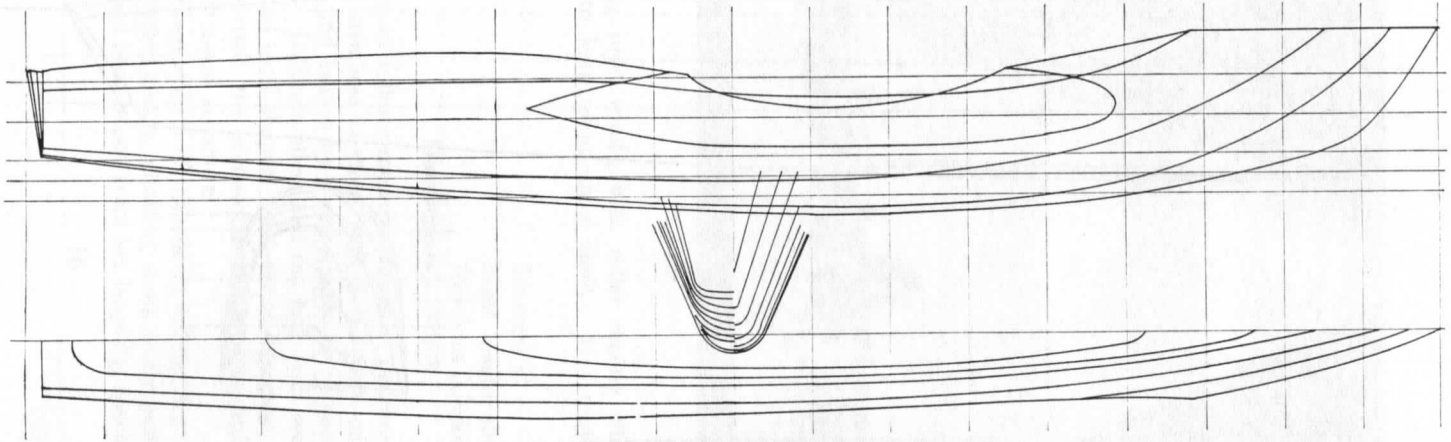
TRIDENT by William Baur whose lines are also given here. This is a largish cruising trimaran hull but the lines are so like those of THAI III that there can be no doubt that great speeds will be inherent in them.

Two further catamarans must be mentioned as having nicely shaped hulls but both are light weather craft, in my opinion, and, though possibly faster in airs would not show the same top speeds.

VELOCE CATAMARAN by L. Le Marrec of Monte Carlo· A.Y.R.S. No. 22 page 40. SEATONIC by Eric Seaton A.Y.R.S. No. 27 CRUISING CATAMARANS. This again is a large craft with lines suitable for a small racing catamaran but the fineness aft and counter would limit the top speeds.



Golden Miller



Trident

THE COUGAR, SHEARWATER III and SWIFT CATAMARANS

Readers will naturally want to know how the Prout range of racing catamarans will compare with those mentioned above. The answer lies in durability, weight and helmsmanship, not really in the hull design.

A COUGAR, SHEARWATER III or SWIFT is unlikely to break when sailed hard over a season and is relatively light for its durability. If one of the above mentioned catamarans were of the same weight as its relative member of the Prout series, a race between the two would go to the better helmsman. However, one cannot but think that the finer bows and flatter runs aft of most of the craft mentioned above must help them at speed compared with the Prout series, though in actual racing this has never been apparent as the craft which have beaten the Prout craft have nearly always been lighter in weight. At speeds of 8 to 12 knots or thereabouts, the SHEARWATER III or COUGAR have less resistance than all others.

JUMPAHEAD

This catamaran, designed by Bill O'Brien doesn't fit into the picture easily as it is a chine catamaran with a very fine bow and very flat run and wide transom. Its speed is, if anything, only the barest fraction worse than SHEARWATER III but it carries more sail area. One can say that the hull resistance is definitely greater than that of SHEARWATER III as it is the same weight.

CATAMARAN MANOEUVRABILITY

It has now been clearly shown that, with shallower hulls of rounded section, cut away forefoot, flat and shallow transom and concentration of weight, buoyancy and wetted surface just aft of amidships, a catamaran can be put about as quickly as one wishes. This makes the need for full Ackerman linkage of the rudders, as described in No. 22, page 12, unnecessary.

LEE BOW BURYING

The theory of this has not been fully worked out as yet. However, some definite facts emerge from the accounts which have been sent in. The first of these is that almost without exception, the catamarans with a Cat or Una rig and the mast placed well forward as it must be to get sail balance, bury their lee bow. On conversion to a sloop rig, this stops. Too much weight forward has the same effect, which

is the main reason for not decking between the hulls right to the bows, though decking in this part causes resistance from the waves hitting underneath and from the wind.

From the foregoing, it looks like being a matter of weight only being too far forward but the 40 to 60lbs. of the rig being a couple of feet different could be balanced by the crew sitting a few inches further back. Another explanation is that this displacement of the moments of weight fore and aft makes the craft more stable in pitch and so the craft tends to go through waves, rather than rising over them.

Hull Explanations. On reaching its top speed, any dinghy or catamaran will bury its bow and tip up forward due to the centre of effort of the sails being high up. This will hold even with planing dinghies whose bows have to be held up by the weight of the crew coming aft. However, dinghies seldom reach this state as a sideways capsize will usually occur first. Catamarans, due to their relatively great lateral stability, will easily get to this state and it is the fore and aft stability which limits a catamaran's speed, rather than the lateral stability, as pointed out by Michael Henderson.

Fine bows will stick in the water less soon than broader ones and those with very deep V's and get to a higher speed but are more sensitive to weight forward, which includes the pitching moment of the sails. Flat runs aft will pull the transom down by dynamic action and also delay bow burying.

Conclusion. Fine bows and a broad flat run, combined with the mast being placed further aft (with larger headsails, if desired) should reduce bow burying. It is noted that several accounts of " Mast-aft " rigs state that the " lift " from the sloping jib raises the bow but the weight of the mast aft may have not a little to do with the rising of the bows. The sloping jib may lift the bows on a reach, especially if the jib is boomed but probably has no such effect close hauled.

THE " ONE-OF-A-KIND " RACES

The principle of these races is that only one of each class of boat is allowed to enter in order that boat shall be pitted against boat, rather than that helmsmen shall be pitted against each other as with normal yacht racing. The courses are so arranged that tactics play a small part and the winner of a race can be presumed to have the fastest boat. There have been several series throughout the world this year but the two which are of most interest to us are those at Miami, Florida and those at Westcliff-on-Sea, Essex.

Miami, Florida, February 21-23, 1959. Races sponsored by *Yachting* and held at the Coral Reef Y.C.

Order of finishing :		Placing on corrected time :	
1	A Class scow (38 feet long)	1	TIGERCAT
2	TIGERCAT (17 feet long)	2	COUGAR
3	COUGAR (18 feet long)	3	International Canoe.
3	(tied) E Class scow	4	SHEARWATER III
5	FEVER	5	505
6	WILDCAT	6	A Class scow
7	SHEARWATER III	7	JOLLY BOAT
8	RAVEN	7	(tied) WILDCAT
9	MANU KAI	9	E Class scow
10	FLYING DUTCHMAN	10	FLYING DUTCHMAN

In these races, the A Class scow usually quickly got a big lead, followed by the E Class scow, followed by TIGERCAT and COUGAR fighting it out for third place. These four boats formed the leading group in 3 of the 5 races and all other competitors came in two later groups.

The Boats.

Tigercat was designed by Bob Harris, the former Hon. Sec. of the American Section of the A.Y.R.S. Details of it are given elsewhere in this publication.

Cougar was designed by G. Prout & Sons and is approximately a SHEARWATER II. A stock boat was used which had just been uncrated on the morning of the first race and thus was not quite in top racing trim.

The International Canoe was sailed by *Maestro* Lou Whitman.

Westcliff-on-Sea, Essex. September, 1959. Races sponsored by the Royal Yachting Association and organised by the Thames Estuary Y.C.

This series of races was entirely confined to catamarans and was instigated by the R.Y.A. in order to evaluate them and form a basis for handicapping. The results of the 6 races are as follows :—

Corrected Times :

1	1	2	2	2	2	FREEDOM. Donald Robertson.
2	3	1	3	1	8	COUGAR I. Roland Prout.
3	5	3	4	3	5	COUGAR II (Fibreglass) Ken Pearce.
5	6	5	5	4	7	SUPER CAT (SHEARWATER III, 1 C.B.
6	4	7	7	5	6	COOL CAT (JUMPAHEAD).

4	2	6	6	7	3	SHE GOES (SWIFT).
7	7	—	—	—	9	KITTIWAKE
8	–	9	8	6	11	BUBBLE (MERCURY)
–	–	4	—	—	4	ALBATROSS (SHEARWATER 2 C.B's).
–	–	11	12	11	14	14 S. CATAMANNER
–	–	—	10	8	10	RIVER CAT (Single handed)
–	–	—	1	—	1	THAI III Roderick MacAlpine-Downie WAVERIDER
–	8	8	9	8	12	R.S. CATAMANNER
–	–	11	11	10	13	FLAMINGO. Cruising catamaran
–	–	10	—	12	—	SKAUBA

These races were a triumph for Donald Robertson, the amateur and Roderick MacAlpine-Downie who spent some 18 months designing and redesigning his THAI catamarans. Members may remember the model of an early design we had on our stand at the Boat Show in January, this year. Both are A.Y.R.S. members and both designed and built their catamarans themselves.

The Boats.

Freedom was fully described in A.Y.R.S. No. 22 CATAMARANS 1958 and is mainly characterized by a good hull shape and lightness.

Thai III is described elsewhere in this publication and has a shape of hull which will appeal to readers as being what they feel is traditional in general but with those certain modifications which make it suitable for a catamaran. An overhang forward, a low prismatic coefficient and a flat run aft with a wide transom are the main characteristics. V'd forward sections and a fine entry develop into a semicircular maximum section which is aft of amidships, the centre of the semicircle being above the L.W.L. The wide flat transom drags by about an inch of immersion. The structure is most carefully stressed to give the extreme lightness on which her speed largely depended. Unfortunately, rigging trouble with an experimental arrangement put her out of a pair of races when in the lead ; a collision at the start which carried away a rudder put her out of a third, and she was disqualified for being over the line in a fourth, in which she finished first. She also made the fastest timed run.

Cougar 1 is a moulded ply 18′6″ catamaran by G. Prout and Sons, Canvey Island, of the same hull shape as the Shearwater II.

Cougar 2 is almost identical, but with fibreglass hulls.

Cool Cat the Jumpahead, was consistently well sailed and proved herself only a shade slower than the Shearwater 3, beating her in 2 races.

She Goes, the Prouts new 14′ Swift of the same hull shape as the Shearwater, went wonderfully and surprised many by beating the Shearwater 3, as well as many other larger boats, to take second place on corrected time in the second race.

Kittiwake, from Sark, was one of the most interesting boats present. 16 feet long, she was amateur built with round bilge hulls ingeniously made from sheets of flat ply, beautifully built and finished and extremely stylish. She had very bad luck breaking her mast, a straight compression failure.

Albatross, the twin board Shearwater, got two 4th places, but was dogged with troubles.

River Cat, designed by Bill O'Brien and described in A.Y.R.S. No. 15, CATAMARAN DESIGN, did well in the strong winds. At times she was unmistakably planing, and travelling very well.

14′ *Sports Catamanner* is a well shaped but heavy fibreglass boat which nevertheless went well.

Flamingo, the 36′ Prout cruising catamaran described in A.Y.R.S. No. 27, CRUISING CATAMARANS, and owned by Donald Robertson, went well and with deceptive sedateness, proving as fast to windward as any, but somewhat inferior downwind and reaching.

Bubble is a MERCURY class catamaran, described in A.Y.R.S. No. 22 of chine construction for home building. She has never had a chance to be fully tuned against good racing competition.

Waverider, is a deep V hull sectioned catamaran, I believe.

Skauba. No information is available.

THAI III

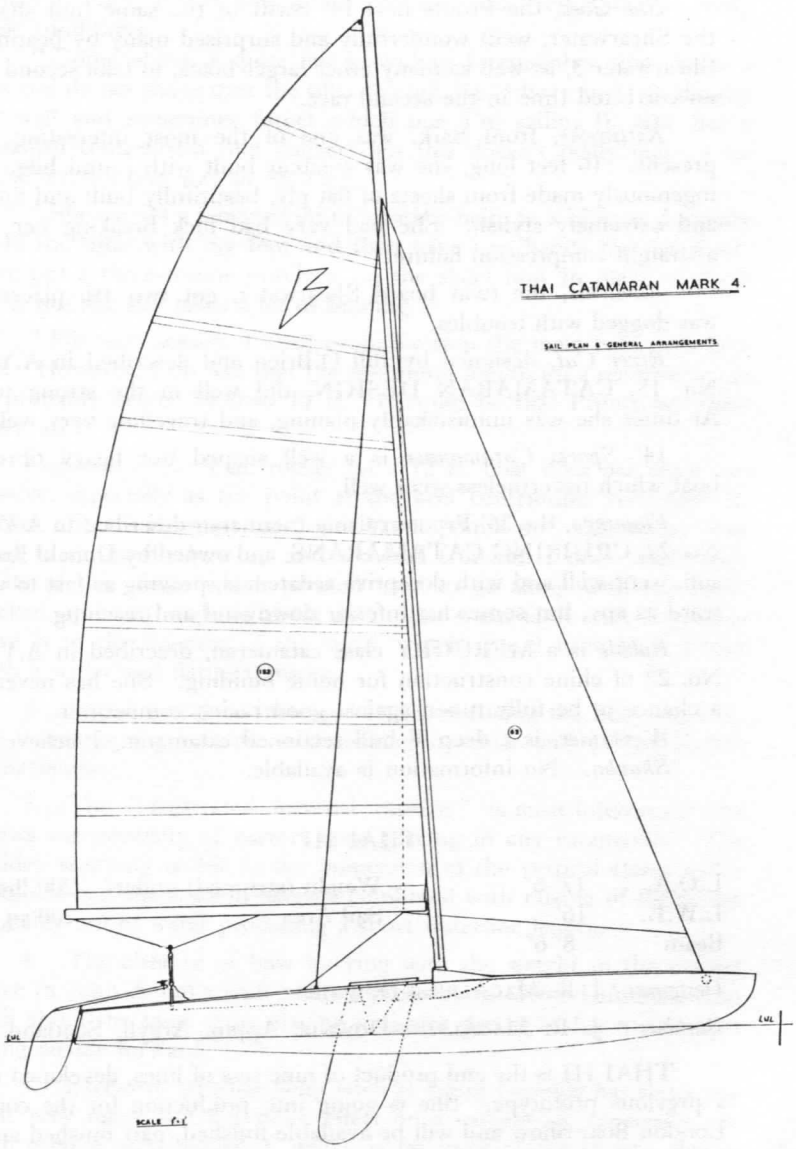
L.O.A.	17′ 6″	Weight (stripped) under	200 lbs.
L.W.L.	16′	Sail Area	200 sq ft.
Beam	8′ 6″		

Designeri : J. R. MacAlpine-Downie.

