

TRUMPETER-Photo: Beken

LIST OF CONTENTS

Page

I AYRS affairs

- 4 Foil letters-Bruce Morwood
- 6 Book reviews
- 13 Wellington University Meeting
- 27 TRUMPETER-Kelsall
- 33 HARRIS 33-Bob Harris
- 35 CHAMARU-Manners
- 39 CAHA PALUNA II-Dora Marin
- 43 NJORTH-Philip Townley

Page

48 PASSAGEMAKER-Rodriguez

- 50 COBIA-Burnham
- 53 A Model Tri-Townsend
- 54 Ocean Waves and Stability-Laurie
- 58 Self-righting Trials-Andrews
- 61 Multihull Capsize-Norfolk
- 62 Trimaran on a reef-Martin
- 64 Oil drum Tri-Reitz
- 69 KLIS to New Zealand-Rhodes

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AYRS AFFAIRS

by John Morwood

July 1971

Summer Meetings

- 1 The AYRS Poole meeting on July 31st and August 1st looks like being a great success. Already, some 20 people have said they are coming. People interested should contact K. R. May, Brook House, Middle Street, Salisbury, Wilts. especially if they are bringing their boats. Ken May will do what he can within reason to help people make arrangements.
- 2 The Magazine "Yachting World" are trying to arrange speed trials for the late summer. The tentative place and date at the moment is Weymouth on September 4th and 5th but this is not fully fixed. The September issue "Yachting World" should give the final venue and date.
- 3 The date of the AYRS Weir Wood Meeting has not been finally set, but it will almost certainly be on the 16th and 17th October.

The Burnham on Crouch Meeting

This was more or less a failure. Only George Chapman brought his foiler and this was well worth seeing, though conditions were far from satisfactory for good sailing for him. Burnham really has far too many moored boats for an AYRS meeting, particularly for the hydrofoils. It seems hardly worth while having another meeting there. We are very grateful to the Royal Corinthian Y.C. for the facilities which they so kindly let us have.

The Yachting Magazines

It is our pleasure to report the very kind co-operation of the Editors of several Yachting Magazines with us in allowing us to use material which they have published. YACHTS & YACHTING have let us use their articles on the *HARRIS* 33, *TRUMPETER* and that on Multihull Capsizing, by Derek Norfolk. The New Zealand Magazine SEA SPRAY first published the article on *CHAM-ARU* a design by Erick Manners and the article by Bernard Rhodes. We also have two articles from a relatively new American Magazine TRIMARINER, which has now moved its headquarters to 1238, Kainui Drive, Kailua, Hawaii, HI 96734. They report that there are 27 trimarans in Ala Wai Yacht Harbour.

HYDROFOILS

by John Morwood

This year (1971) is undoubtedly the "Year of the Hydrofoil". I think there can be no doubt whatever that absolutely EVERY PRINCIPLE OF DESIGN has been worked out at this moment, leaving only the very slightest alterations in details of shapes and angles to achieve the absolute optima.

The Single "Bruce" Foil

This is undoubtedly the configuration of choice for the Lake and Longshore sailer, where "flying" is not the objective. (I'm not saying that it *couldn't* be made to fly—see Smith's 40 knot Sailboat). However, this system has not yet found a place in sailing. Dave Buirski, in South Africa, has shown that it works for a high-speed sailer but it may be that its greatest use will eventually be found in the light, fast-cruising sailboat.

Perhaps the answer lies in a 25 ft PVC foam and fibreglass *Curragh* of which my own *KINNEGOE* is a plywood example (See AYRS No. 70). Ordinarily, such a boat would have about 7 ft of beam and a fin and bulb keel. With a single *Bruce* foil, it could have 4 ft of beam and draw only a few inches. When I have some time, I intend to convert *KINNEGOE* to this system. I already have the foil and, if anyone is prepared to do this for me, I will be only too happy to accept.

The Hydrofoil "Proa Flyer"

For the fastest possible sailing speeds, too, there can be no doubt whatever that the ultimate configuration will be the proa with three foils, all sloping up to leeward and using a semi-elliptical "squaresail". Here, a theroretically ideal sail, with easy handling properties, should give the smallest possible "drag angle" and good maximum drive force. The forward drive force should be as powerful as possible and the unwanted "side force" is that used to lift up the boat, thus reducing the displacement and wetted surface. Incidentally, such a craft will not capsize to leeward (as far as we can see) because lifting the weather foils will so reduce the angle of slope of the lee foil, or foils, that it will slip sideways. Capsizing to weather may also be impossible. A model would prove the point.

The Holtom Foiler

As shown in AYRS No. 74, SAILING HYDROFOILS, Gerald Holtom starts his concept with the *Double Bruce Foil* and thus can sail comfortably in the lightest as well as the strongest of winds in a boat which can put about and maeoeuvre as well as any multihull. Speeds, moreover, are comparable with those of the catamaran. The reason for having the double Bruce foil is the deep-water seaman's distrust of the single foil to weather in waves. Gerald, however, has now developed fore and aft foils which can slope up to leeward on both tacks. This results in all the hydrodynamics of the *Proa Flyer* with all three foils sloping up to leeward. He has thus developed a yacht with the hull and sails of more or less "conventional" pattern, though the hull is very narrow. The innovation lies entirely with the foils, which is a correct way to experiment. The result is a boat which will satisfy yachtsmen in a way far different to the *Proa Flyer*, which will need a massive re-orientation of sailing thought and habits.

The Rowe Foiler

All the hydrofoils mentioned so far have been "surface-piercing", gaining area on immersion and losing it on emersion, thus giving a relationship to the



water surface. Chris Rowe's concept, on the other hand, comes from an AYRS suggestion probably via Rodney Garrett's *SULU*. It stems originally from "The Theoretical Yacht" of an aerofoil in the air and a vertical hydrofoil in the water. This system is supported by a hull with the least possible resistance (a catamaran hull) and is stabilised by an inverted T foil to leeward, which is, at the moment, manually operated.

Chris Rowe simply must have a very fast boat when he has ironed out the snags. It is most certainly too early to say that the line he is working on will not produce as fast a craft as any other foil-stabilised boat. His advantages are:

1 No cantilever foil, other than the centreboard.

2 Far less cross arm beam.

3 No surface waves from the side foil.

4 Less weight.

Letter from: Edmond Bruce, "Lewis Cove", 69 Hance Road, Fair Haven, N.J. 07701

Dear John,

If, in the foil application you mention (*Ed.* A double foiler, heeling at 10°), there is any degree of surface wave, at a working angle of 35° , it would pay him to change to 45° when sailing, thus 55° when upright. In my own early experiments, I developed quite a wave popping out of the water surface for 35° at speed. Harry Morss had similar experiences.

For anyone interested, dividing the usual leeward foil into two parts, one placed forward and the other aft, would achieve a stability in pitch and yaw not present in the single foil. I want again to stress that the canted type of foil to leeward gets its lift mostly from the lateral component of the sail force. It does not appreciably rob the precious driving force component to obtain lift, as do so many foil proposals.

As to using both starboard and port foils (*Ed.* The heeling double *Bruce foil*), several people, including myself, greatly improved their speed by dismantling one of the two outriggers. With double outriggers, one is hauling around a lot of unused junk and must tolerate unnecessary beam. Also, due to the balancing of outrigger weights, out of water weight becomes ineffective.

One might consider including a proa and your semi-ellipitical square-sail

with two canted foils to leeward and one under the hull in the alternatives. Problems are removed since a reverse in sail curvature is never called for because of the double direction of sailing. This might make possible a selfsupporting sail without a mast. I have some wind tunnel evidence that such a sail would be superior to present wing-masts and battened sails in windward work.

About the failed experiment you refer to with a single outrigger. The foil was not only canted but of very high aspect ratio and *highly buoyant* through appreciable thickness in its hollow structure. It made an awful fuss in the form of waves and wake. It had the common mistake of so many inexperienced experimenters. There should be *only one variable at a time* in a well conducted experiment. I suggested experimenting with models having

thin foils and then to transfer successful dimensions accurately to full size.

I have done a lot of board "toe-in" experiments on various hulls in the towing tank. The best results always seem to occur when there is the same 5° angle of attack on *both* board and hull in the form of least drag angle. This means a board parallel to the main hull's centre-line. As for non-heeling, a slightly longer arm can compensate for the main hull's lateral resistance.

Edmond Bruce

Letter from: John Morwood to Edmond Bruce

Dear Edmond,

Many thanks for your letter with its warning against high aspect ratio and thick foils. It is also good to remind people of the value of model experiments.

From what I have seen, there can be no doubt whatever that the single canted (Bruce) foil is the configuration of choice. The foil must be thin and (in my opinion) a triangle of proportions between the top and span of 2:1.414. This gives your aspect ratio of 1:1 when canted at a working angle of 45° .

For flying, I agree that the proa is the best answer, either with two foils to leeward and one under the hull (or vice versa). The foils should be of the same shape but may now be curved 1 in 12 to give extra force.

However, Dave Keiper, Gerald Holtom and George Chapman are all "deep-sea" men who know ocean waves and are distrustful of the single foil to weather and of the proa. They are therefore willing to carry an unused foil with all its weight and windage "for safety". Dave Keiper still believes in high aspect ratio but Gerald Holtom and George Chapman both retrieve some of the losses from the unused weather foil by having a curved lee foil.

For flying, two of these three experimenters are using some of what you call "the precious driving force" to lift the main hull. Gerald Holtom, however, has just perfected fore and aft canted foils which give him all the hydrodynamics of the proa foiler you suggest. He converts the side force of the sails into lift.

John Morwood

EDITORIAL

by John Morwood

The material for this publication was assembled by Dudley Soulsby but he has left me the job of writing the Editorial.

It is a review of modern trimarans of excellent design and, in some cases, startling performance. The outstanding article is the review of trimaran design features at Wellington University, New Zealand. Essentially, this meeting should give people some idea of the work and uses to which trimarans of the various designers can be put. For anyone thinking of building or buying a trimaran, it will, we hope, be an excellent guide and hence the title which the publication has been given.

Peter Shreve, who originally undertook to study multihull and single hull

safety, has unfortunately found it impossible to continue—at least for the present. We are therefore including some studies and ideas for multihull safety. This section begins with a *simple*, but scientific study of sea waves by Peter Laurie which I found fascinating. It ends with an account of the break-up of the boat and the rescue of Raymond Reitz and his wife in their unfortunate attempt to be the first people to cross the Atlantic in a trimaran made from welded oil drums.

We conclude with the final stages of Bernard Rhodes' cruise from England to New Zealand.

BOOK REVIEWS

We have taken the opportunity of a rather short publication to have some book reviews. Arthur Piver's books and those by Bob Harris will give people an idea of multihulls from a different outlook to that of the AYRS. The cruises will give food for dreamers.

TRANS-ATLANTIC TRIMARAN by Arthur Piver TRANS-PACIFIC TRIMARAN by Arthur Piver TRAIMARAN THIRD BOOK by Arthur Piver

Publishers: PI-CRAFT, 50 Marlin Avenue, Mill Valley, California. Price of each \$4.95.

My position as AYRS Editor has forced me to study the history of invention and material progress in the tiny field represented by yacht research and invention. My conclusion in our field, which may be general in invention, is that Progress takes place in two ways:

- 1 Lots of people work on a problem like beavers chewing around a tree-trunk of ignorance and finally the problem is solved, slowly and laboriously.
- 2 Certain gifted men have a unique capacity to imagine or visualise mechanisms which *could* work and give a satisfaction in a rather nebulous way. It is unusual for such ideas to be passed on to others because they are virtually incomprehensible. However, the gifted man can often take his idea and, by dint of very hard work, can give it a form in which it can be communicated. Finally, the idea is perfected by skilled mechanics or engineers. For example, Alexander Graham Bell had very many inventions to his credit but I doubt if any of them are now used in their original form.

The late Arthur Piver was one of the gifted men of yachting. He saw the uses and potentiality of the trimaran. From this point, he compromised with efficiency by using hulls with a right angled V at the keel but he built some beautiful yachts with his own hands and sold plans so that others could do likewise. Moreover, he sailed across oceans to show that his boats were safe and that a new dimension in yachting had arrived.

With apparently boundless energy, Arthur pursued his course of building boats, selling plans and, fortunately, writing the above three books.

These books are written in an English style which is believed to be the most readable. The paragraphs are short, the language is simple and clear, the thread of the writing is precise because he knew exactly what he wanted to say and above all, there is humour.