Builders : J. R. MacAlpine-Downie, Appin, Argyll, Scotland.

THAI III is the end product of nine sets of lines, developed from a previous prototype. She is going into production for the coming London Boat Show and will be available finished, part finished and in kit form. Hulls are of fibreglass with moulded-in centreplate cases. Moulded agba hulls are available for those who like varnish.

Modifications are being carried out, in the light of racing experience, to improve both her appearance and her performance,



particularly to windward. The sail area is also being increased to 215 sq. ft. of higher aspect ratio, on an alloy spar.

Although I have myself trailed her over 800 miles, flat, without

the least trouble from either traffic or police, for greater convenience a light, cheap tipping trailer is being marketed with her to reduce her effective beam to under 6'.

She is very lively and responsive to sail, and quick in stays.

Pi-Cat

THE PI-CAT CATAMARAN

by ARTHUR PIVER, Mill Valley, Calif.

LOA 17′ Beam 8′ Draft (less boards) 9″ Total sail area 200′

Pi-Cat is the result of an inability to accept certain apparently intrinsic limitations in catamarans.

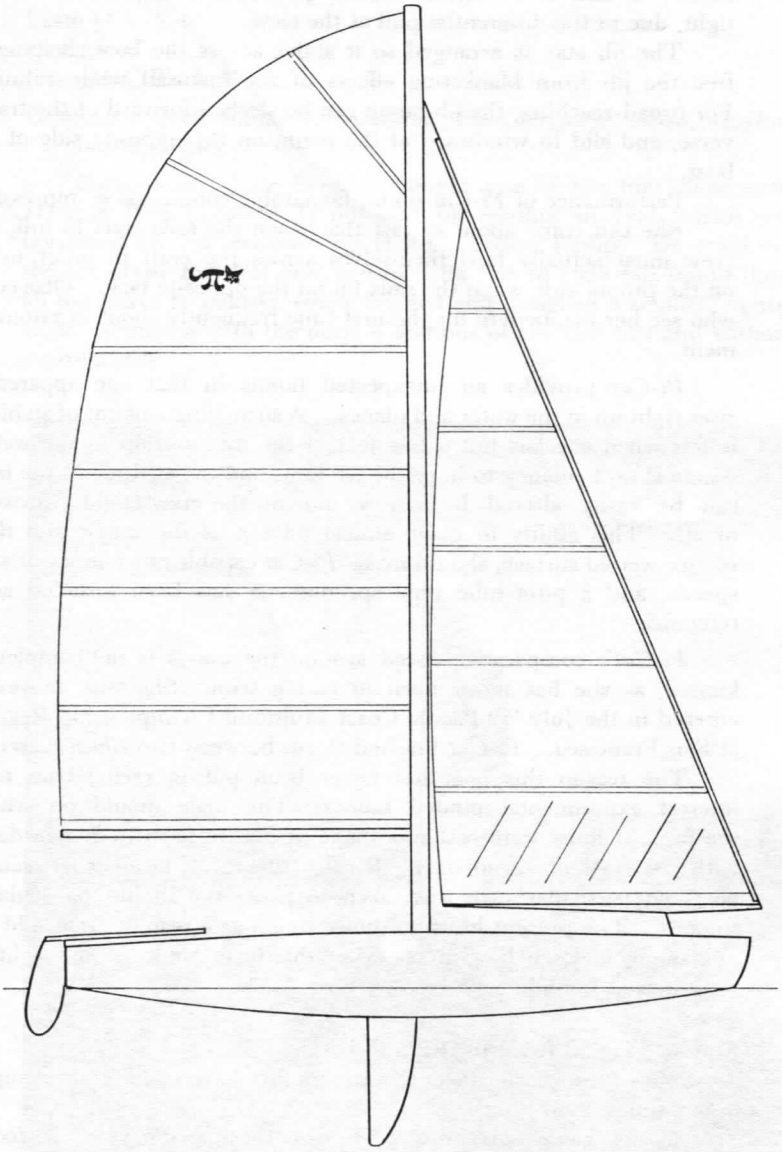
Manoeuvrability. It was felt that the turning rate of the craft should be limited only by the speed with which the crew can move across the boat while putting about.

Hull Form. It was felt that the traditional destroyer shape now widely favored could be definitely improved upon. Full, round bows, which cause pounding and pitching, should be replaced by finer ones more conducive to smoother operation. Full bows were formerly felt necessary to avoid diving of the lee bow. It was felt that the answer to this problem was weight distribution, instead of full bows.

Pi-Cat has perhaps the most complicated hull form yet seen on a catamaran—possible only with the adaptability of fibreglass. The bow is quite fine, with hollow sections. There is, however, a flare at the deck line which reduces spray and which is expected to keep the boat from driving under even when sailed full speed down the face of breaking seas. This it has so far successfully done.

Forward underwater sections are V'd in order to present an easy entrance. The form changes to semi-circular just before the mid-point. The semi-circle is continued almost to the stern, where in the last foot or so it changes to an almost flat section at the transom. This flat section, which is normally above water, prevents pitching which might be expected with the high degree of rocker which is a characteristic of this particular hull. The generous rocker aids manoeuvrability and keeps wetted surface at the minimum for light airs.

To help keep the lee bow from diving, the mast was moved aft to the mid-point. This resulted in a large jib. In an effort to aid handling this sail, a balanced jib boom was used. This was based on experiments with this arrangement on the 20′ trimaran *Caper* last year. A report of a similar sail on the catamaran *Freedom* in A.Y.R.S. No. 22 gave further information. As can be seen in the illustration, this jib has a large transparent panel of *Mylar* film—a common-sense idea for any fast boat. This particular sail has an adjustable draft arrangement. When the clew is moved forward and aft to vary the camber, control lines to the lower guide batten extend and retract automatically and proportionately. The balanced jib has proven



Pi-Cat

most satisfactory. Its use removes much of the pull from the jib sheet ; it acts as a built-in whisker-pole ; and keeps the fore stay tight, due to the differential pull at the clew.

The jib stay is arranged so it slides across the boat, helping to free the jib from blanketing effects of the mainsail while running. For broad-reaching, the jib boom can be slacked forward of the transverse, and slid to windward of the main, on the opposite side of the boat.

Performance of *Pi-Cat* under favourable conditions is impressive.

She can come about so fast that when the sails start to luff, the crew must actually hurl themselves across the craft in order to be on the proper side when the sails fill on the opposite tack. Observers who see her manoeuvre for the first time frequently shout in astonishment.

Pi-Cat provides an unexpected bonus in that she apparently rises right up in the water and planes. A surprising amount of stability is felt when she has but a few feet of the mid section in the water. There is no tendency to bury the lee bow, and the attitude of the boat can be easily altered by merely moving the crew slightly forward or aft. This ability to plane almost on top of the water, and thus reduce wetted surface, should make *Pi-Cat* capable of some surprising speeds, and a pitot-tube type speedometer has been installed as a reference.

Pi-Cat's comparative speed around the buoys is not completely known, as she has never been in racing trim. She was, however, entered in the July '59 Pacific Coast Multihull Championship Regatta at San Francisco. *Pi-Cat* finished third, between two *Shearwaters*.

The reason this boat has never been put in racing trim may interest experimental-minded sailors. The male mould on which the present hulls were cast was made of plastic form in 2 man-days, with 20 worth of STYROFOAM. Because this was to be an experimental boat, no particular care was taken to make the mould particularly smooth. The present hulls are quite rough as a result. It would be interesting to learn how much faster this boat would be if the hulls were indeed smooth.

Add : THE TRANSPARENT SAIL

NOTE : Since the above was written, we have made some changes in our transparent jibs.

Because these sails wore out first in the upper part of the leech due to luffing, we now use DACRON for the upper part of the sail, with a large lower window only of MYLAR.

The 17′ PI-CAT has the latest version—a balanced jib with horizontal, 3′ wide cloths, fully-battened. The MARLAR window is 3′ deep and the full width of the sail. This gives maximum visibility, but more wear-resistent sail cloth is used above.

The MYLAR windows are no longer cemented in, but merely sewn with wide stitches (1/8″—3/16″ apart). A 2″ wide MYLAR strip is fastened with pressure-sensitive transparent tape near the perimeter of the MYLAR panel, overlapping the sail cloth on each side.

After sewing through both thicknesses of the MYLAR and the sail cloth in between, the stitches are covered with strips of ½″ MYLAR tape in order to keep the now perforated film from ripping. In the corners of the panel, where strain might be concentrated, the MYLAR is left slightly fuller than elsewhere.

TIGER CAT

L.O.A.	17′ 0″	Total weight, less crew	530lbs.
Beam	8′ 0″	Total sail area	235 sq. ft.
Draught	7½″	Measured area	183 sq. ft.
Draught C.B's	3′ 5″		

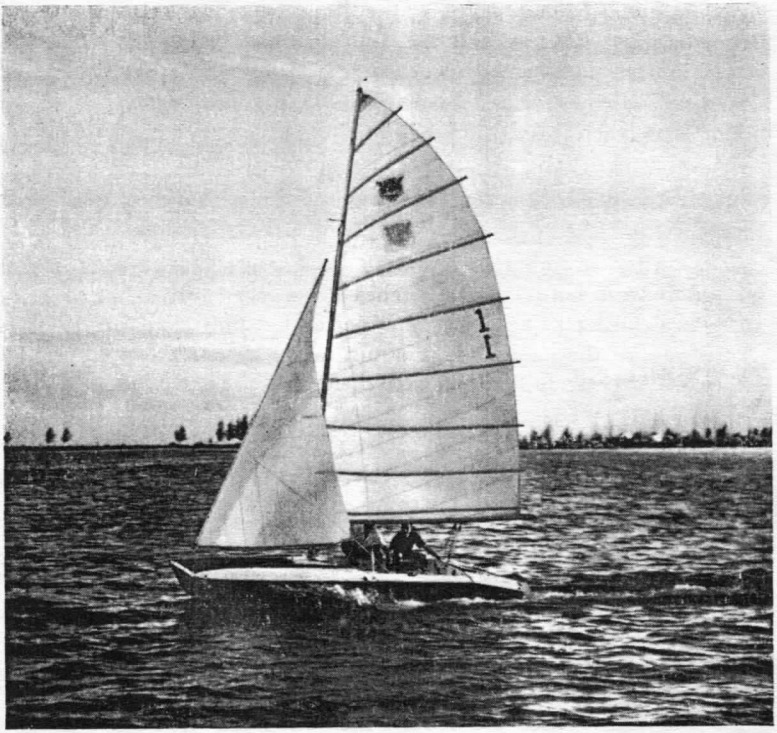
Designer : Bob Harris, 9 Floyd Place, Great Neck, L.I., N.Y.

Hulls. These are 3/16th inch moulded plywood covered with 4oz. glass cloth. The decks are ¼ inch plywood, faced with phenolic plastic. The centreboards are ¼ inch aluminium alloy plate, toed in ½°. Only one board is down at a time, for example the port board on the starboard tack and vice versa.

The Mast. This is elongated in section and also aluminium alloy as is the luff spar.

The Production Model. The dimensions of this are the same as the prototype except for ½ inch reduction in beam. The weight comes out at 55lbs. more. The craft is cleverly cast in two pieces, the upper one comprising the whole top deck and the lower one, the hulls and the underside of the bridge deck. These two pieces are joined at a flange which also forms part of the spray strips.

TIGER CAT won the Miami ONE-OF-A-KIND races, beating the Prout COUGAR so she must be a very fast boat. The production model must be a little slower than the prototype and we can but see what the relative performances of the two craft are in future.



Tiger

5 April, 1959

Dear John.

Kindly accept my sincerest thanks for your congratulatory letter of 20 March re TIGER.

Allow me to say right off the bat that not one concerned with the creation of the TIGER expected that Eric Olsen would be able to beat out Roland Prout, not only from the fact that Eric had had little or no experience sailing the catamaran, but that the designer had himself so very much to learn as yet about the design of small catamarans. I will however venture these comments in retrospect.

1. It was felt by all that the use of asymetrically shaped centre-plates in each hull, both thin plates, and using of course but one at a time, set at an initial angle of incidence to the fore and aft centreline of the hulls gave TIGER her first advantage over COUGAR, using thicker plates, two down, symmetrically shaped. This is probably the second best advantage, if it was one at all. We could not prove any

of these statements actually unless the boats were tested together in tanks under exactly controlled similar conditions.