Trans-Atlantic Trimaran deals with the building of the 30 ft NIMBLE I in the first chapter. The rest of the book deals with transporting the boat across America and sailing the Atlantic but it far from being just another "cruising yarn". Shining out of the text of the adventure comes the "Concept of the Trimaran" as seen by Arthur, even before the first one was built. One can find all the advantages of the type and be shown trimaran seamanship, though this appears rather more simple than most people find it. All this is to be found "between the lines".

Trans-Pacific Trimaran is a similar account to the previous one but in the 35 ft LODESTAR. Setting out from San Fransisco, Arthur sailed to San Diego and from there to Hawaii with the Trans-Pacific fleet. Returning home for business reasons, he later sailed again to Hawaii in a boat built by a doctor nearing retirement to pick up LODESTAR again. Leaving Hawaii, they called at Tahiti and Rarotonga and on to New Zealand where Arthur got a very warm welcome from the "Yachtiest Country in the World", where everyone builds his own boat and yacht designers are National Heroes.

It had been an idea in Arthur's mind to sail with the "Roaring Forties" in the South Pacific where the surfing power of his trimarans would surely beat the record for the best day's run ever for a sailing ship. However, when it came to the point, he did not proceed with this plan. He gives some reason in the book but I think that the idea was just alien to him. His life was to create the trimaran, not break any records.

The "Concept of the Trimaran", as expressed in *Trans-Pacific Trimaran* is more mature than in *Trans-Atlantic Trimaran*. The process of answering questions to a host of builders of his plans had crystallised his outlook on trimarans and he is now more sure of the features of design which appeal to people.

Trimaran Third Book like the other two books has a theme—the design and building of BIRD. She was then taken to Tampa, Florida, launched and sailed to various West Indian Islands, giving many trips to people in the ports and finally joined the Bermuda Race from Newport, Rhode Island. Dick Newick in TRICE also joined that race and finished third, beating all but two of America's finest single-hulled boats. Arthur was not racing in fact and, though he set out with an intention to join in the Single-Handed Trans-Atlantic Race, he did not get to England for it. One supposes that he realised that his boats could only reach very high speeds in very limited conditions of light weight and a reaching course. They were not racing boats and, when loaded with stores, would have been relatively slow. BIRD and the later STILETTO were Arthur's only attempts to build racing trimarans and the newer, light, round bottom trimarans of other designers were beginning to appear.

The value and charm of Arthur's *Trimaran Third Book* lies in the short asides of accounts of trials and incidents with people building and sailing his trimarans. Again, the "Concept of the Trimaran" is presented in delightful English prose. His account of a very violent storm in the Atlantic is worthy of Conrad while the concluding chapter on "Handling the Trimaran in Storm Conditions" should be read by anyone putting to sea in these craft.

Arthur Piver's tragic loss while trying to qualify for the OSTAR by sailing single-handed for 500 miles meant that we lost a man of genius, even though his main work had been accomplished. He came and went from the face of the earth and left us with the trimaran. We less gifted folk can round the hulls and work out the proportions of the hull and floats.

The Trimaran is Arthur Piver's epitaph.

RACING AND CRUISING TRIMARANS by Robert B. Harris

Publishers: Nautical Publishing Company. Price: £3.25.

Bob Harris was the first American Secretary of the AYRS and wrote our publications Nos. 10 and 19 (AMERICAN CATAMARANS AND HYDROFOIL CRAFT). This is his second book, the first being *Modern Sailing Catamarans* and both take their style from AYRS.

The book is dedicated to Victor Tchetchet and Arthur Piver and begins by giving short accounts of the contribution of both to trimaran development. Bob follows this by accounts of the other developers of the trimaran; the AYRS, Meade Gougeon, Dick Newick, Jim Brown, Norman Cross, Ed. Horstman, Dobler and Kantola, Tom Urie, John Westell, Derek Kelsall, Ib Nielsen, Lock Crowther, Hedley Nicol, Andre Allegre (*PEN DUICK IV*) and Rod MacAlpine-Downie. Most of these names are familiar to AYRS readers and each section has a description with a photograph of at least one of the designer's boats.

Passing on from the people and boats which make up the modern trimaran, the book turns more technical by discussing in detail just what makes a trimaran the yacht of choice for so many people. He places "Habitability" first and goes on to discuss "Seaworthiness', "Construction", "Rigs and Sails" and "Auxiliary Power".

Chapter V has 22 pages devoted to what makes for good design in trimarans written in such a way that everyone should be able to understand it no matter how technically uninformed.

I was especially interested in the general discussion of "Construction: Materials and Methods". Bob Harris has had his trimarans and catamarans built in most materials from Aluminium to sandwich and by both profes-

sionals and amateurs and therefore has a deep insight into the trials and troubles and also the costs of many constructional methods.

The book is extremely easy to read and contains a wealth of information. The profuse illustration by photographs, diagrams and plans brings his points into excellent relief and the result is that, on putting the book down, one feels that one has a deeper insight into the trimaran than before. The book is, I think, written for a person without any great technical knowledge of yachts but who is wondering if he should have a trimaran for his next boat. However, the best points of trimaran design are all to be found clearly stated so that even an established trimaran designer should learn something from it.

I feel that this is a book which could well become a "Classic" on the subject.

MODERN SAILING CATAMARANS by Robert B. Harris

Published by Nicholas Kaye Ltd, London. Charles Scribner & Sons, New York.

Bob Harris wrote this book a long time ago and it was first published in 1960 at a time when we were not having Book Reviews. A re-reading now, however, shows that it has not become out of date and should be read by all people interested in racing or cruising catamarans.

The real history of the modern catamaran starts with the "One-of-a-kind" races held in America in 1959 on Biscayne Bay, Florida, run by YACHTING MAGAZINE. In England at Stokes Bay in September, 1960, no less than 21 racing cats and three cruising cats (SNOW GOOSE, SHAMROCK and GOLDEN MILLER) ran a "One-of-a-kind" series between themselves.

Bob Harris' TIGERCAT won the American series against the previously unbeatable Scows, a few catamarans and a variety of the fast dinghies. The COUGAR and SHEARWATER also beat the Scows but sandwiched between them in the finishing order was a sliding seat canoe (a one-hulled catamaran) and following them was a "5-0-5".

It was thus proved to the yachtsmen that the catamaran was a much faster boat than the dinghies or scows only some 5 years after the Prout brothers' SHEARWATER I had been produced. At the time, we were appalled at the prejudice against cats by yachtsmen but, looking back, the rate of acceptance has not been slow, as these things go.

Starting with these "One-of-a-kind races, Bob goes through the History of cats and them goes on to design. He shows an early design of his own NARAMATAC which he later refined into a lovely boat OCELOT and finally into TIGERCAT.

Early in the book however, we start to have drawings of cruising cats to Bob's design mostly of 28, 30 and 32 ft long with accommodation plans and this betrays Bob's main interest. However, with only one chapter exclusively devoted to cruisers, this book shows the main types of catamarans which existed in 1960 and gives all the principles of design and construction.

With many photographs ranging from the veteran MANU KAI, SNOW GOOSE, ANUI-NUI, SHAMROCK (Bill O'Brien), DREAMER (Hugo Myers) and the famous AIKANE (C.S.K.) and racing cats like his own TIGERCAT, SHEARWATER (Prouts), JUMPAHEAD (Bill O'Brien), the book is profusely illustrated.

TRIMARAN SOLO ("Victress" around the World Single-handed) by Nigel Tetley

Ever since catamarans and trimarans have appeared on the yachting scene, we have seen more and more daring voyages in them. Some have broken up. Some have capsized and some have achieved really amazing ocean crossings.

The ultimate yachting voyage is, of course, single-handed, non-stop, around the world. This has only been achieved by Bernard Moitessier, Robin Knox-Johnson and Nigel Tetley. Bernard and Robin used single hulled yachts and Nigel the Piver designed trimaran VICTRESS which he had been using as his family home. It was Nigel's bad luck to have the bow of the

port float come off only 1,100 miles from Plymouth and this made a hole in the main hull which made her uninhabitable.

Nigel is obviously a born seaman. He must also have acquired seamanship and had it thrust upon him during his service in the Royal Navy and in sailing *VICTRESS* in the years since he got her—the first of her type—in 1964. He also had his wife Eve who took care of all the victualling for the voyage, which provided variety to what could well have been a tedious trip. He was also lucky in being sponsored by "Music for Pleasure" who provided tapes of all kinds of music he enjoys which must also have been a great "morale booster".

The book is extremely readable in good simple English, well illustrated with coloured photographs and drawings and extremely well laid out. I think that it is the best produced book I have ever seen.

The meat of the book cannot be described here. The impression one gets, is of very high morale throughout, only sagging slightly if he neglected his diet or lost too much sleep. The seamanship was outstanding with all eventualities catered for on departure.

The lessons learnt from this book are as follows:

- 1 A well designed and built trimaran can be as seaworthy as any single hulled yacht.
- 2 Nigel gives an impression of a more comfortable and drier voyage than Robin Knox-Johnson.
- 3 A holed trimaran will probably capsize. Nigel's boat was later seen floating upside down.
- 4 To do any ocean crossing the forethought and preparation must be intense.
- 5 Plywood covered with fibreglass is not a durable material. Its life, if kept afloat permanently is only some 5 years in North European waters and it has been known to perish in 3 years in the United States.

Trimaran Solo is as full a study of the trimaran in use as we are ever likely to see.

YACHTSMAN IN RED CHINA by David J. Steele

Publishers: John de Graff Inc, 34 Oak Avenue, Tuckahoe, N.Y. 10707.

BARRIER REEF BY TRIMARAN by John Gunn

Publishers: Collins, St. James's Place, London.

Both these books are in the best traditions of trimarans. David Steele built a 14 ft pram dinghy, then a *Sunfish* and a Piver *Nugget* before building the 32 ft Piver *Herald* in which he was taken by the Red Chinese at a spot which he carefully reckoned was well outside of Chinese territorial waters. John Gunn had never built anything more complicated than a bookcase before he built the 35 ft Piver *LODESTAR*. However, one supposes that he was spurred on by the need to set an example to his six children, though he only took two of his boys for part of the trip.

Both authors write extremely well and with a good sense of humour. Steele speaks Dutch, Spanish and French and has a working knowledge of Vietnamese, German, Italian and Japanese which doubtless gives him his command

of simple explicit English. Dunn is a professional writer, with a background of the Royal Australian Navy both as deck officer and Fleet Air Arm Pilot, with a short spell as a medical student.

Yachtsman in Red China was most interesting to me in the yachting part which takes up over half the book. Steele stresses what he calls "escalation". You build and sail a small boat and immediately want to build and sail a larger one. Having gone through this process myself is probably the reason but a witty exposition of the phenomenon is always welcome. The part of the book which concerns his experiences in the hands of the Chinese is well written and shows how it is possible to endure imprisonment with fortitude and even humour.

Barrier Reef by Trimaran is a more or less orthodox cruising yarn. Its main interest to me lay in the description of the plants and animals seen on the Great Barrier Reef of Eastern Australia.

SEPARATE HORIZONS by The Rev Stephen Pakenham

Published by: Nautical Publishing Company. Price: £2.25.

This is an account of the 1968 Single-Handed Trans-Atlantic Race, written by a competitor in ROB ROY, a 32 ft single-hulled ketch. It is not a personal account of the race but tries to cover the experiences of as many of the contestants as possible. This is done by referring to the logs of the boats after the race was finished.

The Boats' Progress

This is shown by a series of clear maps which are better than any I have seen so far. They only cover 4, 5 or 6 days at a time and not too many courses are included so that they are very clear. Though there is a map of the total courses of all boats, the complete courses are also shown in groups of three which makes them easy to take in.

Stephen Packenham has also tried a "Parallel logbook analysis" which is an excellent idea but can only be applied to a few boats. The eight weather maps are a valuable asset.

The Boats

PEN DUICK IV, Eric Tarbarly's gigantic aluminium trimaran dominated the contestants at the start with the tiny (19.7 ft) Swedish yachts contrasting severely with her. RALPH (Alain Gliksman), SIR THOMAS LIPTON (Geoffrey Williams), SPIRIT OF CUTTY SARK (Leslie Williams), SAN GIORGIO (Alex Carozzo), and VOORTREKKER (Bruce Dalling) were the "Big Boys". Dick Newick's CHEERS, sailed by Tom Follet, at 40 ft was the sleekest boat in the race. SAN GIORGIO, OCEAN HIGHLANDER (Sandy Munroe), GOLDEN COCKEREL (Bill Howell) were the cats, while the tris were COILA (Eric Willis), YAKSHA (Joan de Kat), GANCIA GIRL (Martin Minter-Kemp), KOALA III (Edith Baumann), WHITE GHOST (Michael Pulsford), STARTLED FAWN (Colin Forbes), TAMOURE (Bernard Waquet) and ARMISTAD (Bernard Rodriquez).