2. The greatest advantage *Tiger* seemed to have was in the sails. She was carrying a tremendous roach compared to *Cougar*, giving her not only much more unmeasured sail area, (an inequality in the rule) but I suggest that these sails stood better in spite of the roach than the *Cougar's*. Besides this there was of course more measured area.

3. The second most important advantage of *Tiger*, and contrary to the reports you have had is that she had a flatter run and the aft sections were *fuller*, or rather flatter than those of *Cougar* ! *Tigers'* beam at the transom was also bigger. If she was down by the stern a bit it is because the crew was unable to get forward enough to the designed position due to the fact that the helmsman could not then reach his tillers effectively. Perhaps it would be more accurate to say that the extension tillers were not in the best position for this important measure nor were they long enough.

4. For the particular sea and wind conditions, 20 to 25 knots wind, with about a two foot to one and one half foot chop I believe that the greater freeboard and resultant greater height of wing off the water gave *Tiger* a bit less drag at speed than the *Cougar*. There seemed to be considerably more wetting under the wing on *Cougar*. There is also the fact that the underside of *Tiger's* wing is convex, curved upwards, thus allowing water droplets, (thus weight carried about) to be run off more quickly. This has something to do with surface tension of fluids which I vaguely remember from my physics class.

5. There is also a fifth and not so obvious a reason for *Tiger's* performance which rather sums up all of these advantages with the possible exception of the sails, and hull form, that being that *Tiger* was built especially as a prototype to meet the competition of the *One of a Kind*. That is to say that in a production model we would probably come up with symmetrical smaller centerboards thus losing I feel some advantage to weather, although even this is inconclusive since at times *Cougar* seemed to be doing better to weather than *Tiger* on pointing and footing. Anyway I must certainly say that Prout came here with his " stock " model and did very excellently indeed, to wit that there was so very little difference in their times and speeds, and not to mention that the *Cougar* was probably built at a fraction of the cost of the *Tiger*.

We are of course planning to produce the *Tiger*, but she will be all fibreglass, with somewhat lowered wing for daysailing comfort,

the symmetrical boards to eliminate having to change boards coming thru the wind and to make them of less area and weight, total, but we have learned that we will be able to have a somewhat lighter craft, possibly thus winning back some lost advantage otherwise. The hull form will be unaltered, as will the sails and the general configuration. We do not expect to lose much in our stock model, and I believe that putting this model against *Cougar* one will see little or no difference in their performances.

By the way we had a spray rail on the inboard sides of the *Tiger* and we will keep these besides adding two to the outsides similar to *Cougar*, to prevent outside wetting and crew discomfort at high speed.

The centerboards and rudders of the stock model will be of cast aluminum alloy, finding that these will have all of the properties of strength and ductility and anti corrosiveness needed and that they can be produced more cheaply in numbers than any other kind at this writing. We also feel in this connection that the thinner plates are better than the thicker ones, not only from the standpoint of frontal resistance but from the fact that the centerboard slots may have less drag where one is using a swinging plate versus a fitted dagger. The daggers such as Prout has will always be unpopular in our shoal waters versus the swing type especially in view of the speeds capable in these cats.

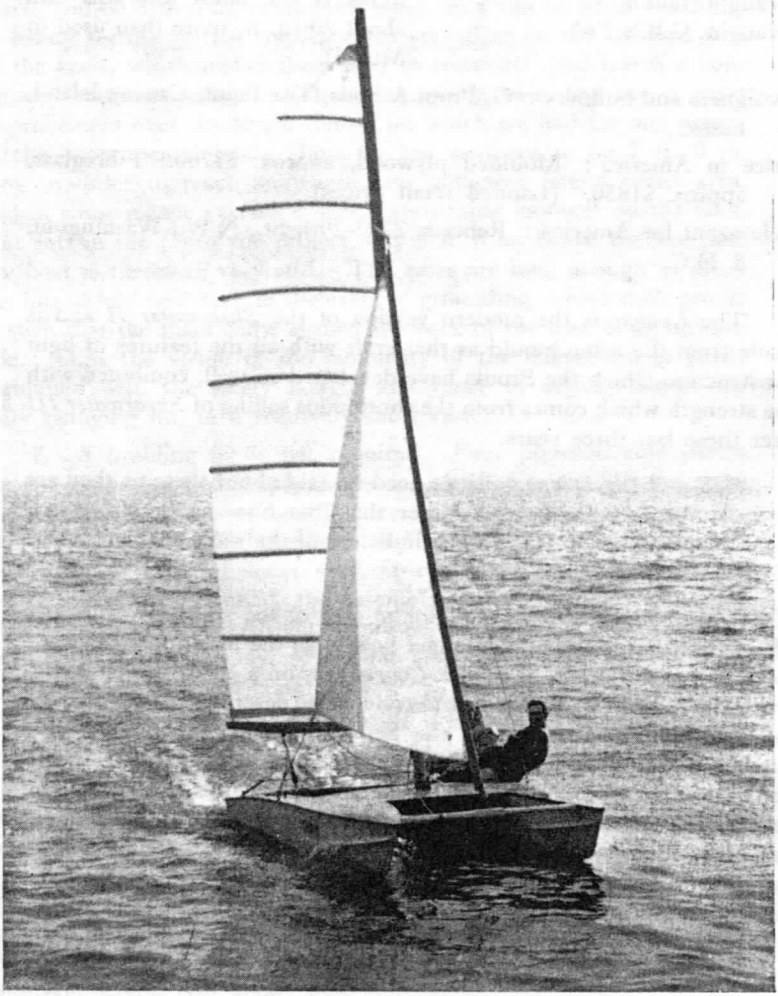
I hope that these remarks may clarify somewhat the conditions under which *Tiger* was able to "eke" out a win over her nearest competition, the *Cougar*. I hurry on to say that the *Cougar* and the *Shearwater* were the best looking catamarans at the race, and both far out performed all other competition. Roland should feel himself well satisfied in producing two so successful craft, that having met him my personal regard for him is and will always be of the highest order. If I can handle my own cat designs someday as well as he does his then I shall only then consider myself of even equal potential.

Well that's about the whole story in the design of *Tiger*, except to say that the final proof of the form used in the hulls of *Tiger* was accomplished in the little 9– foot prototype of the *Tiki*. I would say that our transom was closer to *Freedom's* than *Cougar's*, and so is our mainsail.

The only regret I have after the *One of a Kind* is that I did not have more opportunity to talk with Roland. I feel in him as you do a great friend. I am proud to know him ! I also met with Rudy Choy there and greatly increased my respect for him.

Very Sincerely Yours,

ROBERT B. HARRIS.



Cougar

COUGAR

L.O.A. 17′ 9″
L.W.L. 16′10″
Beam O.A. 7′11″
Draught, hull 8″
Draught, C.B.'s 2′6″

Total weight 380 lbs.
Sail area 210 sq. ft., including all rounds.
(This is the latest sail area and about 20 sq. ft. more than used in Miami).

Designers and builders : G. Prout & Sons, The Point, Canvey Island, Essex.

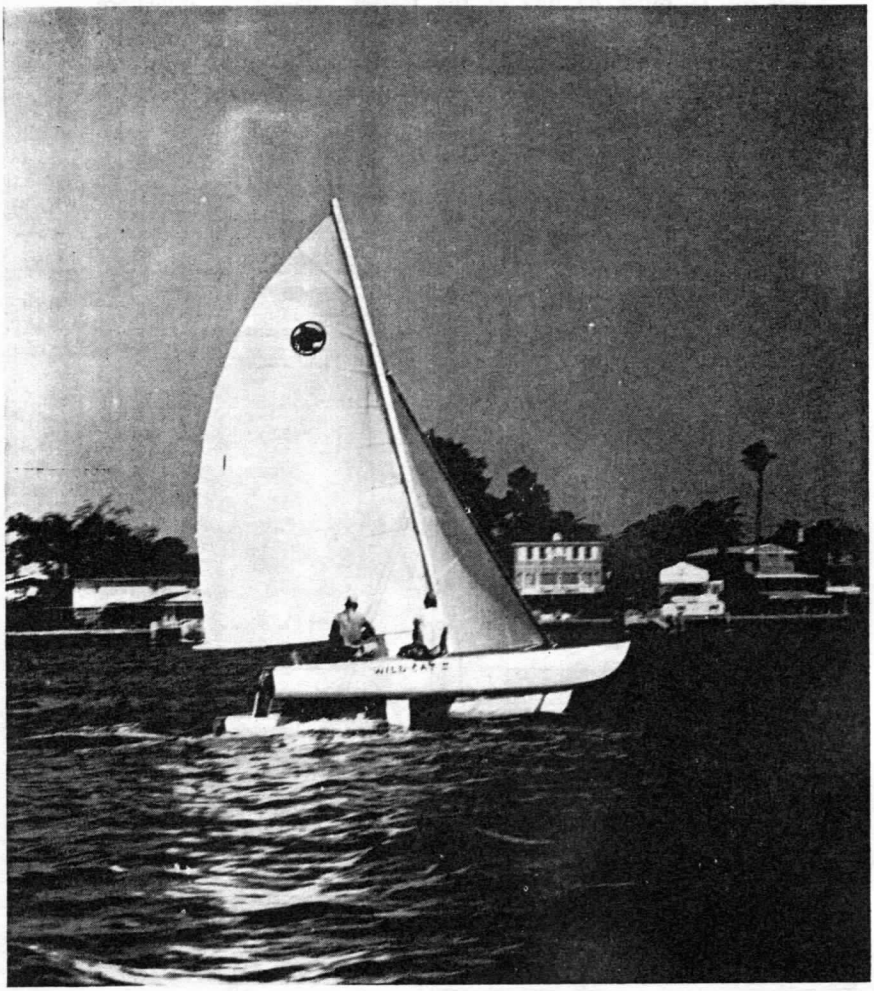
Price in America : Moulded plywood, approx. $1700. Fibreglass, approx. $1850. (Landed retail prices).

Sole agent for America : Rebcats, 2727-29th St., N.W., Washington, 8, D.C.

The *Cougar* is the modern version of the *Shearwater II* and is made from the same mould as that craft with all the features of light construction which the Prouts have developed so well, combined with the strength which comes from the continuous sailing of *Shearwater III* over these last three years.

Hull and Rig Design. Little need be said about these as they are in most respects similar but larger than the *Shearwater III*, which most people know already. The hulls are of the same shape as those of *Shearwater III*, but longer.

Performance. This is superior to that of the smaller *Shearwater III* as regards speed, being a longer boat. In the Miami *One-of-Kind* races, the performance of a stock *Cougar* was on a par with that of the prototype *Tiger Cat* which has already been described, though *Tiger* won the series. *Cougar* won the Sea Cliff race against the *Tigers* but lost the Presidents Cup to them. As could be expected from the hull shape, *Cougar* is at her best in moderate winds when she can beat *Tiger*. In light and heavy going, she appears to be at a slight disadvantage up to the present. The speed of catamarans depends far more on their weight than the hull design and the *Shearwater-Cougar-Swift* hulls are lighter in weight than most others, though the scantling appear to be the same.

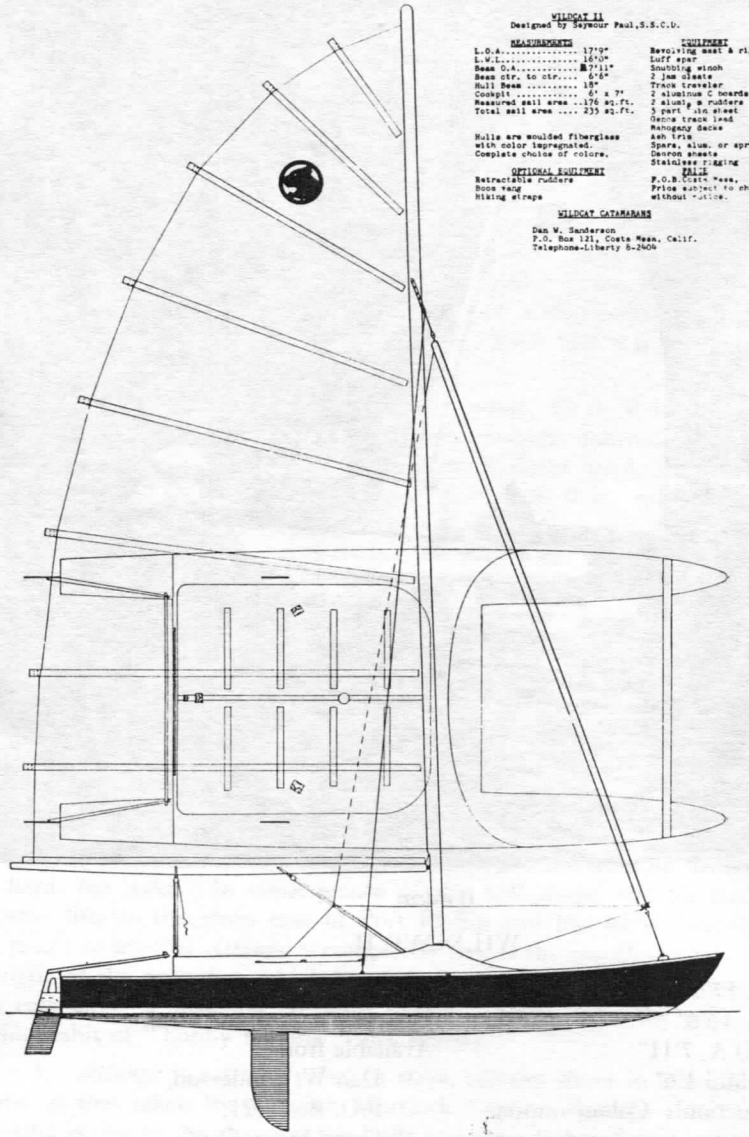


Wildcat

WILDCAT II

L.O.A. 17′9″
L.W.L. 16′0″
Beam O.A. 7′11″
Beam, hull 1′6″
Construction : Colour impregnated fibreglass.
Sail area 235 sq. ft.
Designer : Seymour Paul.
Available from :
Dan W. Sanderson,
P.O. Box. 121,
Costa Mesa, Calif.

Wildcat II must be one of the fastest catamarans anywhere, having won the Pt. Fermin Race in the Spring against some very strong opposition from Hawaiian-type catamarans and *Shearwaters* and also the West Coast *One of a Kind* Race in Newport Harbour.



She has had a clocked speed of 21 knots average over a 1 mile course.

The Design. The hull shape appears to have a very fine bow, going into a semi-circle amidships underwater, with a flat run ending in a transom with a rounded lower surface instead of the flatter undersurface of other fast catamarans. Twin centerboards are used and these are placed much farther aft than in any other catamaran. The rig is also placed far aft and the result is probably an ability to keep the fine bow from burying when hard pressed in a beam wind. The total weight is not given but *Wildcat II* appears to be very light.

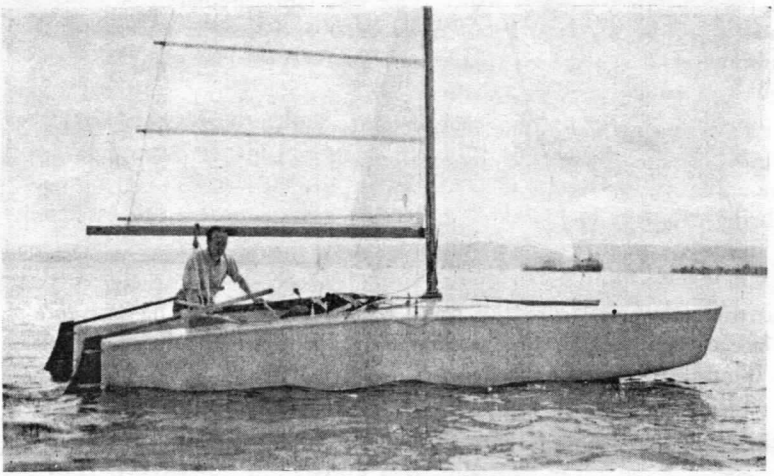
Sails. The sails shown in the photograph are most beautifully cut. There is a huge overlap on the jib and a huge roach on the mainsail, with the result that the rated sail area is only 176 sq. ft., whereas the cloth carried has 235 sq. ft.

CHIQUITA II

L.O.A. 16′0″
L.W.L. 15′4″
Beam O.A. 7′6″
Beam (hull) 1′6″
Beam (hull W.L.) 1′2″
Freeboard 1′5″
Draught 1′10″
Displacement 585 lb.
Sail area 160 sq. ft.

Designer, owner and builder : David Jeffrey.

Readers may remember *Chiquita*, a 24 foot overall catamaran designed by David Jeffrey and described in the YACHTING MONTHLY of January, 1956. She was a hard chined craft designed to



Chiquita II

plane but, though she did 14 knots, there was never any indication that planing had occurred.

The latest craft made by this amateur designer is, in his own words, an " exercise in plastics." The hulls and most of the bridge deck are built from foamed polystyrene (Polyzote, Expanded Plastics Ltd., Mitcham Road, Croydon). This material weighs only 1 lb. per cubic foot, comes in slabs 3 foot x 2 foot x 1½ inch thick, can be easily worked with a saw, knife and sandpaper although a Surform plane is also useful.

Advantages. The advantages of using expanded polystyrene are (a) No mould is needed as in normal glass fibre boat construction and therefore a one-off boat can be economically made and (b) This closed-cell plastic is permanently buoyant, making separate buoyancy tanks or bags unnecessary. The attractive feature of this inherent buoyancy is that all internal floors are above water level, thus eliminating completely the need for pumping or bailing out the bilge water. This surely is the only boat in which it is possible to drill holes through the bottom to drain off spray water and not sink it. The floor of each hull is 3 inches above the L.W.L. and two 2 inch holes in each transom allow any water shipped to pour out.

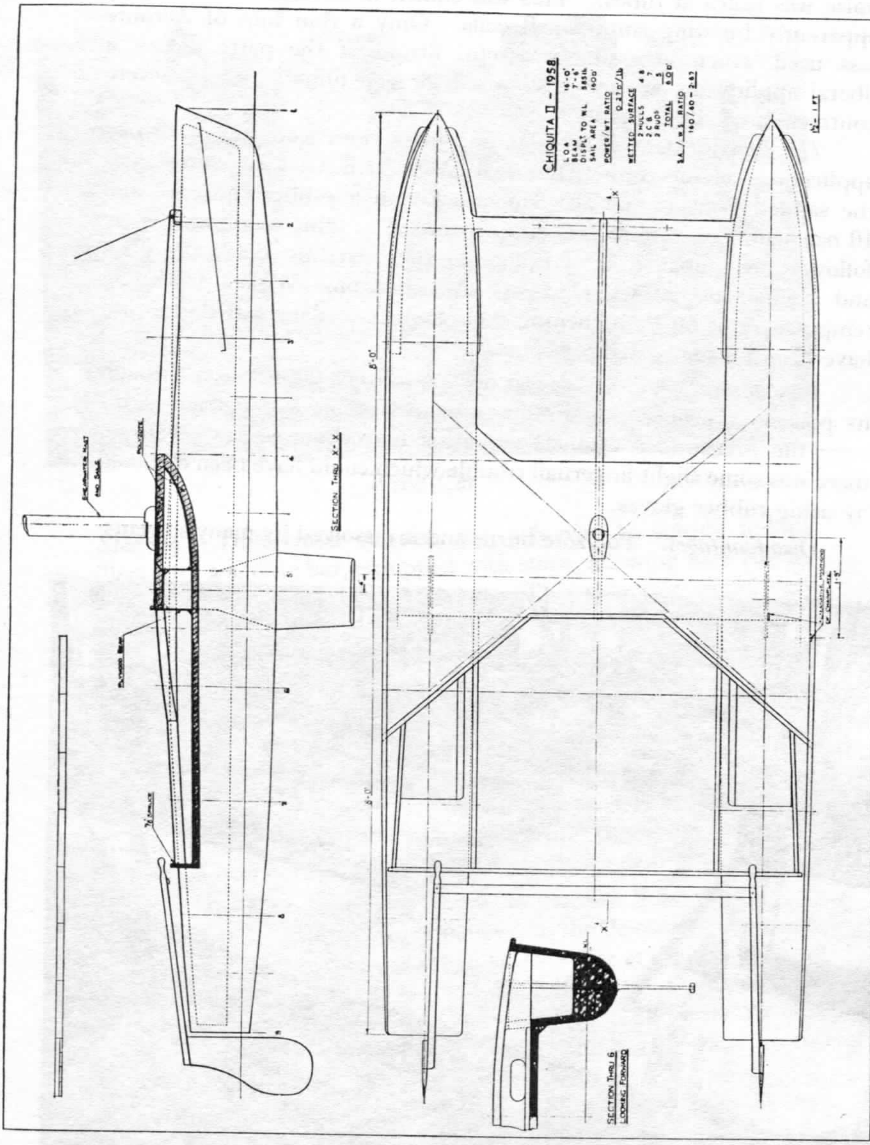
After the boat was completely made of foamed plastic and sanded smooth, it was covered all over with epoxy resin reinforced with glass cloth. This put a hard and strong skin on the boat and, although it is only about 1/32nd inch thick, it makes it entirely weatherproof and resistant to wear and tear. The resultant catamaran is a little lighter than the plywood Prout *Shearwater* and has the advantage of flexibility of design as no moulds are required. The materials cost about the same.

The Construction. The design is similar to *Shearwater III* but to improve diagonal rigidity, cross beams of 4 inch x 3/8th inch spruce were sunk into the Polyzote. The entire structure has a good feeling of being " one solid piece."

The rounded bottoms are made from the slabs of Polyzote glued flat on each other up to the floor level, 3 inches above the L.W.L. The top sides are from the slabs placed on edge. The Polyzote surface sands smooth but the texture is open and fibreglassing is needed for durability and gloss surface.

The whole hull was quickly made and glued together and it was at this stage interesting to have a catamaran weighing less than 100 lbs.

Glues. The glues recommended by the makers of the Polyzote broke along the glue line when edge glued. Aerolite 306, a urea glue,

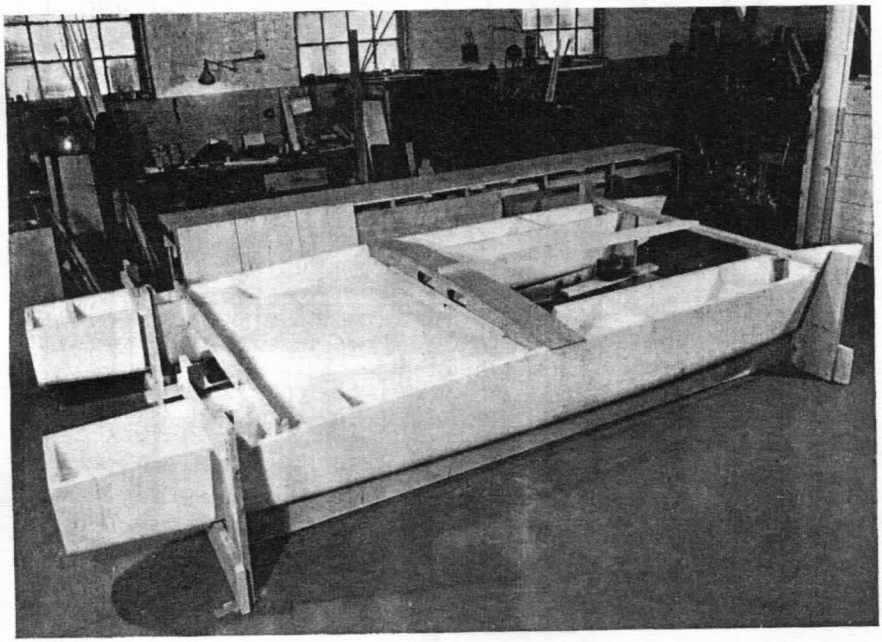

SHEARWATER MAST AND SAILS
PLYWOOD BEAM
POLYZOTE
7/8" SPLICE
SECTION THRU X-X
8'-0"
8'-0"
CHIQUITA II – 1958
LOA 16'-0"
BEAM 7'-6"
DISPLT TO WL 585lb
SAIL AREA 160□'
POWER/WT RATIO
0.27□'/lb
WETTED SURFACE
2 HULLS 48
2 CB 7
2 RUDS 5
TOTAL 60□'
SA/WS RATIO
160/60 – 2.67
1½" – 1 FT
SECTION THRU 6
LOOKING FORWARD
ALTERNATIVE POSITIONS OF CHAINPLATE
1'-9"

was much stronger and quicker to use. After glueing, a sharp crackling noise was heard at times. This was shown to be caused by the glue apparently bursting some small cells. Only a thin film of Aerolite was used which necessitated careful fitting of the parts. With a liberal application as used with wood for gap filling, there is severe contraction of the Polyzote.

The Epoxy Coat. The resin and glass cloth were put on at one application i.e. the resin (Araldite L.W.2 C.I.B.A.) was poured onto the sanded Polyzote surface, smoothed with a rubber squeegee and 10 oz. plain weave fibreglass cloth spread on. This was immediately followed by amber resin, Araldite D for " wetting out " the glass and a final coat of white L.W.2 smoothed on. With a workshop temperature of 60°F. hardening took about two days and this would have been longer in damp weather.

Precautions. The epoxy was not found to be disagreeable through its poisonous properties. Frequent hand washing and barrier cream were the precautions against dermatitis of the hands but, even so, there was some slight fingernail trouble which could have been obviated by using rubber gloves.

Disadvantages. Polyzote burns and is dissolved by many solvents·



Hot sunlight can cause the surface to powder. The Epoxy is poisonous and may cause dermatitis. The fibreglass-epoxy coat may be dented by a high localised pressure but it can be walked on safely. The under surface of the decking Polyzote needs to be fibreglassed to get the necessary strength.

With proper precautions, therefore, there is no difficulty in using this method of construction. However, the Epoxy coat had ripples which took 40 to 50 man hours of labour to get off, using an industrial orbital sander. This was the only serious snag.

Performance. The all up weight is about 260 lbs. ex crew which is a little lighter than the plywood version of the *Shearwater III.* Two fixed keels were used, instead of drop keels. As a result, *Chiquita II* is slower on the run than *Shearwater* but is about as fast to windward.

Chiquita II had the misfortune to run onto some submerged rocks at over 10 knots, pitching the crew violently forward. The only damage was a slight split in the fibreglass. Plywood would not have withstood this impact so well.

Summary. Expanded polystyrene, glued with a urea glue and coated with Epoxy resin appears to be an excellent boatbuilding method. David Jeffrey is to be congratulated in being a pioneer in this field.

Ed.—Reports have been received by me that a quick setting polyester resin can be used with expanded polystyrene. Other workers have not been able to confirm this and find that the foam dissolves.

SNAP, AN 18 FT. CATAMARAN

by DONALD ROBERTSON

As a result of a series of experiments carried out on a small trimaran *Fun*, I decided to build another boat. These experiments convinced me that neither outboard floats nor hydrofoils were the answer to high speed and having read of the success of the catamaran *Endeavour* built by the Prout brothers I ordered a pair of similar cold moulded hulls.