Seven single-hulled boats retired. The catamarans SAN GIORGIO and OCEAN HIGHLANDER (lost her mast) suffered a like fate but no less than five out of the eight trimarans either broke up or otherwise failed to finish. Eric Tabarly had bad luck to collide with an anchored ship but Joan de Kat's YAKSHA, Edith Baumann's KOALA III and Michael Pulsford's WHITE GHOST just were not strongly enough built for the voyage. The Royal West of England Y.C. hope to avoid such a decimation of the fleet next time by having a rule that the 500-mile qualifying voyage shall take place in the yacht to be raced. Eric Willis was the only man so far to have been taken ill at sea in any of the Single-handed races. This was exceptionally bad luck.

Just how Stephen Packenham got so much detail from so many of the entrants in the race is hard to imagine but he moves from first-hand account to first-hand account throughout the book with very little about himself. He has tried to bring the race itself into the picture and has I think succeeded extremely well. It will be an excellent guide for anyone thinking of going in for this race for the first time and even seasoned single-handed sailors of the Atlantic will not only enjoy it but may well learn something.

CAPE HORN: THE LOGICAL ROUTE by Bernard Moitessier

Published by: Adlard Coles, London. Price: £2.50.

Most yachtsmen only know Bernard Moitessier from his entry in the Sunday Times Round the World Race. When he was leading the others, he suddenly decided to sail from the South Atlantic, having completed the circuit of the World non-stop and single-handed, not to Plymouth, England but to Tahiti. This amazing action resulted because he had done what he wanted to do, ie, sail around the World single-handed. Also, I doubt if he much cares for "ballyhoo".

The above book is not, however, concerned with the Round the World Race. It is Bernard's second book, the first being *Un Vagabond des Mers du Sud*, (Editions Flammarion). This book starts with the loss of his yacht *MARIE-THERESE II* in the West Indies. He then explores ways of getting a new one but finally joined a tanker as crew after an abortive attempt to make a boat skinned with layers of paper. On the tanker, he learned that five men could paint a 16,000 ton tanker in nine hours and that this preserved the steel in top condition.

Returning to France, he took a job as a Medical Representative and wrote his first book. The royalties and his savings were then put into *JOSHUA* which was built of steel by Jean Fricaud, of Marseilles.

The cruise described here was from Marseilles to the Canaries, Panama, the Galapagos, Marquesas, Tahiti and back to Alicante with his wife Francois for crew. The title stems from the fact that the quickest way for a sailing boat to get to Europe from Tahiti is via Cape Horn and that is the route which they took.

I suppose that the charm of this book lies in the way it is written and has been translated. It is certainly a very readable and fascinating account. One feels that the author is telling one personally how to sail such a course because

Bernard is continually giving factual information about his yacht and the seas through which he is going. The "Designer's Notes" and "Author's Notes" as the appendices, giving the information on the yacht itself, the self-steering gear and the propellor installation, are such a care for the reader's edification.

THE LURE OF THE SEA by D. H. Clarke

Published by: Adlard Coles Ltd. Price: £1.80.

Nobby Clarke's place in the trimaran scene is assured by the fact that he set up a selling organisation which sold nearly 200 trimarans of Arthur Piver's design. The craft were built by a separate company, Contour Craft Ltd. The trimarans sold well and we all thought that the organisation was to be a permanency. However, when the Labour Government started to interfere with all industries by taxes and in other ways, Nobby immediately wound up the whole thing. He now writes books, this one being his third. The two previous ones are: *What were they like to fly* and *Trimarans*.

The Lure of the Sea is not about trimarans. Its main theme is the economics of yachting both from the yachtsman's and the boat-builders and yacht sellers angles. However, this theme is a continuous offshoot of another theme, namely, the process of getting a yacht for a long ocean voyage. Finally, a third theme appears. This is seamanship of a more orthodox kind though, of course, one should include economics and yacht purchase in seamanship.

Nobby Clarke must be a first rate seaman under sail. He owned the Thames Barge JOHN & MARY from 1946 to 1957 and sailed her without an engine, converting her to a yacht. His experiences with his barge are not described in this book, except in small part but are largely the source of his knowledge of yachting.

People who have done adventurous things and can write produce the most readable books. Nobby flew Hurricanes and Spitfires during the war. He sailed his Thames Barge and sold the Piver trimarans. These three things do not sound very much in number but the length of each stage was long enough to allow him to become an expert in all.

Perhaps it is because I myself was with Fighter Command during most of the 1939-45 war with the squadrons to which I was attached flying Spitfires; that I have always wanted to sail a barge (though preferably a Norfolk Wherry) and have been connected with trimarans since 1955, that I enjoyed this book so much. The seamanship and yacht management will interest others while the process of working out what one can afford to buy with some fixed sum of available money may well guide a prospective boat owner into buying a boat which will suit him in the best possible way.

TRIMARANS

Illustrated Address and Panel Discussion at the University of Wellington, 7 September, 1970

A pictorial survey of most Trimarans throughout the world today was presented by D. E. Barry-Martin, who used an Epidiascope to project pictures

on to a large screen. This was followed by talks from Mr Dick Griffiths, who for some years has sailed a *Lodestar* 35 which he built, and from Mr Roger Youmans, who told of his experiences in sailing a lively *Hartley Sparkle* 28 ft and his present Piver *Victress* 40 ft.

During the month prior to the Address Mr Barry-Martin has sent a questionnaire to 18 leading designers throughout the world. 14 replied, and a condensed summary of answers is given at the end of this report.

The following are a few significant points covered by Mr Barry-Martin in his illustrated address:

- 1 Tris are not new. Patrick Miller of Glasgow designed some in 1786. Moro Vinta's, the Indonesian double outriggers, have been sailing for hundreds of years, and in 1945 Victor Tetchet produced a typical small Tri in New York. Since then they have occurred all over the world, in an amazing variety of forms.
- 2 Too many inexperienced people build a particular design and do not realise that there is a large variety of design and performance in Trimarans. Comprehensive research by would-be builder-owners or buyers is a must.
- 3 Between roughly 1950 and 1960 too many people got the idea that Trimarans were foolproof and could be made from cheap materials slapped together, then sailed off round the world without any practice. The absolute opposite is the case.
- 4 Hull and float shapes now occur in all varieties—V, round, squarish, double chine, flat bottom, etc.
- 5 Generally wider beam is becoming more popular, although a lot of Tris have stabilised at the medium beam range.
- 6 Floats are tending to be fuller and more forward, in some cases projecting in front of the bow. Both submersible and non-submersible floats have their protagonists, the former usually for racers and the latter for cruisers.
- 7 Permanently immersed floats are on the wane. Generally when at rest both floats just touch, or for racers, are out of the water so that when sailing one float is usually well clear of the water, thereby minimising wetted surface.
- 8 Wetted surface is minimised for racers and narrow sterns help this.
- 9 There is a tendency to imagine that Tris rotate around the main hull or one float, whereas they rotate around the centre of buoyancy, and as the lee float is submerged, accepting part of the displacement, the main hull correspondingly rises. This occurs even with submersible floats. It is dangerous to take too much notice of simplified diagrams which refer to unreal circumstances. It is almost impossible to calculate exactly what happens in a moving Tri, as there are numerous dynamic forces of the wind, the boat and the sea which cannot be perfectly measured or related.
- 10 Even very large floats have been known to nose-dive under some conditions. In such a situation a dynamic downward force can operate on the top of the float as it dives if the boat is moving forward at some speed. This could cause an unwanted diagonal flip.

- 11 The thing to remember is that proportionately only a very few Tris have capsized throughout the world. Taking all risks into account, even some monohull experts have stated that multihulls are safe.
- 12 The argument keelers versus Tris is a waste of time. Both can be beautiful and both can serve different purposes well.
- 13 Commonsense and seamanship can keep both keelers and Tris out of trouble, but lots of practice is desirable in both cases.
- 14 Third generation Tris, as the present designs and production models are called, are more sophisticated and more safe than the earlier models of the 50's, and use more restrained publicity.
- 15 Skinned-out lightweight racers generally prefer no side decks, just netting, to avoid windage. This is good, but having curved cabin tops as well or curved decks produces shortage of flat non-skid areas to walk on. Such flat areas are highly desirable for working on decks.
- 16 Technical development is covering a wide range and know-how and the general quality of design is improving.
- 17 Modern attitudes, safety, sense, strength are all much more predominant in certain Tris.
- 18 Strongly built early Tris sailed by experienced crews are still satisfactory. Some of the interesting boats illustrated and referred to were:

TRIBELLE

Pi-Craft Dart (of which one, the *TACTILE II*, has an excellent racing record in Christchurch)

MacCouilliard's attractive Trimar range

Ed Horstman's well engineered range

Jim Brown's original Searunner series

Robert Harris' apparently versatile 40 ft model

Hedley Nicol's impressive VOYAGER

Harrelson's super simple houseboat-like Tris

Derek Kelsall's pioneering foam plastic racers

John Westall's original and effective OCEAN BIRD

Lauren Williams' orthodox but impressive sailers and motor sailers

Norman Cross' very sound, deep draft Tris

Dobler's fascinating hot 30+, built by Intercontinental Trimarans

Dick Newick's lovely fast boats

MacLear and Harris' very professional boats

Simpson-Wild's handsome racey series

Lock Crowther's outstanding Kraken series, together with what looks like a little beauty, his 24 ft BUCCANEER.

D. E. Barry-Martin also showed his *Nugget* and his 14 ft experimental dinghy with movable floats (side-to-side) and folding "lateen" rig with hinged luff-spar-mast and radial battened "lady's fan" sail, all operated by one haliard-cum-forestry via a rotating bowsprit.

Summary of Answers from Designers and Boat Builders to questions asked by D. E. Barry-Martin in August 1970

(Most answers have been shortened and the wording, but not the meaning changed to save space).

The following designers and firms answered the questions, displaying outstanding co-operation by answering quickly and comprehensively.

Cox Marine Limited, The Shipyard, Brightlingsea, Essex, England. (Boat builders). Captain W. in't Veld wrote.

Honnor Marine Limited, Yacht and Boat Builders, Seymour Wharf, Totnes, Devon, England. (Boat builders). Designer John Westall wrote.

Intercontinental Trimarans Inc., PO Box 718, Wrightsville Beach, NC 28480, USA. (Boat builders). President Bill Fetner wrote.

Derek Kelsall Limited, Sandwich Marina, Sandwich, Kent, England. (Designers and builders). Derek Kelsall wrote.

MacLear & Harris, Inc., 11 East 44 Street, New York, NY 10017, USA. (Naval Architects). Frank MacLear, NA, wrote.

Richard C. Newick, Box 3039, Christiansted, St Croix, US Virgin Islands, 00820. (Designer and builder). Dick Newick wrote.

Pi-Craft, Box 449, Mill Valley, Calif 94941, USA. (Trimaran designs by Arthur Piver). Mrs Piver wrote, in consultation with executive Mr Howard Noble.

Simpson-Wild Marine Partnership, 19 Kings Road East, Swanage, Dorset, England. (Designers). Andrew Simpson wrote.

Tri-Cat Trimarans, RR1—Box 24B, Kent, Conn 06757, USA. (Boat builders). R. H. Parish, President, wrote.

Jim Brown, Jim Brown Sailing Trimarans, Swanton Road, Davenport, California 95017, USA, designer and builder, did not have time to answer the questionnaire at the short notice given but airmailed his huge informative catalogue.

Lauren Williams, Lauren Williams Sailing Trimarans, 137 Mill Valley, California 94941, USA, who was rushing to finish a large boat, did the same.

Border Marine, Sandstell Road, Spittal, Berwick-upon-Tweed, England, whose principal was away, referred us to Simpson-Wild.

The outstanding thing about all the replies was that although very busy all designers and builders were willing to go to much trouble to send good replies, some pithy, some more detailed, but all extremely worthwhile. 18 designers in all parts of the world were written to, 15 replied. Their ready interest is much appreciated.

Question 1. What features do you regard as important for safety in Trimarans?

Cox Marine

Registered Designers only. Professional builders. Light strong materials and fittings. Good skipper and crew. Sail Tri like mono and use extra reserve stability when needed.

Honnor Marine Ltd

Very strongly built. Designed by a competent designer.

Intercontinental

Good construction. Light weight.

Derek Kelsall

Test boat and crew in gale before trip. Carry normal safety equipment. Crew know Tri well, eg float buoyancy. Practice under all conditions.

MacLear & Harris

Structural and skin integrity. Limited wing area to avoid wind flip. Floats just submersible.

Newick

Strong hull sheathing, light strong structure. Windward ability, stability, experienced skipper.