One reason for not building a catamaran sooner was that I live some distance from the sea and whereas a trimaran can easily be made detachable for trailing, a catamaran is a more difficult problem. Obviously to get the benefit of stability the hull centres must have a big beam in relation to the length of the boat and as soon as these are made detachable the boat ceases to be one unit and loses its stiffness. A further point arises over the maximum size that can be trailed on the road not only in beam but in length. In the case of *Snap* the length is 18 ft ; beam overall 9ft. 4in. and, with the special trailer I designed,

Snap

the maximum road width with the boat mounted at 60° to the horizontal is 6ft. 6in. In my opinion anything much larger than this is out of the question for trailing, apart from the difficulty of manhandling on to the trailer. Assuming this is the maximum practical size for trailing, any larger catamaran must be strong enough to make a sea passage — a heavier and different type of boat altogether.

Having tried out so many different gadgets on *Fun*, every one of which entailed using tools to assemble before each sail I was determined to keep the new boat simple and to go back to first principles ! The outcome was a non detachable boat with fixed skegs under each hull (i.e. no centreboard) and a straightforward sloop rig. The two rudders were non lifting.

In designing the bridge deck I gave *Snap* 9in. clearance above the water line and a type of structure which I hoped would be very

stiff. The clearance under the bridge deck on a catamaran is a critical factor in the design as an increase in clearance increases both the weight of the boat and the air resistance. At sea, *Snap's* was found to be adequate except when running when occasionally a sea would build up and touch the underneath of the aft part of the bridge deck ; under the mast where one might expect a wave to hit the clearance seemed to be sufficient.

On first sailing *Snap* it was found that with the skegs, which were 3ft. by 8in., she reached well and would go about with difficulty but was very poor close hauled especially in a light wind. The skegs were removed and lifting centreboards mounted in each hull. This improved the performance and handling characteristics enormously but mechanically they were a complication and a constant source of leaks. The water pressure that builds up in the centreboard box is considerable and the holes through which the lifting wires passed could not be made watertight.

It was found that the wooden rudders warped when left in the sun. This upset the balance of the boat by giving weather helm on one tack and lee helm on the other. Lifting metal plates overcame this trouble but a positive wire and shock cord had to be fitted to hold the blades down at speed. Later on larger rudders were fitted not so much for the improvement in power but to give better control when at sea. Rudders have in fact been a constant source of trouble largely due to trying to save weight and drag, but in any case a catamaran is very sensitive to directional control.

In an attempt to increase the speed when reaching some spray guards were attached to the bow. These were 3ft. long and 4in. wide at their widest point. These were successful as not only was the spray from the hull lee deflected horizontally but the upward reaction gave considerable lift to the bow.

I think *Snap* has often touched 18 knots but this is only a guess. I did however cover the half nautical mile in Chichester harbour in 1 minute and 53 seconds, which is 15.9 knots. Going to windward in a strong wind she was fast and fairly close winded, but her performance fell off in moderate and light winds.

WIND-CAT

L.O.A. 15′ 0″	Depth of Hulls 1′ 2″
L.W.L. 14′ 11″	Draft 2½″
Beam 7′ 0″	Sail Area 83 sq. ft.
Hull Beams 1′ 8″	Weight (all-up) 150 lbs.

Designer : Finn Andersen, Durban, S. Africa.

1) HULL DESIGN

The *Wind-Cat*, obviously, is designed on the realization that a catamaran is rarely a planing craft, in the true sense. The weight factor (—displacement) was therefore receiving top priority. Second consideration was a hull-shape, offering the least possible resistance, yet sufficiently buoyant in the forward sections to reduce hull-burying . . . all with one eye on dryness, and the other eye on windage.

The " Fish-shape " was chosen for C.W.L. with a flattish semi-circular section. Length/Breadth ratio : 1 : 9.

The 7 ft. long platform carries the revolving cat-rigged mast on the forward cross-beam, with a central dagger-board slot running its full length. Given a 3 in. rocker it also produces slight additional lift in a seaway.

Hulls symmetrical, with centre-lines dead parallel.

2) CONSTRUCTION.

The hulls were built over a mould, with strips of 3 mm. plywood, and sheathed with fibre-glass. Internal bracing of hulls effected with $\frac{1}{2}$in. dia. aluminium tubing. Total weight of each hull (un-decked) 24 lbs.

The perforated platform is slung under the two cross-bars, and under doublings, fixed to inner sides of hulls, offering a central " Well " a few inches below the sitting-out decks.

3) RIG

The 21 ft. mast, made up of fibreglassed bamboo, is un-stayed and fully revolving. A detachable hooked top gives the sail its characteristic appearance, resembling an aeroplane wing, stood on end.

The 83 sq. ft. Terylene sail, fitted with a wide pocket, running the entire length of the luff, is slipped over the mast before being stepped. The straight leech and 4 through battens take care of the set.

4) PERFORMANCE

Speed : The exceptionally low weight of *Wind-Cat* permitted the use of the small sail area, which, nevertheless, enables her to move faster than the wind on a broad tack and close reach. She moves comfortably at 16-18 knots, and is estimated to have done 22 in moderate squalls.

As soon as the faired luff, however, ceases to act as leading edge, as in the case before the wind, she drops to the speed of other displacement craft.

Wind-Cat

Steering : Differential steering was achieved by simply linking the tillers with a sliding bar, equipped with stops, allowing each rudder to trail independently, for a certain arc. This principle works very well indeed, and it is observed that only the windward rudder actually contributed to sharp alterations of course, such as going about, the lee rudder trailing obediently without disturbing the flow of water.

Lateral Resistance : The dagger-board, which can be swung to varying depths, and also moved fore-and-aft, was originally intended merely to augment the lateral resistance offered by the hulls, but was found to be grossly inadequately, particularly at low speeds, as the shallow-draft, rounded hulls did not provide the expected lateral resistance. A deeper board is now dealing with the drift at low speeds.

Wetness and Hull-Burying. I have, as yet, not been able to " fly a hull " in the *Wind-Cat*, thanks (I believe) to the flexible mast, which, in strong winds, will bend out as much as 3 - 4 feet at the top, without any appreciable increase in the lee hull displacement. For this reason also, there is no exaggerated bow-wave. The hulls seem to slice through gently, leaving no wake, except from the board, which is also flexible, and " humming " before it really should.

Whatever bow-wave is worked up in rough water, usually hits the underside of the platform, which is positioned well forward, and renders the *Wind-Cat* amazingly dry.

Although she does not bury her lee bow, when going hard, there is a tendency for slicing-in a bit deeper. Sitting her out further out does not altogether eliminate this short-coming.

Manoeuvrability. With the dagger-board lowered, slightly forward of balanced position, the *Wind-Cat* carries just enough helm to throw her about as easily as a dinghy.

I have found that it pays to sit her well out, until the sail is filled on the other tack, in order to lighten the hull, describing the larger arch. She nevertheless loses most of her speed, when going about.

As for wind-ward work, the *Wind-Cat* points as high as any dinghy, but in most cases, provided there is sufficient water, fewer and longer tacks, with slightly eased sheet, pay the best dividends.

Overloading. Designed as a single-hander, for best performance with a total all-up weight (craft and helmsman) of maximum 300 lbs. It is obvious that the weight of another crew-member would over-tax its dead-weight (or : load to be carried) by 50%. In fact, even a small boy of 50 - 60 lbs. makes the increased drag noticeable.

Criticism. The L.O.A. could well be increased by 1 ft., and the mast-step moved correspondingly aft, to reduce the tendency to dip the lee bow, under pressure.

Also, platform could be extended, allowing helmsman to sit her out further aft.

Boom could be raised 6 in., merely for the comfort of helmsman.

The profile would benefit in appearance, from lifting the sheer forward (at present parallel to W.L.).

A means devised for hoisting and lowering sail, without having to step and un-step the whole rig, and yet maintaining the mast-fairing, that the sleeve provides.

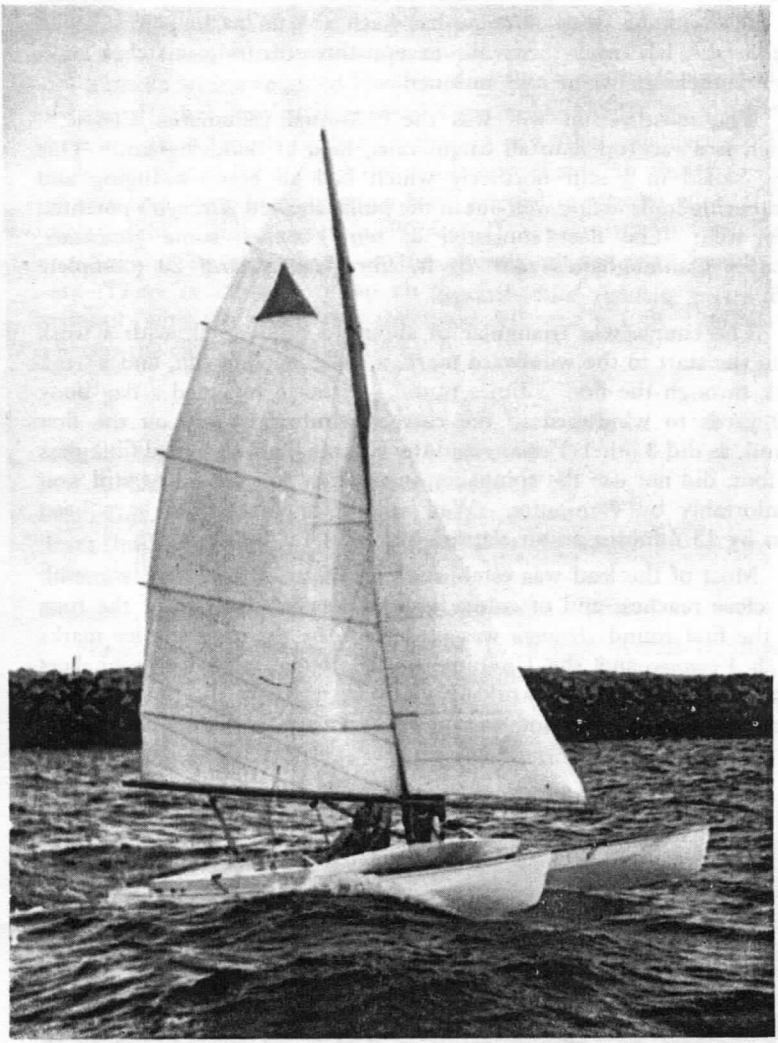
It is doubtful whether any further reduction in weight would be possible, without affecting the strength generally, and torque in particular.

ATTUNGA — 20 FT. SAILING CATAMARAN

by PETER HOOKS, 43 Comer Street, Brighton, Victoria, Australia

This design represents the summing up and consolidation of 4 years' experience with an experimental 20 ft. catamaran which was modified extensively year by year as various arrangements of fins, hull shapes etc. were tried out.

The prototype boat built *exactly* to the plans has proved to be an outstanding success, particularly in hard winds.



Attunga

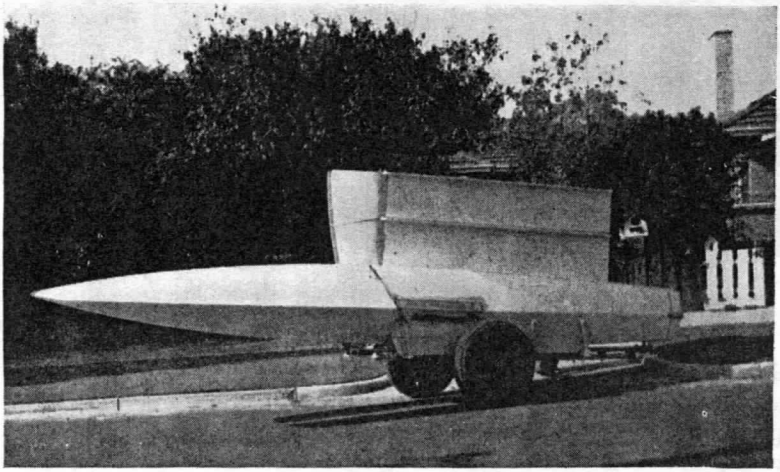
The yardstick for catamaran performance in Port Phillip is the racing fleet of ten Yvonnes, which includes the National Champion, *Duet*, at Sandringham Yacht Club. *Attunga* has not had many opportunities of racing consistently with this fleet as they are quite naturally a keen group racing for an aggregate prize and should not

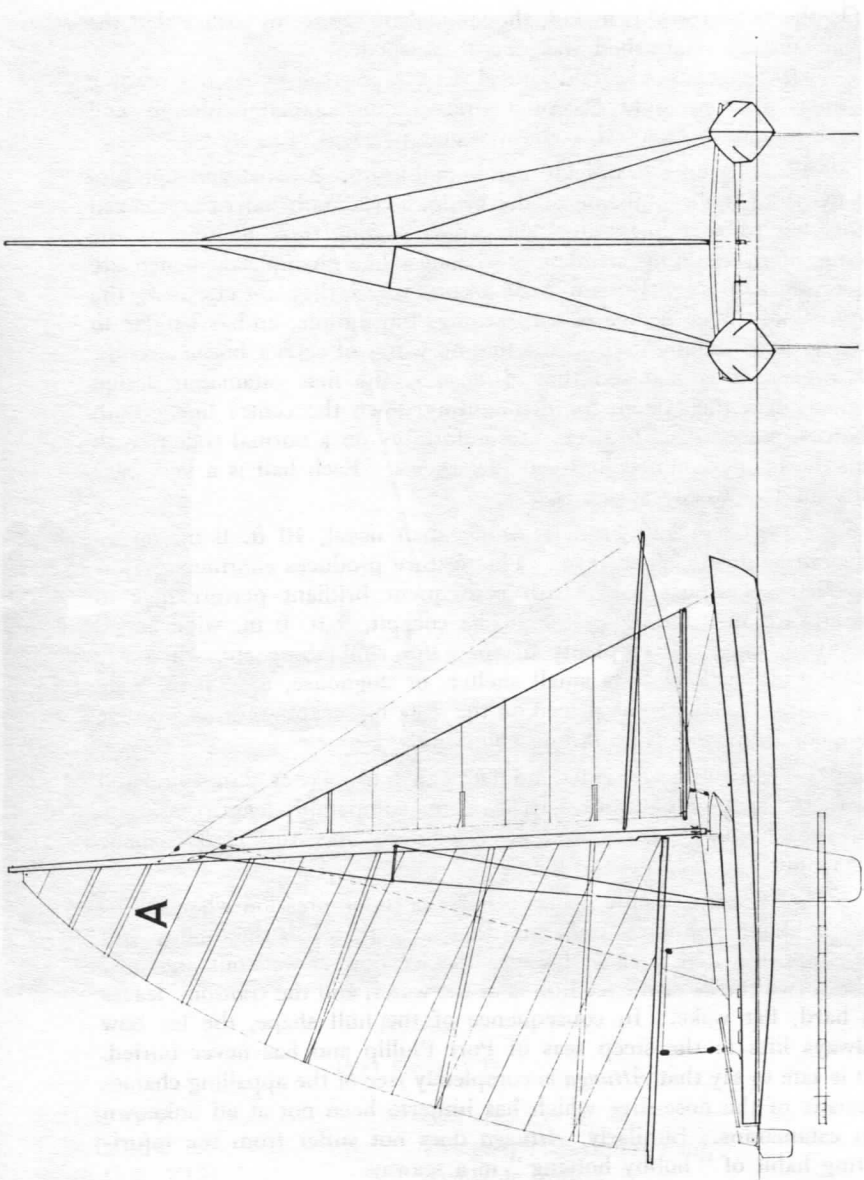
suffer interference from another boat on their course. However, on the occasions when *Attunga* has been able to participate in open events she has won them all, except three drifting matches soon after launching, when still untuned.

The most recent win was the " Annual Catamaran Classic ", which is a race open to all catamarans, held at Sandringham. This race, sailed in a stiff northerly which had all crews swinging and weathering hulls lifting well out in the puffs, showed *Attunga's* potential very well. The fleet consisted of ten *Yvonnes*, some *Quickcats*, Charles Cunningham's new 20 ft. fibreglass *Austral* 20 (complete with swing planks), and *Attunga.*

The course was triangular of about 15 miles total, with a work from the start to the windward mark, a close reach, a run, and a work back through the line, 3 times round. *Attunga* included a flag buoy 300 yards to windward of the correct windward mark on the first round, as did 3 other *Yvonnes* and the Cunningham designed fibreglass 20 foot, did not use the spinnaker on the first two runs, and still won comfortably by 4 minutes. Well sailed, the race could have been won by 15 minutes on an elapsed time of 1 hr. 50 min.

Most of the lead was established on the windward legs, some on the close reaches, and of course ground was lost on two of the runs (in the first round *Attunga* was passed on the run near the lee marks by 3 *Yvonnes* and the Cunningham 20 footer, all with spinnakers set). On the first long work to windward through the line, *Attunga* opened up a big lead and was never seriously threatened thereafter.

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On the third run downwind, the spinnaker was set to ensure that the lead already established was not diminished.

Attunga makes several radical departures from what has become somewhat commonly accepted practice in catamaran design and performance both in this country and overseas, namely :—

1. The boat is quickly demountable into 2 equal and opposite halves down the mid line of the bridge deck, both halves are locked together by 4 stainless steel shear pins passing through holes in the ends of overlapping stainless steel fangs, like chainplates, which are screwed to the ends of the main beams where they are cut along the mid line. This device is very strong, but simple, and is similar to the type of locking used in the folding wings of carrier borne aircraft. However, it is believed that *Attunga* is the first catamaran design which uses the system for demounting down the centre line. Both halves, placed deck to deck, fit comfortably on a normal trailer, with all the load contained between the wheels. Each half is a very easy lift for two weedy specimens.

2. The overall beam is wider than usual, 10 ft. 0 in. on an overall length of 20 ft. 0 in. This feature produces enormous power to drive the boat hard, with consequent brilliant performance to windward in a strong breeze. The cockpit, 9 ft. 0 in. wide and 8 ft. 0 in. long, allows plenty of space for sunbathing etc. when day sailing and will allow a small shelter, or doghouse, 6 ft. 0 in. wide by 4 ft. 0 in. long to be placed on the deck for sleeping, or as a refuge for children away from strong cold winds.

3. The hulls are wider and flatter than usual (2 ft. 2 in. compared with the average of about 1 ft. 6 in. for comparable length), and are of the disappearing chine type, something like the *Darkie* shape fined out and without the flare.

4. The boat really planes ; one has the impression when reaching at about 20 knots on one hull that more than half the total weight is supported dynamically, because the lee bow is well out and only about two thirds of the lee hull is in the water, and the transom leaves a hard, flat wake. In consequence of the hull shape, the lee bow always lifts to the steep seas of Port Phillip and has never buried. It is safe to say that *Attunga* is completely free of the appalling characteristic of the nose-dive which has hitherto been not at all unknown in catamarans. Similarly, *Attunga* does not suffer from the infuriating habit of " hobby horsing " in a seaway.

5. *Attunga* is extremely fast in stays, coming about in a similar time to that taken by a Payne Mortlock Canoe. Perhaps the fast tacking is due to the shape of the hulls and disposition of rig ; when

tacking the sterns sweep across the top of the water as the helm is put down. It is quite unnecessary to back the jib or to jerk the main boom to windward, as in common practice with deep hulled catamarans.

6. Twin fins provide plenty of "bite" for windward work and even when one hull is skipping, can be adjusted to a nicety on a reach, and be drawn up completely when on a run or when beaching. A handy feature is that the fin cases are offset on the inboard side of the keels, which makes them easy to construct, and leaves a continuous running surface for beaching. The twin fins are a great improvement over the single central fin which we had for one season in the experimental boat. This fin had perforce to be 7 ft. 0 in. long in order to reach anywhere near sufficient lateral plane area, and in consequence exerted a great overturning moment on the boat. The fins in the prototype project only 3 ft. 0 in. below the keel and the boat is therefore very stiff. The cases are long enough to allow the fins to fold well back in the event of grounding, where their profile is such that the main force against the back of the case is an upward one. Thus the virtue of the simplicity of the dagger fin is partly combined with the safety margin and range of adjustment of the fully swinging fin, in a relatively short case.

7. A building jig is not required. Four plywood side panels are cut to the finished shape, chines are attached to the inboard sides and gunwales to the outboard sides. Opposite pairs of sides are placed over two levelled trestles, the frames inserted where marked on the panels, the keel drawn over, fin cases built in, keel and chines faired off, bottom skinned, the assembly turned over and the deck applied in one panel. All curves are so easy that the side panels fit around the frames nicely, somewhat after the manner of building the fuselage of a model aeroplane.

Final connection of the two hulls is uncomplicated, as the two crossbeams fix directly to cleats projecting through the deck.

The mast is a modified box section, which is very suitable for amateur construction, as is indeed the whole boat which can be put together from the cheapest of materials, by any amateur. It is interesting to note that *Attunga* is much lighter than another catamaran of similar size built of fibreglass, and, being constructed of wood, is quite unsinkable in any circumstances. All the materials, including Terylene working sails at £A83, cost approximately £A250. A spinnaker would cost about £20.

8. The prototype *Attunga* has been subjected to a series of sailing tests and inspections of the structure by members of the committee of the Australian Catamaran Association, most of whom are

keen sailors of the now well-known *Yvonne* type. The general committee passed a motion on the 14th April to the effect that the *Attunga* has now been declared an approved design, and thereby receives the full approval of the Association. The rating " A.C.A. approved Design " ensures that the boat is structurally sound, handles well and gives good performance. *Attunga* is the first design to receive a full rating under this comparatively new Association Ruling. Fortunately, the Committee had only to consider the structure and handling characteristics.

A point was raised at the meeting that, unlike narrow beam catamarans, there is as yet no definite information as to whether or not the boat is rightable. No false claims are made for the design on this point ; it is the designer's opinion that, if capsized, *Attunga* would be difficult to right again without some assistance. The crew would stand on the lower fin with the boat on its side until assistance could be rendered. When the mast can be raised parallel to and above the water the weight of the crew on the fin would almost certainly right the boat.

The fully detailed working plans, which include full size profiles of critical parts, have been drawn up with a view to fostering an Australia wide class. Weights will be laid down when all the components of the existing prototype boat have been weighed in the fully dry state, which will serve as a guide for establishing minimum weights slightly below that of the prototype.

SWIFT

L.O.A. 14′ 6″ — Weight 225 lbs. rigged.
Beam 6′ 0″ — Sail area 120 sq. ft.
Draught ex. C.B. 7″ — Mast length 18′ 3″
Draught C.B. 1′ 9″
Designers : G. Prout & Sons, The Point, Canvey Island, Essex.
Price : £165.

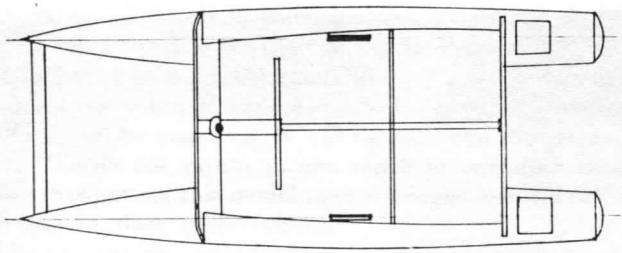
The *Swift* catamaran was only introduced by the Prouts at the Boat Show in January this year (1959) and already has been adopted by many sailing clubs as class boats and will soon be seen in most sailing waters.

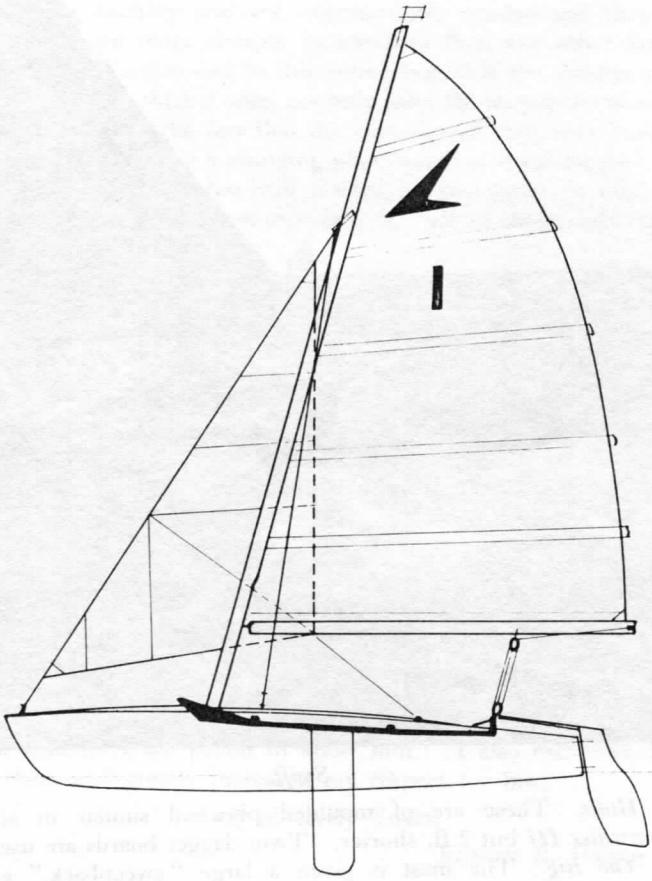
The Design. The smaller the catamaran, the greater the relative sail area which can be carried as compared to the weight and wetted surface. For this reason, the *Swift* is not so very much slower than her larger sister, *Shearwater III.* In fact, at the ONE OF A KIND races at Westcliff-on-Sea, Essex, in one race *Swift* beat both the *Shearwater III* and *Jumpahead.*

Swift

Hulls. These are of moulded plywood similar in shape to *Shearwater III* but 2 ft. shorter. Twin dagger boards are used.

The Rig. The mast is given a large "sweepback," giving a





nice roomy cockpit and an increased efficiency to the mainsail by straightening its vertical axis. At the same time, the extra " sweep-back " to the jib must *decrease* its drive but this is apparently of little moment in view of the above race results.

Summary. The *Swift* is a fast and comfortable catamaran of a more popular size than the larger ones. If capsized, she is easy to right single handed.

SHAMROCK

L.O.A. 22′ 0″
L.W.L. 19′ 3″
Beam O.A. 12′ 8″
Draught 1′ 4″
Sail Area 241 sq. ft. (Main S.L. 144, Genoa 97).
Displacement 1.3 tons.
Accommodation 4 berth.

Designer : Bill O'Brien A.I.N.A.

Makers : Hawker Siddeley Hamble Ltd.

This attractive hard chine catamaran is designed as a twin hulled motor sailer without a centreboard. Comfort and safety are given priority rather than speed but she will do her 10 to 12 knots in a force 6 wind with no tendency to lift the weather hull. However, all the weights are low down in the hulls and, should she be thrown over in a gale, she should right herself from a mast-horizontal position. The design is a reduction of a 26 ft. catamaran which was originally designed for an A.Y.R.S. member.