Pi-Craft

Follow plans. Sail in home waters first.

Simpson-Wild

Safety is the product of integrated design, eg, racer needs open net side decks.

Tri-Cat

Follow plans strictly. Good skipper, well experienced in his boat. Good seamanship.

D. E. Barry-Martin in Address:

"This shows the third generation thinking in Tris—that you've got to be a good sailor first, whatever you sail, whether it's a bath tub, a keeler or a trimaran".

Question 2. What stand do you take concerning wide over-all beam versus narrow, and submersible versus large float?

Cox Marine

Very wide beam for racing tris only. Average Piver type beam best. We find non-submersible V-shaped floats successful—have no experience with submersible.

Honnor Marine

Wide beam good, submersible float best.

Intercontinental

Wide best, but not as great as certain designers like. Large planing type floats best, as by designer Dobler.

Derek Kelsall

Agrees with trend to wider beam, eg, 26 ft on 40 ft LWL.

MacLear & Harris

Medium beam best, too narrow causes wave interference, and too wide creates too great a wing area. Likes float of 85 per cent total displacement with about 60° heel, therefore submersible so won't act as pivot. Float should not be so small that it dives. Large beam ok in day racing boats with open wings.

Newick

His boats getting slightly wider. Amas always just about submersible in knockdowns.

Pi-Craft

Medium beam to avoid unbearable motion, and large floats.

Simpson-Wild

Adequate structure with submersible floats far enough out to equal stability of non-submersible float and narrower beam. This is safer provided wings are not solid. In a boat longer than 50 ft, float beam combinations are not so critical because of vast stability. At this size a catamaran seems best.

Tri-Cat

As a builder accepts any combination that works well but adequate hull spacing to avoid wave interplay. "I do not envy the designers as they seek the ideal compromise. I have very seldom been inconvenienced because of a large beam in berthing or docking".

D. E. B-M:

"Now you'll find that there is quite a conflict of opinion. I think overall they tend to go to the wider beam—there's no going back to really narrow beams. There were some Tris that had floats that were just stuck on the main hull. The wide beam seems to be well established, medium beam equally popular, and a variety of float shapes seem popular".

Question 3. Do you think Trimarans are developing in two streams—the one for floating charter hotels and the other for high performance safe ocean-going vessels?

Cox Marine

Building high performance safe ocean-going cruisers and charter Tris to good designs only.

Honnor Marine

Development following many lines with tendency to high performance in Tris and large accommodation in Cats.

Intercontinental

"I agree. We now build extremes, including a beautiful overweight 54 ft with five heads".

Derek Kelsall

Large charter type Tris seem to be dying here. The Cat makes the best accommodation multi.

MacLear & Harris

Infinite variety between houseboats and skinned-out racers. Prefer ocean Tris long and lightly loaded. Too much accommodation makes craft danger-ous.

Newick

Have always had slow ugle commodious Tris, never very many safe high performance ocean-going vessels.

Pi-Craft

Floating hotels and speed machines limited part of Tri world. Demand is for day sailing and limited comfortable cruising.

Simpson-Wild

Tris must develop into as wide a spectrum as possible. Every possible application can and should be catered for, from racing to chartering. Multis can do all this, usually better than equivalent priced monohulls.

Tri-Cat

There are plenty of "Roomarans" and "Guided Missiles", but there are still a lot of good load carriers with pleasing performances.

D. E. B-M:

"Well there you are. They agree there's a wide development and that any sort can be done provided it's done properly".

Question 4. Do you think Trimarans require better seamanship than other boats?

Cox Marine

No, just seamanship and commonsense, and experience of different sailing technique.

Honnor Marine

No. Tris easier to sail because of larger more upright platform.

Intercontinental

No. Just require sensible people.

Derek Kelsall

No, provided crew have good knowledge of particular vessel.

MacLear & Harris

Tris definitely need better seamanship than monos, but are slightly more forgiving than Cats. All multis need two men on watch at night, one steering, the other ready to release sheets or drop sails. Sheets should be doubleended so either can be cast off. Tris need more alert and more competent seamen because they tend to be faster and present a larger deck area to overfalls and breaking seas.

Newick

Depends on how speed potential is used. Over-driving a fast Tri can reduce safety.

Pi-Craft

No. Tris are more forgiving, but owners must gain sailing experience. The boat is only as good as the crew.

Simpson-Wild

Tris need more prudent seamanship than monos. Accidents seem related to excessive speed in prevailing conditions. Designers partly responsible for this in publicity.

Tri-Cat

No. Tris more forgiving, despite certain peculiarities. However seamanship still essential for safety. Early concept of invincibility wrong. Must not be lulled into false sense of security.

D. E. B-M:

"This indicates that the majority think that Tris are easier to sail. MacLear & Harris don't—they're quite happy to design them but they think you should have a crew on watch. That probably sums up seamanship anyway. Single-handed sailing may be interesting but it is, I suppose, contrary to the basic principles of safety at sea. However there you see a variety of opinions—most of them seem to think that the Tri is easier to sail".

Question 5. Have you any comments concerning speed?

Cox Marine

Speed is terrific, provided right sails and setting used.

Honnor Marine

Harm has been done by excessive claims for high speed. Multis compare with monos 80 per cent of the time, and occasionally put on high speed dash.

Intercontinental

All for speed-this is all the Tri can really offer.

Derek Kelsall

Past speed reports ridiculous. 10 knot average is good. Short bursts of 20 common only in lightweight racers.

MacLear & Harris

Speed narcosis should be avoided at peril of death, particularly at night, when surfing down seas can bury a float or cause a broach or both, followed by disaster. Speed must be regulated to match sea conditions. Enough speed must be made to avoid bad situations and yet not too much speed which might put the boat out of the helmsman's and the crew's control.

Newick

Greater speed than an equal monohull in Tris is the only reason for existing. "A slow Tri is like an ugly, ill-tempered, un-loving woman who can't keep house and has expensive tastes—why bother?"

Pi-Craft

Speed of a multihull built for that specific purpose has best been achieved by Eric Tabarly in *PEN DUICK IV*. And I quote my husband, Arthur Piver, "Concerning the question of performance, great speed under sail has never been the basic problem with multihulls. Almost any reasonable hull shape with sufficient overall beam and good sails can go like crazy when coupled with extreme lightness and the wonderful stabilising factor of leeward buoyancy".

Simpson-Wild

The measure of Tri performance lies in safely achieved average passage speeds, not wild ride down face of a breaking comber.

Tri-Cat

"Speed is great, so are girls and booze, but all in their place and time—and appropriate amounts to suit the conditions".

D. E. B-M:

"There again you get this third generation thinking of commonsense in the use of Tris".

Question 6. Do you think Trimarans are generally built strongly enough?

Cox Marine

Yes, by professionals. Right design is important.

Honnor Marine

Yes, by professionals. A proportion of experimental and amateur trimarans have proved inadequate.

Intercontinental

Yes, generally, but a lot of "wrecks" get into trouble.

Derek Kelsall

Many Tris are not strong enough, but considering the short development time the record not too bad.

MacLear & Harris

50 per cent are strong enough for their purposes, but probably 95 per cent are not strong enough for ocean cruising. Most Tris are not strong enough for gale conditions. Far too few Tris are built by experts or those who follow best practices. Too many crews attempt voyages beyond their seamanship.

Newick

I think my Tris are strong enough.

Pi-Craft

Yes, we think Piver Trimarans are built strongly enough. They are carrying weights we never expected, and the boats over 40 ft are usually powered by diesel auxiliary motors.

Simpson-Wild

Most Tris are not strong enough for ultimate conditions, but adequate for most. We incorporated massive safety margins into beams and fixture areas. Demountable designs highly suspect, particularly those relying on wires. More designs should be extensively tested. We use a 20 to 1 safety margin. Amateur designers beware.

Tri-Cat

The short answer is yes, if well designed, properly engineered and *built* according to plans. Even professionals have failed to do this in some cases. Results can be tragic. Stick to established designers.

D. E. B-M:

"That I think gives a pretty clear picture of the strength situation. They can be strong—everybody knows that, but a lot of them certainly haven't been. A lot of backyard stuff has been flung together and people who have never sailed have headed off to the other side of the world".

Question 7. Have you any comments on the merits of fibreglass versus plywood?

Cox Marine

Both are successful in appropriate applications.

Honnor Marine

Fibreglass has a great many advantages over plywood.

Intercontinental

Fibreglass alone is out. Fibreglass and foam excellent. Plywood is excellent, but the US public is brain-washed on glass.

Derek Kelsall

Plywood won't achieve necessary shapes. GRP/PVC foam sandwich is best for one-offs and has all the advantages of fibreglass.

MacLear & Harris

Plywood is excellent for one-off or short series. Fibreglass is more expensive but lasts longer. It is best for stock boats, but fibreglass weight and cost are harder to justify in Tris than in single hullers. Combination of fibreglass hulls and wood and plywood wings and bulkheads may be good compromise. Double curvature in fibreglass is an advantage but cold moulded plywood with double curvature is excellent at reasonable price.

Newick

Best material is the lightest, given equal strength.

Pi-Craft

The hulls for their 48 ft Tri are available in fibreglass later this year.

Simpson-Wild

Both ply and glass have their place. We mostly prefer cold moulded plywood sheathed in epoxy-glass for lightness and strength. Foam sandwich leaves much to be desired and is nothing like the miracle material it is hailed to be.

Tri-Cat

Plywood ok Early attempts at glass were too heavy. In USA they use plywood, covered and reinforced in glass (same in NZ). Foam sandwich looks promising for the future but there is much to learn yet to avoid current problems.

D. E. B-M:

"Seems true enough about the foam sandwich. No doubt a wonderful material eventually. So you can see plywood is still really up there in front, as far as Trimarans are concerned, and good fibreglass is obviously an excellent alternative provided it's not too heavy".

General Comments

Cox Marine

We believe in Piver designs and our latest Cox 32 Waverider, designed by John A, Bennett & Associates, and designs of other established designers.

Honnor Marine

John Westall personally has the greatest faith in the future of Tris for cruising and racing because they offer more comfort, more speed and less draft than a mono, but it will take many years to achieve full acceptance.

Intercontinental

Bill Fetner enclosed a paper by designer Dobler on the 30 +, wherein Dobler explained the advantages of his flat bottom Tri and its safety in accelerating ahead under sudden gusts. He also said "For what it's worth, we have built 2×24 's, $9 \times 30 +$, 14×36 's, 2×42 's, 2×52 's, 1×57 , and have under construction $1 \times 30 +$, 1×36 and 1×54 ft.

Derek Kelsall

No additional comments to full answers to questionnaire, but enclosed a drawing and a photograph which give the message that Tris have a good future.

MacLear & Harris

"The *Petersen* 44 ft Trimaran being built in the Philippines as a stock boat represents my latest thinking in a fast, yet wholesome boat, built of sheet plywood. Once this boat has been in production from three to five years it might be worth designing and building a fibreglass counterpart with rounder bilges.

I am a strong advocate of centreboards in Trimarans, despite construction problems. Our 40 ft Trimaran in the Great Lakes is closer winded and faster footing than any single huller of the same size and arrangement, according to monohull sailors.

Tris have a shallow draft, large decks and exciting turn of speed, and under 45 ft are better cruisers than Cats. The future of Tris is particularly good in non-crowded areas. Crowded metropolitan centres will retard Tri growth but Tris will multiply in shallow harbours. Tri progress will be retarded by greedy persons who try to build over-sized deckhouses on a given acreage. Trying to sail houseboats offshore will lead to unfortunate mishaps".

Newick

One can have only two of the three desirable attributes in a boat; low cost, high performance, large accommodation. Any designer who promises all

three is kidding his client and perhaps himself too.

Pi-Craft

Mrs Piver included a Pi-Craft catalogue, which listed a full inventory of safety equipment which should be carried on a tri, such as dinghys, flares, food, etc. Like other designers Pi-Craft features safety high in their third generation thinking. 400 Pi-Craft started building this year!

Simpson-Wild

The future is secure. Much early hysteria has gone. Confidence, is growing despite occasional grossly over-publicised accident. Sound professional design and construction is displacing the crack-pot fringe. Intense technical development occurring.

Tri-Cat

President Jack Parish recommended Robert Harris' Racing and Cruising Tris, his new book, Jim Brown's catalogue and new book, and one to come from Commander Edward Cotter. He states that Jim Brown's Searunner cagalogue expresses a lot of philosophy and advice that many have found difficult to put into words.