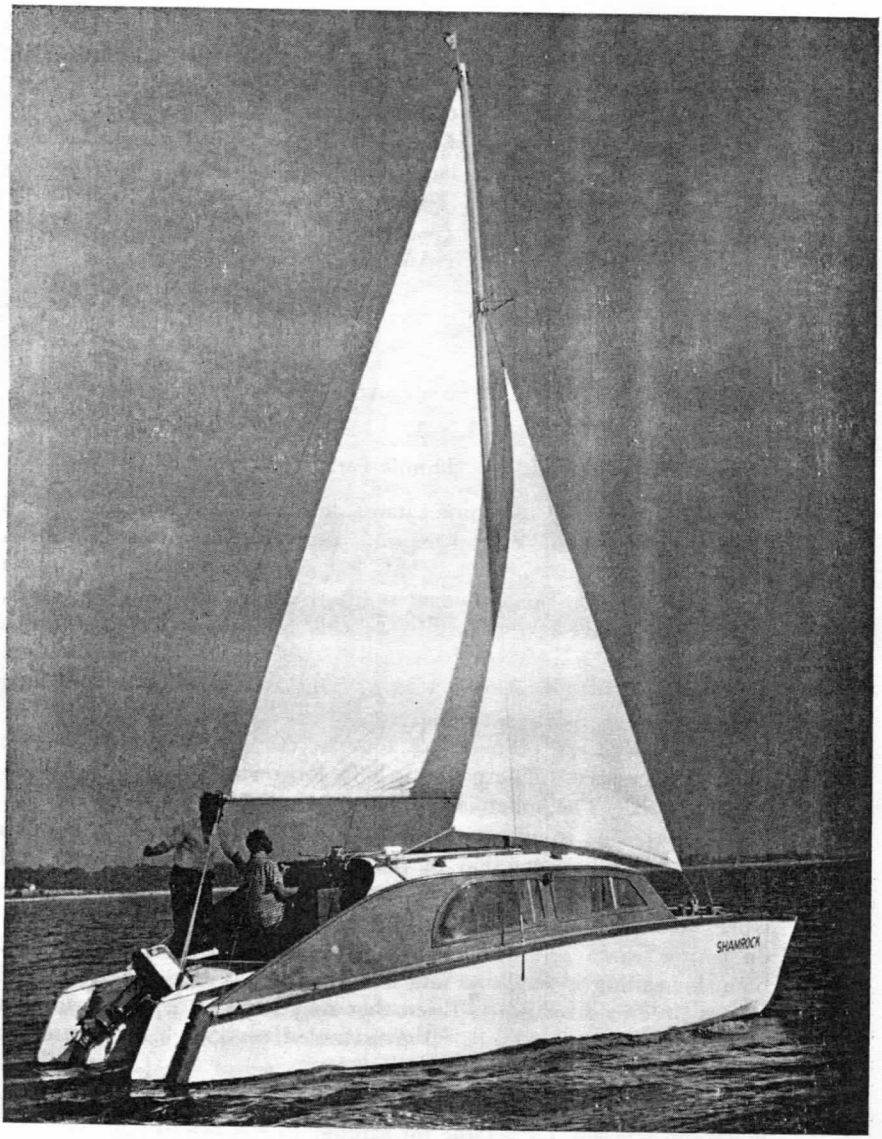
Accommodation. There are four berths but two extra can be slept, if necessary. The galley is 7 ft. long with standing headroom in each hull. The toilet is a " Baby Minor."

Sailing. As in all catamarans, there is virtually no heel and this will be the main attraction of the craft. She tacks smoothly and quickly with the jib let fly in normal keel boat fashion. There is wheel steering coupled to tillers for ease of handling as she will stay on course when set. The absence of centreboard will be a great boon for sailing in shallows and it is one of the features of the hull shapes produced by Bill O'Brien that they have a surprising amount of lateral resistance compared to rounded sections. Drop rudders are used.

Motor. The 18 h.p. Evinrude gives 8 to 10 knots without undue noise and is easily retractable for sailing.

Photographs : TONY HOOK, *Southern Evening Echo*, Southampton.

Summary. *Shamrock* is about the right size, has wonderful qualities and no vices. She should be ideal for longshore sailing for a family



Shamrock

man. There is a hatch in the bridgedeck floor and a keen angler can fish without even getting out of bed. What more could one want ?

HURRICANE

L.O.A. 12′ 6″
Beam O.A. 5′ 6″
Draught 6″
Draught C.B's 1′ 9″

Weight : 150 lbs.
Sail Area : 115 sq. ft.

Designer : Jack Blundell, Sandhills, St. Catherines Road, Hayling Island, Hants.

Background. Jack Blundell bought one of the first *Shearwater III's* in 1955 (*Zoomph I*) followed by another in 1956 which was borrowed on one occasion by H.R.H. Prince Philip. He tried out the prototype *Bell Cat* designed by Uffa Fox in 1958 but found them all too heavy to manage single handed and designed a smaller, lighter 12 ft. catamaran with the deep V sections of the *Bell Cat* and without centreboards.

Hurricane

Tamahine : John Acton

Performance of the 12 ft. deep V. This little catamaran had under 100 sq. ft. of sail area but was sailed by Jack around the Isle of Wight, some 60 miles in ten hours, quite a remarkable feat. However, the light weather performance suffered for want of dagger boards and when driven hard, the lee hull buried. These faults were corrected by raising the bows 3 ins. at the stem, lengthening the mast from 15 ft. to 18 ft., increasing the sail area to 115 sq. ft. and bringing it aft 6 ins. Two small dagger boards were added. Performance was then found to be on a par with the 12 ft. 6 in. *River Cat.*

The Hurricane. The shape of this hull is a V forward which is slightly deeper than a right angle, sweeping back through a semi-circle to a U-shaped transom. This should go well if the weight is right. Indeed, the whole design is very carefully and astutely done and should produce a good boat.

Jack Blundell will shortly be producing these hulls in fibreglass for sale at £19 each with built in dagger board casings. For those who may wish to finish the craft off to the designer's plans, the balance of the wooden parts will cost £18, the plans and instructions £2-2-0 and wooden mast and boom planks £10.

The Hurricane Class. Jack believes that a large number of people want to experiment with catamarans and this cannot but fail to be good for development in addition to the great fun to be derived by backing ones ideas. For this reason, the *Hurricane Class* will only have three restrictions : 1. The hulls to be from the designers moulds. 2. The sails to have the *Hurricane* insignia and 3. The length overall to be no more than 12 ft. 6ins. However, one would think that some restriction on sail area would be necessary to avoid complicated handi-capping systems.

For the 1960 season, the designer proposes to hold one meeting for any catamaran 13 ft. or under with a £25 cash prize for the winner.

TAMAHINE

L.O.A 12′ 0″	Beam, hull 1′ 6″
L.W.L. 11′ 3″	Displacement 267 lbs.
Beam O.A. 7′ 0″	Sail area 110 sq. ft.

Designer : John Morwood.

Amateur builders : John Acton (No. 1), Geoff Dumble (No. 2).

Readers may remember the *Tamahine* design of publication No. 18 which was made from five strips of plywood tacked together at the corners. This design has been made by John Acton and also Geoff Dumble as two separate boats. In both cases, the hull construction produced no great difficulties which was the main object of the design

but the sailing reports are so full of interesting points which have a bearing on catamaran design and rigging that they should be studied with care.

John Acton's Report No. 1 : " I was rather concerned that *Tamahine's* rocker might make her rather unstable fore and aft, but this is not the case, though the sitting position on her is fairly critical if drag from the transom is to be avoided. Having had to experiment with weight distribution, I made up a platform to sit on which is absurdly heavy (being made of materials I already had). The hulls weigh 50 lbs. each and the tubular steel cross-frame weighs 26 lbs. and is highly successful, being dead rigid and enabling the two hulls to be dismantled for transport, though I have also adapted my trailer with rollers to take the keels so though she can be rolled up on to the trailer and launched with ease. This arrangement is highly successful as one person can handle her in this way with no difficulty.

Rig. " Since I already had an 18 ft. mast, I decided to have a Bermuda type of rig which has the advantage of being able to back the jib to assist going about.

" I think the hull design is excellent but it is not getting a square deal as a result of heavy equipment and too small sail area. I am sure she will be very fast. She goes about easily. I should like you to know how pleased I am with your design, which suits my particular purpose ideally."

Report No. 2, *John Acton :* " I have now done a good more sailing in my *Tamahine.* Although I have not got a speedometer and therefore cannot give actual speeds, I can say that she is faster than dinghies in light winds but not appreciably so in moderate winds. In fresh winds, however, when she planes readily, she will go at least 50% faster than an *Enterprise* or *G.P.* 14.

" The above performance is with one up. The additional weight of a crew has the effect of slowing her down considerably and making it almost impossible to rise on to a plane.

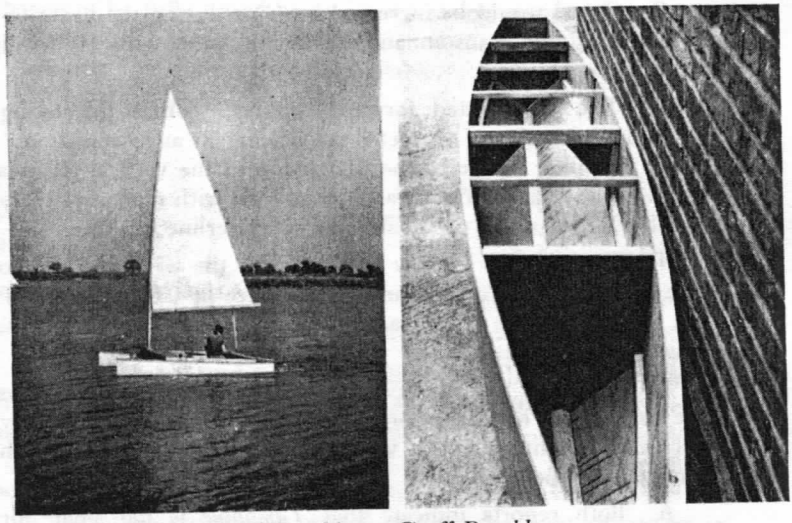
" It is necessary in light winds to move forward to avoid transom drag, but if you remain forward in a moderate to fresh wind, she will plane along satisfactorily but will dig in her bows from time to time and occasionally will stop dead. This is a most alarming thing and I suspect it may be a sort of frustrated forward capsize. However, if one moves back a little, she will lift her bows up, showing perhaps 18 inches of daylight forward and go like a train. She goes about easily and needs very little board. Her centre of lateral resistance seems to be further forward than is relatively the case with larger cats but perhaps this is to do with crew weight distribution.

" The only respect in which *Tamahine* falls short of my requirements is her limited carrying capacity. I have therefore been considering building a larger one, perhaps 14 ft. or 14 ft. 6 in., or halfway between *Tamahine* and *Tuahine.*

" My only anxiety about a large midships section to reduce wetted surface to a minimum is that it entails rather a sharper run to the stern which I think tends (on *Tamahine* at any rate) to pull the stern down and lift the bows when planing, thus making a shorter and more sharply curved boat than would be the case if she rode along on her full length.

" It occurs to me that a good way of comparing the behaviour of right angled sectioned hulls with that of round sections would be to construct a right angled hull with exactly the same distribution of buoyancy as that of an existing design, such as the Prout *Swift.* I would be prepared to do this if the figures are available, though of course the buoyancy would vary according to the degree of immersion of the hulls. Nevertheless, an approximate parallel could be drawn. Having built *Tamahine*, I do feel that in a 14 footer I would like rather less rocker."

Geoff Dumble's Report : " We now have her on a fairly large gravel pit near here where the wind is reasonably steady. As you will see, she has a " Solo " sail of 90 sq. ft. Not really large enough but she does motor along if the wind is reasonably strong. The lee bow



Tamahine : Geoff Dumble

tends to bury, I find, and would probably sail itself under in really gale conditions.

" Going about is quite fair providing I remember that she is a cat and do not shove over the tiller too quickly (I have an 11 ft. dinghy as well and sometimes forget which one I'm sailing !) She has a smallish centreboard (not dagger) but this doesn't really make a lot of difference one way or another.

" She carries a fair amount of weather helm in a blow so I mostly hold the tiller with my foot and then have two hands for the sheet. I've put a three-to-one purchase on the sheet now in place of the 2 to 1, but she still takes a bit of holding.

" For next season, I shall probably step the mast back and fit a jib. However, I do feel that the minimum length for a reasonable cat is probably nearer 14 than 12 ft. It could be that Prouts are right after all ! "

Comment : 1. 9 in. rocker on a 12 ft. boat does not seem excessive, especially as the point at the keel contributes very little to rocker effect. However, as John Acton points out, this shape does tend to throw the bow up and a model trimaran I once made with floats of this shape which pivoted used to go along with the floats cocked up at an angle of about 30°. The main fault with *Tamahine* here is in the fineness of the stern, which would have been better with a wider and flatter transom.

2. Speed would be increased by (1) reducing the beam to 5 ft., (2) flattening the transom and making it wider and (3) by lighter construction.

3. The " frustrated forward capsize " is most interesting and shows the necessity of correct crew placing in any catamaran. The sudden stopping is due to the immersion of the vertical stems and a resultant bad shape for resistance combined with raising of the sterns probably out of water producing a short waterline length.

4. The absence of bow burying with the weight in the correct place in John Acton's craft and its presence in Geoff Dumble's boat with about the same crew placing indicates that it is due to the mast being so far forward.

5. Excessive weather helm such as Geoff Dumble has slows any boat very much but has more effect on a catamaran, especially one with even a right angled V which is far more stable in yaw than a rounded sectioned hull.

6. Both reports indicate that *Tamahine* is too small for the members concerned but this objection only applies to the craft in

question. With the same hull profile and wider hulls aft more buoyancy would be added where it is needed, fore and aft stability would increase as would top and medium speeds.

Lighter construction and reduced beam would allow more weight to be carried. It would be a pity if 12 ft. catamarans were found to be too small for two persons.

14 FT. SPORTS CATAMANNER

L.O.A. 14′
Beam 7′
Draught 7″
Weight 330 lbs.
Sail area 145 sq. ft.
Construction : Fibreglass.
Designer : Erick Manners, 93, Ridgeway, Westcliff, Essex.
Builders : Twin Hulls Ltd., 50a, Salisbury Ave., Southend, Essex.