It is repreated here that the foregoing has been substantially condensed and reworded, but the meaning retained. There are some other excellent designers in the world, such as Robert Harris and Louis McCouillard, who were not written to. They should have been, but in the pursuit of a hobby such oversights occasionally occur. Perhaps Dr John Morwood of the Amateur Yacht Research Station should have been the first to receive a questionnaire, but he has probably asked and answered all the questions during the last 10-15 years anyway. Anyone wanting to study the development of tris should first read every AYRS publication from that period.

This summary has been dictated at speed. It is hoped that the reader can sort out the mixture of first person and third person quotations in the answers.

Summary of late arrival letter from Bert Anderson who (with partner Herbert Grosswendt, Naval Architect, ex USN) runs Trimaran Design Centre, PO Box 1232, Thousand Oaks, California 913660, USA

(Mr Anderson has owned a Piver Trident, Nuggett and Lodestar and sailed many hours on Nicol and Brown designs).

- A Bought TDC 18 months ago to produce stock tris. Tris suffered too long from backyard builders and designers. This is *major* cause of accidents, etc.
- B Been in boatbuilding field 20 years in native Sweden, Denmark and England. Took long time to accept multis but now absolutely convinced on tris.
- C Proper design and construction essential.
- D TDC producing Australian Lock Crowther's Buccaneer Mark II and Bunyip 20 tris and New Zealander Ron Given's Paper Tiger cat.
- E Sailed for 25 years but nothing as good as BUCCANEER II, which has surprised both multi and mono sailors for its stability and performance. Submersible floats important to Buccaneer. Gives time to act in gusts.
 F Broad-reached in 35-40 knot winds with 490 sq ft spinnaker, 210 sq ft drifter and 190 sq ft main all up together with no trouble but frightened crew. Monos lost rigs etc, lots of knockdowns, etc in large seas while we passed 169 racers, including 8-10 metres, in 4-5 hours.
- G Buccaneer handles all conditions from good to very bad with ease.
- H One real tri hater wanted a new boat (not a tri) but Buccaneer captivated him and he bought one, loves it, races it and wins.

Answers to Questions

1 Safety means submersible floats and open wing decks. Hit by 70-80 knot gusts BUCCANEER went up high but safely with full main and jib (120

per cent) while a 40 ft cat with reefed main and small jib capsized. Cat skipper later reported no time to release sheets as heavy gust pushed cat to 30° then flipped it.

- 2 Wide beam best.
- 3 Diminishing demand for floating charter hotels. AYRS and multi magazines teaching people what is best. Not enough good safe designs.
- 4 Tris don't need better seamanship. ALL BOATS NEED SEAMANSHIP!
- 5 Faster moving boats are more stable. Ease of handling and general performance more important than speed.
- 6 Too many tris and cats are not strong enough. It will take a long time to eliminate backyard stuff and cheap dangerous plans.
- 7 Plywood is best. Glass and foam will come more in future, but no glass and foam manufacturer can give us a product for *BUCCANEER II* with enough compression strength.

The foregoing has been summarised, condensed, re-worded and sectionalised by D. E. Barry-Martin, but the exact meaning is retained.

Lock Crowther's letter arrived 22.9.70 thus:

- 1 Safety requires:
 - a structural integrity
 - b stability
 - c sensible rig
 - d warning of overdriving
 - e recovery from large angle of heel
 - f steering control
 - g windage reduction sufficient to prevent capsize under bare poles in 100 knots.
- 2 See brochure (wide submersible).
- 3 Performance is on the way in at the expense of hotel accommodation.
- 4 All multihulls require different seamanship to monohulls. A prime requisite is a season sailing day racing cats or tris.
- 5 No comments.
- 6 Some are, some aren't, no general statement can be made.
- 7 F.R.P./PVC foam sandwich is the up and coming material for amateurs.

Yes, BUCCANEER did win the Williamstown-Geelong race. It has been doing extremely well in California beating all other tris but losing to large cats, eg, PATTY CAT II, SEASMOKE, MABAI, etc.

Final Comment by D. E. Barry-Martin on 22.9.70

Six years of *Nugget MATARIKI* and experimenting with tri-dinghy was most satisfactory. I am now ready to build 40 ft, my own design. Recent investigation confirms the belief that tris have grown up, will continue to improve and gain wide acceptance. But care and competence are essential in building and sailing. Slipshod builders and sailors beware!

Next, Mr R. T. Griffiths explained how some years ago he was building a copy of *Slocum's SPRAY*, and reached the stage where he was fed up with

steaming timbers. He had 20 or 30 years sailing monos and wanted a new one. At this stage he encountered Piver's tris and decided to have a go at a 35 ft *Lodestar*. He has never regretted it and still sails the same boat—8 years now.

Maiden journey across vicious Cook Strait cost him his mast, followed by hours of drifting and eventual tow. He then built a heavier box mast to later Piver design and used rigging 50 per cent heavier than designed. This has worked well ever since. Tri is moored at Mana Cruising Club, Paremata, on New Zealand's west coast near Cook Strait and directly opposite lovely Marlborough Sounds in South Island. Safe crossings in all weathers have been made and happy cruising in Sounds enjoyed. He has fitted a good sized motor and does not hesitate to use it in adverse conditions of tide, weather or wind. He finds the boat a lovely cruising boat, which does not usually fly a hull but provides a safe pleasant platform for both handling and enjoyment. He believes that good seamanship is essential. However this can be achieved only by plenty of practice and commonsense sailing.

Mr Griffiths strongly recommends bollards at the bow and stern of each float as well as the main hull to facilitate mooring from any point and putting out more than one anchor or mooring rope. He says he has ridden out gales in difficult positions with no trouble by mooring the boat from more than one point to suit the conditions. He favours the use of warps when under bare poles before a gale, but not so much as to stop the boat moving freely. He pointed out that the boat always wanted to lie broadside on to the sea and wind if left to lie a-hull without sail.

The interesting thing about Mr Griffiths is that he had a life-time of experience in monos and converted to a tri, which he enjoys and sails regularly. He gave sound answers, based on experience, to numerous questions from the audience.

He was followed by Mr Roger Youmans, who at present owns a 40 ft Piver Victress, his second tri, his first being a 28 ft Hartley Sparkle. He has fond memories of the latter, which he says he sailed hard much of the time with submersible floats under water. He liked the Hartley and regarded it as an exhilarating fun boat as well as a useful cruiser. The Victress, which he sails from Paremata, he finds an ideal family cruising boat with large accommodation, plenty for 7 children and 4 adults on extended holiday cruises. He does not regard it as a racing boat but as a relatively speedy cruiser which can average $8\frac{1}{2}$ knots over long spells. The boat's size and ketch rig give terrific stability and he very rarely flies a float. Like other Victress owners, capsizing never enters his head. However before he bought this tri it was moored at Kerikeri where a tornado hit it, whipped it through the water for a distance when the mooring chain flipped the whole boat completely upside down. This was followed by a flip to even keel again. Damage was only superficial-a fine tribute to the structure and craftsmanship in the boat. (It is true that most New Zealand workmanship in boats is of very high quality).

Mr Youmans went on to say that sailing tris is different from sailing monos and practice is necessary. He prefers to bear away, as in dinghy sailing, when hit by a gust, rather than round up. He has always been impressed by the

stability of the Victress even in an accidental broach in heavy breakers on the Paremata Bar. The boat has behaved very well in a wide variety of good and bad conditions, including rough weather in Cook Strait and fierce squalls in Marlborough Sounds.

He is strongly of the opinion that tris have suffered because thay have been sailed by beginners, whereas like all boats, tris need experience and seamanship.

Mr Youmans answered a variety of questions from the floor and demonstrated that a sound approach to the handling of a well built trimaran produces great rewards.

'TRUMPETER'

By fast tri to America-Jack Biscoe reports

L.O.A.	44 ft 0 in	L.W.L.	40 ft 0 in
Beam	26 ft 0 in	Draught	(centreboard up) 2 ft 0 in
Displacement	6,500 lb		(centreboard down) 6 ft 0 in
Construction	Glassfibre	Berths	4
	sandwich	1 17 .	

Builder: Derek Kelsall, Sandwich, Kent.

By Courtesy Editor: YACHTS AND YACHTING.

The departure of a single small yacht bound for the other side of the Atlantic no longer makes the news headlines since the numbers making the passage each year have now reached almost the proportions of a winter migration. Most of the yachts involved, however, are designed for cruising and the ocean crossing is incidental to the main object of reaching warmer climates. The case of TRUMPETER is somewhat different in that her owner, Philip Weld of Gloucester, Massachusetts, has chosen this means of transporting his British built trimaran to her home waters on the Atlantic coast of America, whilst TRUMPETER is a yacht built primarily for racing with little concession made to crew comfort or passenger accommodation. Philip Weld is a family man aged fifty-five who became bitten by the excitement offered by small high speed multihulls some three years ago. Whilst his wife shares his enthusiasm for sailing, she does not-in his own words-"relish screaming across the bay with a fire hose turned on her full blast" and suggested that something similar but with a lid on it might prove more fun for all concerned. As a result, Philip came to this country last September to seek a multihull, either cat or tri, which would satisfy both his craving for high speeds and provide some degree of comfort for his family. His decision after much discussion with builders and designers in this field was to commission Derek Kelsall to design and build a trimaran to compete in, and perhaps win, this year's Round Britain race but be capable of making the return passage to Gloucester under her own sail. TRUMPETER was the result and her overall third place in the race including her remarkable passage



TRUMPETER-cockpit

of five hundred miles down the East Coast at an average speed of nearly ten knots is a clear indication of her potential.

The three hulls are of straightforward glassfibre construction in the sandwich form favoured by her builders. The hulls are reinforced by transverse bulkheads with a pair of full length stringers in the main hull, which is fitted with both a centreboard and retractable skeg beneath the cockpit. The most interesting feature of her construction is the method used to tie the three hulls together. For this purpose, eight tubular alloy spars are employed in four pairs with these four pairs disposed to comprise two eliptical girders running the full width of the hulls. The arrangement is claimed to provide great strength combined with considerable saving in weight but at the same time to permit a degree of flexibility in the vertical plane thus reducing stresses in a seaway. The top pair of girders carries narrow gangways fore and aft to provide access to the wing hulls and the intervening space is filled in with netting. The hulls are of round bilge form and even in relatively light airs the weather float lifts clear of the water, reducing wetted area to that of the main and lee hull. The centreboard is operated by a winch in the cabin and is fully lowered only when on the wind. The retractable skeg is adjusted for optimum balance on a given point of sailing. TRUMPETER is seven eights sloop rigged with alloy mast and boom by International Yacht Equipment. The large section rotating mast is stayed by two pairs of shrouds, single forestay and one pair of diamond stays with the aft shrouds carried well aft and secured by tackles so that they can be released in the manner of the old fashioned runners and enable the boom to be swung right out when running. Unusually, the remaining shrouds and forestays are



Mast turning device



Mainsheet system



Roller, reefing and furling gear

secured to the hull with lanyards. The owner prefers these to rigging screws on the grounds that they are simpler.

The large genoa is permanently bent on to a stainless steel rod which is secured to the mast by a swivel and at its lower end carries a roller reefing gear made by the Nautical Development Co of North Island, New York. Philip Weld claims that this gear is so efficient that he regards his working and storm headsails as reserves only and carries the genoa in all weathers. It certainly appeared efficient since it seemed to take only a matter of seconds to unroll the full area of the sail and have it drawing.

The boom is not provided with a kicking strap but a formidable seven part tackle is used to bowse down the spar to a circular mainsheet track running the full width of the three hulls. The traveller on this track is provided with controls and the sail may therefore be trimmed by this means alone but there is an additional four part main sheet secured to the aft deck by ring bolts. The main purpose of this appears to be to relieve the strain on the single shackle securing the downhaul to its traveller. Three geared Lewmar type 40 winches and two additional smaller ones are mounted on the bridge which divides the cockpit. Two mainsails, one fully battened, are being carried on the voyage, together with two smaller and spare headsails. Steering is by wheel and Morse cable from the port side of the cockpit with a tiller for emergency use. A self steering unit by Quantock Enterprises has also been installed. This acts directly on the tiller via control lines. A Bosun grid type compass and repeater for the Hector speed and distance indicator are mounted in front of the helmsman.

In the course of our reports on cruising multihulls, the excellence of the accommodation which can be provided below deck has generally been a matter of favourable comment. The same cannot be said of *TRUMPETER*



TRUMPETER—winch bridge



Wheel, net and float

Q.M.E. self steering gear

and her accommodation in relation to her overall size is Spartan indeed. The saloon is entered by three steps down from the cockpit and its aft end is largely taken up by the centreboard casing with a small galley to starboard and a chart table, inclined and at chest level, to port. Forward of these two units are two very narrow saloon berths which project via tunnels through the forward bulkhead. This serves to enclose a shallow fo'c's'le in which is located an SL 400 w.c. and a transverse hanging cupboard. While there is full standing headroom throughout, storage space is at a premium and is limited to open lockers beneath the chart table and galley, the narrow spaces beneath the berths and with a limited amount of space in the bilge.

While the chart table is of reasonable size and, with its inclined surface, is easy to work at seated on the centreboard trunking, the galley unit is about the size of that usually found on a 20 ft monohull. It is fitted with an Argyle gas stove and small sink unit but there is virtually no working space other than the cover fitted over the sink. The gas bottle is stowed beneath the cockpit in the bilge and is connected to the stove by unarmoured flexible piping. Water supply is from a built in tank with a Flipper pump to the sink, with reserve water carried in flexible rubber tanks stowed in the floats. No sea water pump is fitted and as supplies for the voyage have been calculated on a basis of half a gallon per head per day, it would seem that a good many buckets will have to be dipped for washing up before arrival on the other side!

In addition to the two saloon berths—one might be long enough to take two people head to head if they were not too tall—a look into what was presumed to be the aft locker under the sterndeck revealed a narrow pipe cot low down in the bilge. The thought of sleeping there would certainly bring shudders to anyone with claustrophobic tendencies. With the hatch cover off in the balmy climate of the Caribbean it might perhaps be tolerable but would not be an attractive feature of the yacht if exhibited at Earls Court in the depths of winter!

While the accommodation plan would therefore not meet with approval amongst those who insist on their creature comforts at sea, Philip Weld has got what he wanted and is happy to sacrifice a considerable degree of comfort in his search for speed. Furthermore, one might well take a different view of it in Plymouth, Massachusetts, in summer from one in Plymouth, England, in the depth of winter.

Making the passage home with the owner is Martin Read, just retired from the Royal Marines, and Miss Patricia Jervis age twenty-two and a ski-ing instructor from North Wales. Martin is designated as co-skipper and crewed in *BINKY*, overall winner on handicap of the Round Britain race. Tricia is listed as crew. No set plan has been made for watch keeping and no doubt this will sort itself out and fall into a routine at sea after the bedlam which seems to be a normal feature of any departure. Philip Weld has a very firm intention of making as fast a passage as possible and does not plan any intermediate calls between Plymouth and St Croix in the Virgin Islands unless forced to do so by shortage of water or stores or other mishap. Given reasonable conditions, he feels that *TRUMPETER* is capable of achieving the magic average of two hundred miles a day and, should she do so, Francis Chichester

will have to look again for fresh worlds to conquer. It remains only to wish bon voyage and a happy return, not only to Martin and Tricia, but to Philip Weld himself who, by his cheerfulness and charm, to say nothing of his tolerances of our shortcomings, has made himself many friends on this side of the water.

HARRIS 33 TRI

By courtesy Editor: YACHTS AND YACHTING

One of the most successful multihulls launched in the States last year was the *Harris* 33 *Tri*. The prototype, *ECLIPSE*, came third in the first multihull Vineyard Race soon after launching and later went on to win first place on corrected and elapsed time in the cruising division of the East Coast Multihull Championship at Roton Point. During the last race of the series, the fleet was struck by gale force winds and *ECLIPSE* was reported to have reached speeds in excess of 15 knots.

The *Harris* 33 was designed by Robert Harris of New York and is built by the Rodriguez Yacht Building Company. She has low buoyancy floats designed to allow substantial angles of heel in order to relieve rigging loads



HARRIS 33









HARRIS 33
whilst at the same time providing a reserve of stability. The two cross beams are of aluminium alloy, tapered at their ends and streamlined along their exposed lengths and both these and the floats can be separated for storage. The extreme beam of the tri is 22 ft whilst that of the main hull is 10 ft. There are two pivoted centreboards, one located in each float; this arrangement avoids siting a centreboard box in the saloon with the attendant evils of wasted space and the possibility of leaking in the main hull. Accommodation has been planned around five people but there are several basic layouts to choose from. ECLIPSE's main hull was constructed of mahogany veneer sheathed with glassfibre with some areas in foam sandwich but production boats will be moulded in glassfibre only though again, certain areas will be of foam sandwich construction. There are two forestays. With rod furling for the genoa, and a balloon reacher which is designed to be tacked down on the bow of the windward float thus eliminating the spinnaker and pole and reducing the amount of foredeck work to a minimum. Sail area with 100 per cent fore triangle is 500 sq ft.

CHAMARU

By courtesy Editor: SEA SPRAY, New Zealand

L.O.A.	49 ft	L.W.L.	46 ft
Beam	23 ft	Draught	3 ft
Designer: Erick M	Aanners		

Commander and Mrs Sturkey's trimaran *CHAMARU*, is the most advanced of her type to visit this country. On a world tour expected to last four years, Charles and Mary Sturkey jnr and their crew Abraham Magpatoc spent about eight weeks in NZ waters before continuing their dream cruise that started from Japan and will take them around the world and eventually to their home port of Seattle, USA.

The largest trimaran built in Japan, *CHAMARU* attracts attention with her tremendous deck area, the quality of her design and finish, the comfort and standard of her accommodation and particularly the charm and friendliness of her crew.

CHAMARU is an Eric Manners' Triform 50 design. She displaces only nine tons and was built at Sasebo, Japan, under the supervision of Commander Sturkey, a naval architect. Her hulls are three skins of $\frac{1}{4}$ in ply and decks $\frac{1}{2}$ in ply, all fibreglassed. Spars are Douglas fir and the stainless rigging is secured with Gibb fittings. Her mainmast halyard winch doubles as an anchor winch and is fitted with a brake that simplifies reefing.

The most unusual aspect of *CHAMARU's* construction lies in the union of her hulls, Instead of the usual built-up box sections she is joined by steel pipes between the outer hulls and the centre hull which is solidly braced with steel plate. Commander Sturkey says that with 6,000 miles under the keel he has yet to see the shrouds slacken through hull flexing. He has complete



CHAMARU-bow view

confidence in his ship and would sail anywhere in her. However, he never overloads her, the outside hulls are never loaded over 500 lb and he seldom sails her faster than 10 knots.

When not under her normal ketch rig and sail area of 850 to 1,000 sq ft,

CHAMARU can make $6\frac{1}{2}$ top or $5\frac{1}{2}$ cruising knots from her Yanmar S2 diesel. This 10 hp unit swings a 19 in \times 13 in prop through a 2 to 1 reduction at 1,500 rpm. It also runs a 3 KVA generator and compressor for the deep freeze and refrigerator. When run for two hours daily to support these facilities and her battery, the diesel draws only half of one US gallon per hour from the 100 gallon stainless fuel tank.

Charles and Mary Sturkey are well known as K7BGS and W7TNA in the ham-radio world so *CHAMARU* sports a vast bank of radio equipment. Most of it is Japanese as is the stereo tape deck that plays through two linen cupboards to achieve as good a reproduction as you will ever hear.

On the navigation side Brookes and Gatehouse equipment include a fathometer, speed log and radio direction finder.



Commander and Mrs. Sturkey—CHAMARU's main cabin



CHAMARU-hull-float junction

Fitted but not yet operating is an auto-pilot system made by Commander Sturkey. He is still short of a few bits to complete this impressive piece of do-it-yourself electronic engineering that will supplement the vane selfsteering system.

CHAMARU boasts four double bunks and two single in the after cabin. A 30 cu ft refrigerator and deep freeze, an 80 quart bar, (how about that!), three heads, a bath tub, carpets, oil paintings by Mary Sturkey—you name it, CHAMARU's got it—and insulation throughout the main hull. One twin perspex astro-dome shelters the inside steering position and the other provides the best view ever seen from a bath tub.

There is a gas stove and oven.



CHAMARU-stern view with self steering gear

CHAMARU has 2.8 navigators, Mary is not quite checked out yet, so navigation is no problem. Leaving Japan in May after a shake-down cruise in the Inland Sea, calls were made in the Marianas, the Gilberts and the Ellice Islands, Fiji and then on the NZ for Christmas. Last month CHAMARU left for Australia, Timor, Bali, Singapore and the Mediterranean. After a stay in European and UK waters she will return to Seattle.

50 ft TRIMARAN-'CAHÁ PALUNA II'

by Dora S. de Marin

AP 415 Cuernavaca, Morelas, Mexico

After sailing 1,700 chart miles in three months (3,240 after corrections were made for headwinds and foul currents), all of it in open water, I am enchanted with trimarans. We sailed from Brazos Santiago, on the Texas-Mexican border to 24'N 94'W, then to Galveston. Galveston-Ciudad Carmen, then around the Yucatan peninsula to Isla Mujeres, Quintana Roo, stopping at Campeche and Progreso.

Our 50 ft L.O.A. ketch-rigged trimaran, whose hulls were designed by Arthur Piver; deck plan by the builders; and sail plan and interiors by me has more than lived up to our expectations as an offshore sailboat. Relatively dry and comfortable, even while going to windward in the 5-6 ft waves of the Gulf of Mexico, with 50 ft intervals, she is fast, and *very* easily handled. Tacking along the coast, I have been unable to see that she makes leeway. We can count on eight knots on the wind, and twelve or more off it—this with full cruising gear on board, a semi-foul bottom, and *very* badly cut sails. I have no idea what her top speed is.

The divided sailplan-two headsails, and ketch rig-and the enormous, dry working area at the bow makes sail-handling easy. I have not sailed her in a



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CAHA PALUNA II on the slip

gale—forty knots in a squall was the most—but, she heaves-to by putting the helm down.

Dr Morwood calls the big tris sailing houseboats—ours certainly is. The month of August, I, my six children, ages 3-12, a teen-age guest, and two crew members lived aboard. My husband joined us for intervals—we were never crowded. She has four double staterooms, each with head, shower, and hanging locker. The main cabin sat nine adults for dinner in Galveston. Her galley is apartment size, with eight feet of counter space.

Disadvantages? The deck is 6 ft from the water, and boarding can be difficult; falling overboard, serious. We have a double life-line rigged right round; pulpits for all three bows and sterns; and nylon line laced between the lower life-line and the deck, and from the pulpits to the deck. We keep our two boarding ladders rigged at all times.

The nest, rigged between the float and main hull bows, are everyone's favourite place, offshore or at anchor. Dolphins love the boat—they swim through the tunnels!



CAHA PALUNA II

She is extremely clumsy and difficult to handle in close quarters. Partly because she is so wide; partly because the designer did not specify a rudder, and the builder gave us a too-small spade rudder 4 ft away from the main hull! This will be corrected next Spring, when we will also have the sails re-cut.

Neither the Diesel auxiliary engine, custom-fitted to an inboard/outboard drive (when it works, it's lovely!) nor the Diesel light plant worked all summer, thanks to poor installation. Lack of an auxiliary meant that we slatted in calms, or anchored—prolonging passages unnecessarily. Lack of the light plant was far more serious—uncharged batteries; no refrigerator nor deep freeze (we cruise out-of-the-way ports where decent food is often not obtain-able); no air-conditioning (a necessity in the Tropics in the main cabin of a flush-decked tri,) no Loran, etc. Short circuits that almost burned the boat, etc, etc. She is now in the hands of the Mexican Navy, who have been working on her for the past three weeks, and will probably finish in a couple more.

It is a joy to steer from a pilot house—no sun on one's head, no spray in one's face! (We also have two outside cockpits). Offshore, a tri certainly moves—my husband said she felt like sailing a dinghy!—but doesn't heel, nor pitch, nor roll.

I visited a large "boat factory" in Florida, recently. Their 55 ft cruising sailboats have *far* less accommodation, both on deck and below; cost more; and cannot be as fast. Plus drawing 6 ft 6 in instead of 3 ft 6 in! !

I consider myself an experienced sailor—have sailed for the past 34 years, and owned a cruising boat for the past 25. Most of my sailing has been in monohulls, although we have had a *Shearwater* cat for the past eight years, for daysailing. I consider trimarans to be *far* superior to monohulls in comfort, accommodation, and speed, but I think it is a shame that, at present, there is no builder in the US or abroad whom I can honestly recommend. I hope this situation changes—*soon*.