This is a nicely shaped hull with a fine entrance developing in to a rounded midships section and a flat run. The hulls are symmetrical and their tops form seats at the side of the bridge deck so that when sailing, one does not sit in a " saucer full of water " as happens with most designs. It is a handsome craft, nicely finished in the model I have seen.

The fibreglass construction means easy maintenance and, by undoing ten bolts, both hulls detach for ease of storage. The craft is available as a kit with the hulls already moulded.

14 FT. RACER CATAMANNER

This craft is exactly the same shape as the " Sports " Catamanner but the hulls are moulded plywood which makes them lighter and there are twin centreboards.

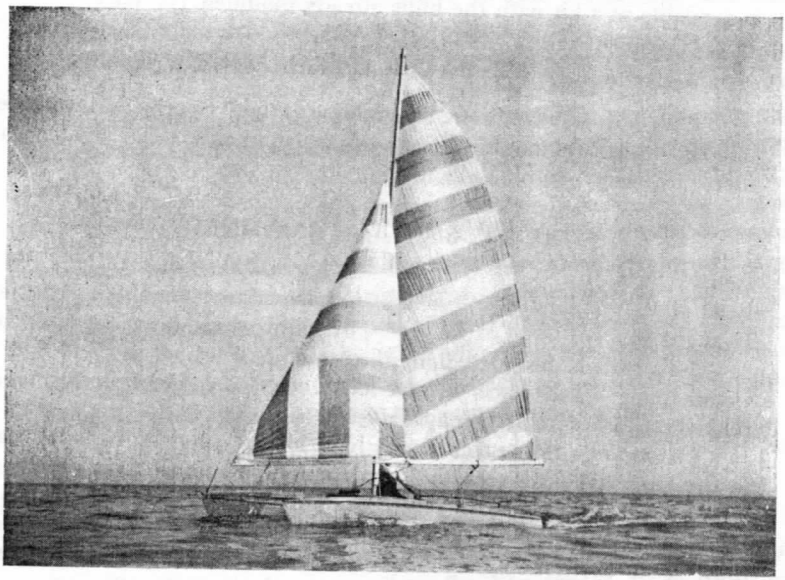
18 FT. 6 IN. CATAMANNER

L.O.A. 18′ 6″
Beam 8′ 0″
Draught 8″
Sail area 200 sq. ft.
Construction : moulded plywood.
Fibreglass sheathing optional.

This craft is designed along the same general lines as the " Sports Catamanner " and looks a nice craft. No details of performance relative to other craft are available.

Comment : These three craft have all got good hull shapes and, in the models I have seen the construction and finish seem excellent. The CATAMANNER range are seldom raced as most of them are fibreglassed and heavier than the pure racing types. However, they must make excellent family boats where their stability and fibreglass construction are valuable.

14 *ft. Sports Catamanner*



16 *ft.* 6 *in.* " *Lake* " *Catamanner*

18 *ft.* 6 *in. De Luxe Catamanner*

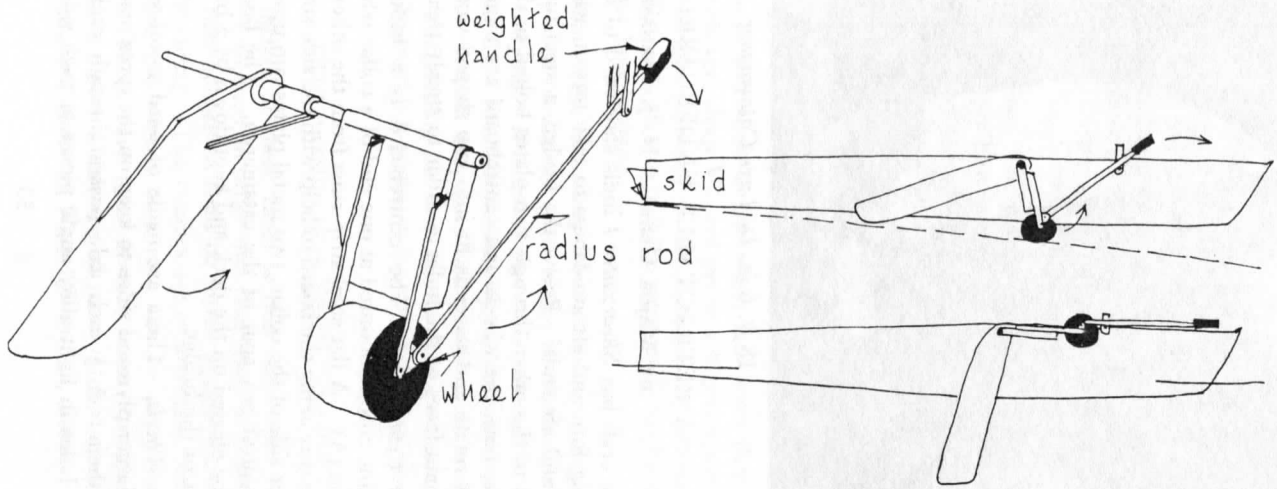
A RETRACTABLE UNDERCARRIAGE

BY MAJOR GENERAL H. J. PARHAM.

The craft has *Shearwater I* hulls shortened to 15 feet with a box spar lying fore and aft amidships to take torsion with a cross spar at its fore and aft ends. Below the bridge, a steel tube (A) runs from one hull to the other through two plates bolted to the box spar. On this tube, both the wheels and centreboard are mounted. This tube does not rotate and its ends fit into cup shaped wooden pieces glued to the main faces of the hulls in order to steady them.

The Centreboard. The centreboard is a little offset from the middle line and is mounted at one end of a collar which rotates on the steel tube (A). A flat steel strip runs from the other end of the collar to a little way along the board to help with the side strains when sailing. On either side of the collar, two metal plates run upwards to be bolted to the central box spar of the catamaran. The board is raised by a short rope cleated on the deck and kept down by a bungee to the front cross bar of the bridge.

The Wheels. These are made of hard wood soaked in oil with slightly larger plywood sides to keep on the tyres made of rope wound around them. A $\frac{1}{2}$ inch axle passes through each and is secured through holes in light alloy angle pieces at each side.


weighted
handle
skid
radius rod
wheel

The Legs. These are composed of the light alloy angle pieces carrying the axle of the wheel and these alloy pieces are bolted to shallow box spars with plywood faces. At the top of each box, two bent metal loops pass over the athwartships tube (A) to form bearings on which each undercarriage leg can swing backwards or forwards.

The Radius Rods. Each wheel is retracted by a " Radius rod " of L section. At the lower end, it pivots on a bolt near the main wheel axle and, when the wheel is down, it passes upwards and forward between two guides under the forebeam of the bridge deck. The guides are joined below the radius rod by a bolt and a notch in the radius rod slips into this bolt to hold the wheel in the " down " position. A weighted handle holds the radius rod in position on the bolt.

Retraction. Each wheel is lifted separately. The handle of the radius rod is lifted an inch or so to free the notch from the retaining bolt and it is then drawn forward, lifting the wheel. It is kept in the " up " position by the weight of the handle.

Lowering. The wheel is lowered by lifting the handle of the radius rod. The weight of the wheel then pulls it down till the bolt below the guides enters the notch, so making the assembly rigid.

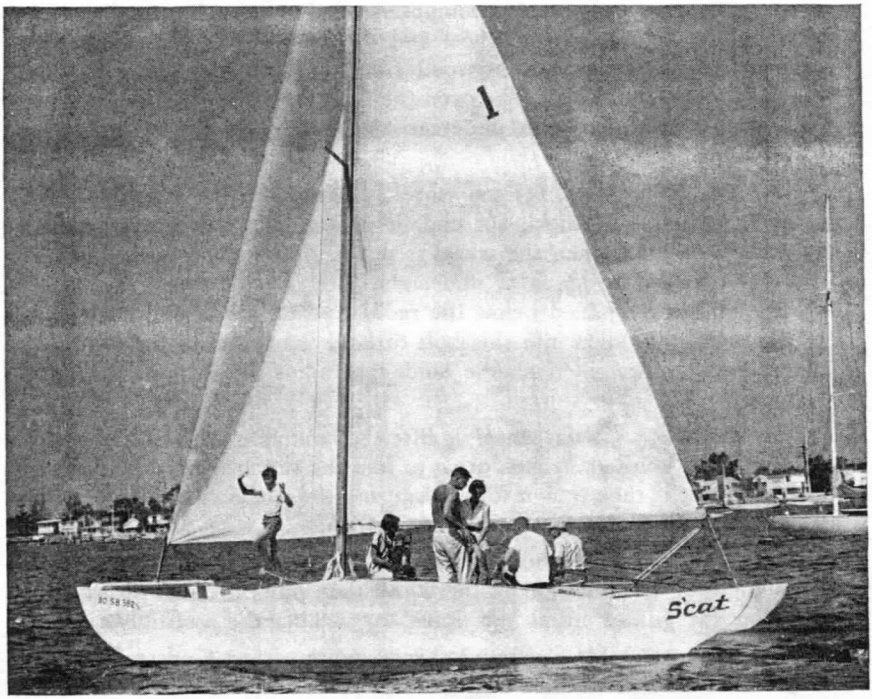
Summary. I have found this system a perfect Godsend. It has given no trouble and the boat has been out 77 days this season (1957). The catamaran balances nicely when the wheels are down so that it will rest either on its bow or its stern and one can walk on deck when on the wheels. By a lucky fluke, the concentrically mounted centreboard bearing also gives correct balance to the boat when sailing. The wheels are very elementary but the oiled " hardwood on bolt " bearing are excellent, needing no oiling or attention during an entire season.

LETTER

Sir,

Congratulations are due to you people in the Long Island area for your strenuous work in organizing an American Section of the A.Y.R.S. I enclose a small contribution towards your research fund and hope others can see fit to assist you in getting systematic experimental test work underway.

I represent a 3-family syndicate which has had a strenuous and pleasant summer completing the final 60% of a Hawaiian type catamaran which we hopefully named *Scat*, from a design by Rudy Choy and Warren Seaman. The design is intended for local ocean racing



Scat

in prevailing light winds, with roller reefing which we hope will permit us to keep going in a blow. Her measurements are the following :

L.O.A. 27′	Draught 1′
L.W.L. 22′	Mast height above deck 35′5″
Beam 9′ 8″	Sail Area (Genoa) 520 sq. ft.
	Displacement 1050 lb.

Fabrication follows modern Hawaiian practice, i.e., light spruce frames and stringers covered with $\frac{3}{8}$ in. plywood skin, forced into mild compound curves by a remarkable combination of wetting and brute force. Difficult fillets and the hull ends were laminated from Styrafoam and hand shaped. A layer of fibreglass, doubled at critical points, converted the somewhat elastic wing-hull assembly into a rigid, skin stressed structure.

During two months of shakedown sailing, *Scat* has shown promising light weather ability, ghosting along easily past all informal competition as had been hoped from her large rig, specialised for Southern

Californian winds. Her catamaran sluggishness in coming about occasionally gives revenge to the large keel sloops in tacking up narrow channels. At first we were somewhat discouraged by the tendency to go into irons and by the inferior ability to point to windward in light airs. However, both defects have almost vanished as the crews gained experience with the boat.

A local catamaran racing club was recently organized, resulting in an initial Christmas race involving three smaller catamarans and ours. In the first race, a 14 mile course inside and outside Newport Harbour with a light breeze averaging 5 m.p.h., *Scat* took a first, followed in 12 minutes by Walt Hall, a former international *Snipe* champion, sailing his modified *Shearwater III* with dagger boards and 175 sq. ft. *Thistle* rig with obvious skill which had our crew sweating to hold the larger boat's lead. The second race was similar with the breeze slightly stronger in which Hall was nosed out of second place by an other 16 footer, the *Black Cat*, designed by Seymour Paul along modified *Shearwater* lines, again with *Thistle* rig and daggerboards. The men on the little cats were surprised at being out-ghosted by a big cat carrying a 4 man crew, but they promise to " suck us up their exhaust pipes " on our next encounter in a windy, sheltered body of water near Long Beach in February.

Some tentative comments regarding the mystical qualities of our asymmetrical hulls without daggerboards may be of interest. While I share the scepticism of other A.Y.R.S. writers, sailing experience has shown that if we hike to leeward in light airs, getting the weather hull up on the surface as much as possible, then the deeply immersed and asymmetric lee hull points quite decently without excessive yaw angle thru the water. In strong breezes, the boat rolls to lift the weather hull clear of the water with four of us hiking to windward and again the immersed lee hull gives good windward performance. Our best speed to date was 15 m.p.h. by an " *Airguide* " commercial pitot tube instrument, sailing fairly close hauled with the weather hull out, the wind being 15 to 20 m.p.h. Bearing off caused us to slow down, suggesting that more wind and a broader tack might provide a bit more speed (or an upset).

The question remains open whether the total hull drag when close hauled might be reduced by putting all the sideforce on a yawed daggerboard of decent aspect ratio, as an attempt to reduce underwater induced drag. We expect to try this experiment on our first haulout.

Despite the wetted surface argument, the Hawaiian deep V sections

at bow and stern appear to generate less wave fuss than the fuller *Shearwater* sections, at low and higher speed.

Warren Seaman tells us that during high speed spinnaker runs down the face of following seas, the outward turning tendency of each hull during rolling serves to counteract the tendency to broach into a spinnaker knockdown — a danger common to conventional sloops and, he says, symmetrical hulled catamarans. *Scat* has not yet sailed in these conditions.

The above comments are intended to convey our growing suspicion that Rudy Choy and his predecessors in Hawaii have empirically arrived at a surprisingly good catamaran hull design for ocean sailing. Still, large improvements are certainly in store thru the efforts of A.Y.R.S. people.

FRED C. GUNTHER.

3689 N. Fair Oaks, Altadena, Calif.

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