Pertinent details

CAHA PALUNA II is 50 ft L.O.A.; 44 ft L.W.L.; 25 ft 6 in Beam; 3 ft 6 in designed draft; 17,000 lb designed displacement; developed from the late Mr Arthur Piver's 48 ft A.A. 48 ft L.O.A. design for use in moulded fibreglass. She sets 758 sq ft of working sail in a double headsail ketch rig; this can be increased to approximately 1,250 sq ft when Yankee balloon, staysail, and mule are set. She carries 600 sq ft in a square sail, whose yard hoists on the permanent backstay. She has aluminium spars; normal reefing; wire halyard and winches. She sets a permanent mainboom kicking strap, and I am going to fit one to the mizzen next Spring. Running rigging is Dacron. Sails stow in bins in two lockers on the float bows. She carries 200 gallons of Diesel, and 280 gallons of fresh water, as well as having a seawater converter. She has a 19 cu ft deep freeze, and a 7 cu ft refrigerator; air-conditioning in the main cabin, and the after stateroom. Power for the above and the Loran, ham radio, 100 fathom depth finder, etc is supplied by a 6 Kw Onan Diesel light plant. Her 45-hp Starrett Diesel, fitted to a Mer-Cruiser inboard/outboard drive. Driving a 3-bladed solid prop, this gives 9 knots in a flat calm, and 4 knots in the teeth of a 40-knot norther.



CAHA PALUNA II

She carries more than ample supplies for her "normal" crew of eight people for a month-eight cases of canned goods in the galley, etc. She floats about 2 in light, with all gear and people on board-I would guess she displaces a ton or so less than designed.

Twin centreboards, fore and aft, enable her to self-steer on a wind, and off it to a beam reach. Perhaps more experience will help there.

This sail area seems moderate, but she has steerage way in 3-4 knots (measured at the mast head); the mule comes down at 15 knots; the Yankee and ballooner at 18; and she can stand working sails up to 22 knots, on a wind. I think it easier to change light sails than to reef! She carries two storm headsails, one of which can be set as a main trysail.

She carries four dinghies on deck, hoisting them on board by a tackle to the mainboom end. Two 11 ft 3 in of my design, built by Tom Urie, one sailing and one rowing; and two 7 ft 9 in sailing Dyer Dhows, for the children. The Dhows nest inside the bigger ones.

She was built by Tom Urie of Texas Trimarans, Port Isabel, Texas of balsa-core fibreglass. She was moulded in two moulds-all three hulls up to deck level; deck, pilot house, and after trunk cabin.

NJORTH AGAINST THE WINTER ATLANTIC

by Philip Townley

By courtesy: Editor of TRIMARANER

Bathing in a $3\frac{1}{2}$ mile deep heated pool, surfing at 18 knots, drifting at 2 knots in air that strives to billow a $1\frac{1}{2}$ oz spinnaker, taking a fresh water shower in a warm rain squall, sailing your floating home over powder white sand veneered light blue by water shallow enough to stand in. Lee and I had been planning to sail across "the Pond" (as the British vernacular terms the



Lee and Philip Townley

Atlantic) for a little more than 5 years before we were able to set off. The most important phase of any extended voyage, preparation, began with finding the best design for our purposes.

Experience had shown that a trimaran about 32 ft in length could perform well and include comfortable living and sleeping accommodations for a family of 4 or 5 with a couple of berths to spare. But no existing or proposed design included all the other features we wanted in an ocean going home: hulls designed for efficiency rather than inexpensive construction, pretty and balanced lines, enclosed head with standing room, a separate dining area, more storage space than was available in existing designs, a separate forecastle, a separate chart and navigation centre, and a large galley with plenty of counter and cabinet space. Tastefully executed lines and winning performance of Jay Kantola's existing designs led to our working out the details of the *PACIFIC* 32 with him. Derek Kelsall of England was our choice to construct moulds

and manufacture *PACIFIC* 32's in fibreglass foam sandwich for us. Spacious, uncluttered decks and a surprising amount of living space for her size were combined with what we believe to be the most advanced and refined underwater lines existing. As her lines took shape, we could tell that the *PACIFIC* 32 would be pretty to wind and water as well as to the eye.

Most prototypes take more time and funds to complete than originally estimated. We got off only a month later than planned because many of the builders worked overtime and often 7 days a week. On November 10th, Lee was able to bean the boat with a bottle as the rising tide floated *NJORTH*



NJORTH

free. Fitting out and rigging were followed by our loading and stowing almost 3,000 lbs of provisions and gear aboard. Brief sailing trials preceded a week of gales and snow, scraping ice off the decks in the morning, and endless last minute details to be checked off the lists. NJORTH handled easily, was well balanced, and tacked effortlessly without backing the jib. The boat, if not completely finished, was ready to sail safely, and we took advantage of a break in the weather to push off from Sandwich on November 23rd (1969). The wind began to increase as we sailed by the impressive Dover chalk cliffs, and built to gale force by evening. This provided our first chance to really test the boat and decide whether to keep going or to go in for repairs to the centreboard, which was inoperative and pouring water into the saloon. Even overloaded as we were, NJORTH hit 18 knots the first day, and we literally shot through the Channel under less and less sail as we reefed until we were still surfing at 13 to 15 knots under 45 sq ft of storm jib alone. Temporary repairs were made to the centreboard assembly to stop the leaks, and we decided to keep sailing. We took movies of a Russian freighter burying



NJORTH, close hauled

her bow as we surfed by and wondered if they thought we were as crazy as we thought they were. One morning, a school of porpoises took obvious delight in body surfing down the waves alongside us.

We had been wary of the flip up rudder installed at the yard and had had a spare solid rudder built and stowed aboard. On the third day out, the weather proved to be too much for the flip up, and we spent a frustrating morning installing the solid rudder, which was given a mind of its own by the waves as we tried to juggle the gudgeons onto the pintles. That accomplished, we found that the wind had decreased enough so that we could divert some effort to hooking up the self steering system, which we had not taken the time to rig at the yard. It worked, and we went below and celebrated the day's successes with a fresh steak dinner, nature having provided refrigeration thus far. The potentially bellicose Bay of Biscay was peaceful as we crossed its mouth. Our QME self steering vane took the helm for all but a dozen hours of the voyage once it was hooked up, and we roasted chestnuts on our cabin heating coal stove and enjoyed an occasional glass of wine with the wide variety of canned foods brought aboard. Fresh oranges, grapefruits, lemons, apples, onions, cabbages, eggs (shells sealed to prevent evaporation), potatoes, margarine (no corn oil), and milk (scalded before packaging) were enjoyed for the 50 day duration of the voyage. Our total fresh water consumption was less than $\frac{1}{2}$ gallon a day, a good portion of our beverages consisting of beer and soda. With the self steering rigged, we checked course every three to four hours at night, turned on lights in and near shipping lanes, and otherwise

lived on a shore schedule, adjusted to daylight, lengthening days, and time advances.

Cabo Villano light flashed over the horizon as we passed the tip of Spain. November 29 provided the start of our next gale, which sent us scurrying under storm jib. A concerned tanker circled us, and, satisfied that all was well, went on its way. The weather moderated in a few days, and we sighted Porto Santo the morning of December 4th, passing between Porto Santo and



The route, daily positions

Madeira that evening. Tempting as the lights of Funchal were, we decided to keep going, as we were off to a late start. From here on, temperatures rapidly became comfortable.

How do you describe the trade winds? Although we stayed on their northern fringe $(23^{\circ}-24^{\circ} \text{ N} \text{ lat at that time of year})$ and had more variety of wind direction than is to be found further south, we enjoyed day after day of warm, clear blue water, marred only by occasional hull staining patches of tar donated by civilization. Birds and flying fish were plentiful all the way across. There were more clouds than we expected in the sunny trades, and it seemed that there was always a double or triple rainbow somewhere in view. One night, we saw a white rainbow glowing silverpearl in the moonlight. During the trade winds portion of our passage, the wind ranged from none at all through two gales measured at Forces 8 and 10. Most of the time, the wind blew between 10 and 20 knots and rarely from the West. In general, we were able to relax, read, bake in the sun, make routine checks and repairs, and delight in the antics of the different seabirds.

December 9, Lee baked fresh date scones and washed the laundry in salt water before rinsing it in a couple quarts of fresh to aid drying. I cut our hair using Sears clippers and the Honda generator, then charged the batteries.

Next, we enjoyed a salt water bucket bath which ended up in a water fight. We won.

All the while, the vane steered, and our improvised Genoa and working jib trade winds rig pulled. A trim board controlled in the cockpit enabled us to trim the vessel for downwind sailing in spite of our temporarily unbalanced rig. The same trim board used in conjunction with the centreboard when it was functioning during trials, enabled the boat to self steer by herself on points from close to broad reaching.

On December 12th we swam (one at a time) during a calm and scrubbed tar off the hulls. We saw ships every few days, and yellow billed tropic birds joined the daily parade of shearwaters and petrels. December 17th saw us 1,100 miles from land, nearly as far from land as you can get anywhere in the world. Our halfway celebration dinner consisted of a whole chicken, fresh baked biscuits, swede (resembles a turnip—we are not cannibals), gravy, wine, and fresh baked peanut butter cookies. Other ships were spotted, most going out of their way to check that all was well before saluting, our returning the salutes, and resuming their courses. One circled us in a calm, and we exchanged season's greetings. We were grateful to the watch officers who noticed the speck on the ocean and the skippers who cared enough to take the time to check on us and say hello.

On Christmas, a whale surfaced near us and blew three times, possibly attracted by the moaning of our log's impeller unit. Pheasant with cranberry was the order of the day along with a Fortnum & Mason Christmas pudding to which we added rum and hard sauce. A few days more brought another gale (a cold front tailing a US snowstorm gone out to sea), flying fish for breakfast, increased sargassum weed heralding the approach to the Bahamas, and increased shipping traffic. Following our New Year's Eve wild duckling and a bottle of champagne, the rudder ever so neatly fell off, remaining attached to the boat by only the self steering control lines. Pintles we had held suspect before launching had broken their welds and come out, one taking a dip in $3\frac{1}{2}$ miles of water. As you may know, loose pintles are inept swimmers. Funeral services were held, and a frustrating New Year's Day was spent reciting seafaring phrases, straightening fittings, improvising, and refitting the rudder. As we approached land, the gannets, tropic birds, and boobies were joined by four magnificent frigate birds in formation which circled us for a while before resuming their inspection of the sargassum weed. Ah, you should taste Lee's fresh baked bread Mid-Atlantic. It is my good fortune that she was willing to live a dream with me. We found that we could rely implicitly on each other's judgement and ability, and grew to be as close



Profile and starboard accommodation plan NJORTH

as I can imagine two people being, facets of the passage from which we will benefit for the rest of our lives. We split work and responsibilities on board evenly, the skipper being whichever one of us was on watch. It was Lee's sextant position which enabled us to spot land within half a mile of where we expected to be, after more than 5,200 miles made good in 41 days (127 nautical miles per day) and some 5,700 miles actually sailed non stop. Adding to the excitement of making landfall, the course we chose as best led by a typically low island, unlighted to seaward, surrounded by reefs, and reported to be inaccurately charted. Lee spotted Rum Cay less than a mile away just after midnight, the overcast and moonless morning of January 3rd.



Profile and port accommodation plan

A pleasant day's sail took us to deserted Little San Salvador, where we anchored *NJORTH* for the first time. There, we waited out 8 days of gale winds and temperatures often in the 40's. Due to our non functioning centreboard and outboard motor and our wobbly rudder fastenings, we needed good weather to sail a narrow and shallow passage necessary to get to Governor's Harbour, Eleuthera. We cleared customs and immigration, called our children and parents, and bought fresh lettuce and tomatoes and delicious frozen western steer hamburger for dinner. Our newly found friend David Mitchell's memorable welcome and hospitality were much appreciated and made a perfect conclusion for a happy dream.

We are frequently asked if we would make the crossing again. Yes, and preferably aboard the same or sister yacht. We think that more trimaraners will be making extended passages in the future and hope that they have as much fun on their yachts as we have aboard *NJORTH*.

PASSAGEMAKER 40

Designed by Bernard Rodriquez

RD No. 2, Box 375, Highlands, N.Y. 12528.

By courtesy, Editor of TRIMARINER

Bernard Rodriquez is a seasoned ocean sailor having sailed in the Bermuda multihull and the Single Handed Trans-Atlantic. He has also been building multihulls for five years. So when he decides to design his own trimaran, we are interested in what he comes up with.



PASSAGEMAKER 40 is designed as a long distance off shore cruiser. Her 40 ft L.O.A. and rounded vee hull shape allow that extra weight which

means comfort to the crew. This hull shape also means a good weather ability, while the long low profile skeg gives a steady helm on downwind legs.

Construction is sheet plywood over frames and stringers, and sheathed with fibreglass. A unique feature is the frames, which are laminated from one half inch strips glued up in a jig. The jig will hold several frames at once. When dry they are cut to exact curvature with the aid of pattern supplied with the plans.

Detailed instructions are provided in booklet form, including building procedure, materials list, fibreglass instructions, and outfitting lists, together with sources.

In addition to plans, *PASSAGEMAKER* 40 is available as a pre-cut kit, partial built, or sailaway, from the designer.



PASSAGEMAKER 40-Sail plan

'COBIA', A TRICATAMARAN

by Thomas C. Burnham

P.O. Box 70, Upper Key Largo, Florida, USA

L.O.A.	37 ft 6 in	Sail Area	300 sq f	t	
Beam	16 ft 0 in	Power	Perkins	4-107M	with
Desch	0 :-		7 1		

Draught

8 in

Z-drive

Dead Wt with engine, $2\frac{1}{2}$ short tons

This hybrid was designed in 1965 and is the developing consequence of the owner's designing, building and sailing a trimaran and an early tricatamaran (1963). Purists may shudder, but circumstances are apt to modify their viewpoints. Which brings us to the pragmatic endpoint: what do you expect from your design? Is it speed, seakindliness, manoeuvrability, safety, appearance, comfort, sleepability, environmental suitability, economy, marketability . . .? Is your preference weekending or cruising, or Round Britain competition? There is a penalty for emphasis on any one factor and no boat yet built will satisfy all requirements. For example, if speed is the desideratum,



COBIA, a tricatamaran

then the design calls for either a light, fragile vessel or a sturdier one with large sail area and therefore a larger crew. *COBIA* was designed to meet rather narrow needs, these being very shoal draught for the waters of Florida and the Bahama Islands, cruising comfort for three, and the pronounced advantage of a light, non-heeling platform. With 8 in draught, shelter can be found where other boats must lay off and take punishment from wind and seas. With small but effective power, there is drive to windward against the prevailing easterly headwinds of the Gulf Stream and Bahama Banks. Sails are auxilliary, but the tiny sail area gives a satisfactory performance except close hauled, and tacking rarely presents a difficulty. Why the tricatamaran? Simply because no other configuration will give the easy motion of a catamaran combined with the desirability of a central hull. The forward pilot house is a luxury, and presents considerable windage, but for tricky shoal water pilotage and protection from sun and wind, it is superlative.

Ed: The side hulls are considerably longer than the central one and their bows are much further forward. The three sterns are approximately in a line.



COBIA showing side hulls forward of middle hull

COBIA. Note bow of main hull



Letter from: P. A. Townsend,

Highburgh House, Packhorse Road, Gerrards Cross, Bucks.

Dear Dr Morwood,

Thanks for your TRIMARANS 1970 received a couple of days ago. I wonder if you would be kind enough to let me have another copy of the issue in which my article on rowing the Atlantic appeared.

Some months ago at the Airforce Club I had with me some drawings of a trimaran that I intended to build. I can't remember whether I showed them



P. A. Townsend's model trimaran

to you or not. However, I have now built a inch and a half to the foot scale model. When it was first built it had stabilising foils on the floats and an adjustable attitude foil on the skeg. These had absolutely no effect at all. On the current version they have been removed and the model now sails considerably faster. Pardon the contradiction there, but I'm sure you know what I mean. I enclose three very poor snaps. Unfortunately I need a telephoto lense and one has not yet come within borrowing range. As you will see the model is not fitted with scale mast and sails, but is considerably overcanvassed. This was done deliberately to test the stability. Actually the boat is to be ketch rigged. I can positively guarantee that the boat *cannot* be capsized by wind action. I am not in a position to guarantee it against wave action, but that is another story! I have sailed the model in heavy gusting winds and it has been blown nearly flat many times. I sailed it deliberately with full sail, with the sails set close hauled and the steering gear set for a reach.

As for wave action: should it be inverted, it would of course be in a stable position. However, I have given the matter some thought and decided that



The model, close hauled

the best way round this is to have a large inflatable bag built in to the superstructure. This could be blown up, by hand or gas bottle from outside the boat. This would cause it to become unstable the wrong way up and the boat would right itself.

I have not had any form of programme of the years events from you but I wonder if you could let me know if there are any model testing sessions or inland lake sailing activities, where I could take my model in order to pick other people's brains. I particularly need advice on the design of rudders.

As the model proved satisfactory, work is now well in hand on a 25 ft version, which itself will be a test bed for a much larger version built out of ferro-cement.

P. A. Townsend

OCEAN WAVES AND STABILITY

ACTURA ANALS WIRD STUDIELLI

by Peter Laurie

The forces of wind and water acting on a sailing boat are difficult enough to visualise even if the sea is calm. Perhaps for that reason, the stability of sailing boats tends to be discussed only in terms of mast heights, sail areas, keel weights or the beams of multihulls, and boats are designed to be safe or not—in a flat sea. Yet experience shows that sailing vessels, and particularly multihulls, are at their least stable when running before a strong wind and heavy sea, although presumably, they are designed to stand up when the same wind blows at them sideways on—this situation one would at first glance think was the most dangerous.

A summer spent surfboarding a Minisail—in a very ham handed way over the Atlantic rollers off Brittany, and suffering some explosive down-wind capsizes in the process, made me wonder if the dynamics of waves hadn't something to do with it. Thinking about it afterwards, it seemed possible to get a bit of theory together which might explain what happens when a boat broaches to, or sticks her lee bow into a wave and goes head over heels. Since this leads to some concrete suggestions for avoiding such a fate, I humbly set this before people who actually know how to handle this problem in the flesh.

To begin with, a short lecture on the theory of gravity waves—the sort that comes in the cockpit with you. When a wave passes over a point on the water's surface—as it might be a floating beer tin—it moves it up and down, and also backwards and forwards in the direction of the wave's travel. When



the wave has passed, the tin returns—for practical purposes—to its original position. The combination of vertical and horizontal movement makes the tin go round a circle in the vertical plane, at right angles to the wave front. The radius of this circle is the height of the wave above mean water level, and the speed with which it goes round is the circumference of the circle divided by the period of the wave. This in turn depends on the wave length.

The speed of the wave itself is usually greater than this, and depends only on its length, not its height. As a wave gets higher—because the local wind is getting up—its particle speed naturally increases, because the circle gets bigger. This goes on until the particle speed becomes greater than the wave speed. At that point water shoots out of the crest of the wave, and a white horse appears.

The water particles are moving in the same direction as the wave at the crest, vertically downwards on the back shoulder, in the opposite direction at the trough, and upwards on the front shoulder.

In effect, these particle movements create local currents which change direction as the wave passes by. In small waves the movements are slight, but in heavy seas they can reach and exceed the speeds of even the fastest sailing boats. When one is beating to windward—which is what most boats spend most of their time doing—the speed of the waves is added to the speed

of the boat, and these regions of differing current are passed through so quickly that they have little effect on handling. But in running, the speed of the boat is subtracted from those of the waves, which may then pass only slowly by, or stand stationary with respect to the boat. Then, I suggest, these currents within the wave have a very important effect on handling.

For the sake of simplicity, let's imagine a boat sailing at V kts before waves that are travelling at V kts, and in which the particle velocity is also V kts. As we'll see, this is a perfectly feasible, but very unpleasant situation. Since boat and sea are going at the same speed, they stand stationary with regard to each other. Lets put her first on the back shoulder, where she'll be sailing uphill in water that is perpetually *falling* at a speed of Vkts. She will tend to slide backwards. If we put her in at the trough, where the particle motion is backwards, she will, for an instant, have a speed through the water of 2V kts. Her steering will be excellent, but the drive of her sails won't be able to resist a quadrupled water drag, and she will slow down again to a speed through the water of V. This means that her speed over the ground will be O, and the crest will rapidly approach from astern. As she mounts the shoulder, the backwards movement of the water turns into a movement vertically upwards. She continues to cut through the water at V, but the wave is now letting her move forward over the ground too. When she reaches the shoulder, where the water has no horizontal speed, she should be able to move over the ground at just the same speed as the wave, and therefore keep in this position as long as she likes.

To complete the joke, lets drop her in on the crest, where the water's moving *forward* at Vkts. For an instant her speed through the water falls to nothing, as does her drag. This is obviously the danger point, because at the crest she has no steerage way; the helmsman has no way to stop her slewing round to windward. If the wind is strong enough she accelerates until she's moving through the water at Vkts again, and over the ground at 2V. She slides sideways down the front shoulder at 2V kts, only to hit the trough where there's a counter current of V already. So her speed through the water, this acts on her keel or centreplate to produce a very strong force to windward—something like 9 times what it would be at her ordinary sailing speed and making the same leeway. This, assisted by the pressure of the wind on the sail, makes a very strong capsizing moment, which would tend to draw the lee bow under on a multihull, or make a keel boat stand on her ear.

What's to be done? Evidently, the thing to avoid is sailing at the particle velocity. One can either go slower or faster. Going slower means taking off sail, trailing warps and motor car tyres, and was the only practicable strategy while sailing boats were incapable of doing more than 8-10 kt. But the advent of fast multihulls makes it possible, in theory, to avoid the danger speed by going faster.

There are three possibilities open to a boat that proposes to sail faster than particle velocity: it can set its speed *between* v and c the wave speed (in the example above, v = c, but that was for simplicity) (ii) it can sail *at* the wave

speed, c; (iii) it can sail *faster* than wave speed—and therefore faster than particle speed.

Before we go any further, its probably a good idea to see what sort of speeds are involved for different wave lengths and heights. The speed of a wave is c, where

$$c = \sqrt{\frac{gL}{2\pi}}$$

The particle speed v, is given by:

$$h = h \sqrt{\frac{2\pi g}{L}}$$

The maximum height of the wave is found by putting c = v, when $L = 2\pi h$. We can use these to make up tables for particle velocities—and therefore critical boat speeds when running in a following sea—for waves of different lengths and heights.

Darticle vel/	Wave Heights ft			
critical boat speed. Kts.	$L = 100 \text{ ft}$ $(c = 13 \cdot 5 \text{ kt})$	200 ft 19·2	500 ft 36	1,000 ft 43)
4	4.7	6.7	10.5	15
6	7	10	15.8	22.4
8	9.5	13.3	21	30
10	11.8	16.8	26	37
12	14.2	20	31.5	44 · 5
14	—	23.4	37	
16		26.7	42	
18		30	47.5	
20	_	—		

-means that waves of that length cannot exist at greater heights than the maximum shown. The highest reported waves are around 45 ft.

The implication of this is, that as far as stability on the crest is concerned, a boat capable of 15 kts, should be able to cope with up to 200 ft waves.

So far so good, and a skipper who is bold enough to resist the natural impulse to take in sail when the sea gets up, may find that his vessel handles better for going faster.

If we reckon that a boat should have 2 kt steerage way on the crests, then, for instance, in waves 100 ft long and 7 ft high, 8 kt is enough. These waves travel at 13.5 kts, and that is how fast a boat will have to go that wants to surf. Anything faster than that will have no problems on the crests, however steep the waves get—but may of course run into other difficulties.

In waves 200 ft long and 20 ft high, 14 kt would be necessary. Surfing speed is 19.2 kt.

These figures apply only to still water. If a wave train passes from still water to a counter current, the wavelength is compressed, and the particle velocity *increased*. Imagine a 100 ft wave train passing into a counter current of 5 kt. Its speed over the ground is now 8.5 kt, and the wavelength compressed in proportion to 63 ft. This moves the particle velocities, and therefore the critical boat speeds, sharply up:

Particle vel/	height, ft	Particle vel/
critical boat		critical boat
speed, still		speed, 5 kt counter
water; kt.		current; kt.
4	4.7	5.9
6	7	8.9
8	waves break	

So a boat that was making 9 kts in 7 ft waves, and had a comfortable 2 kt steerage way on the crests, will suddenly find herself out of control on entering the current. (Could this have been what happened to *APACHE SUNDANCER*?). Since particle velocity is proportional to the square root of the wavelength, the effect is much less severe in long waves for the sort of counter currents one is likely to find in practice. Thus, a 5 kt current compresses 500 ft waves to 415 ft, and increases the critical speeds by only 10 per cent.

It would be interesting to hear how this theoretical treatment squares with practical experience.

SOME SELF-RIGHTING TRIALS WITH A SMALL TRIMARAN

by Dick Andrews

25 Audubon Drive, Ossining, N.Y. 10562, USA

SERENDIP is an 18 ft day sailing trimaran designed and built by myself some ten years ago. Her main hull has a 14 in waterline beam, and beam overall is 8 ft. The floats, 12 ft overall, are an equilateral triangle in section, 12 in on a side, and are quite sharp-ended. There are no side decks (the helmsman sits her up on the after cross arm and any passenger rides in a

long cockpit in the main hull. She carries 110 sq ft of sail in a sloop rig on a 19 ft stick.

In all the years I have sailed her, sometimes in quite rough-and-tumble situations, she has never capsized nor shown any real tendency to do so. The lee float can be forced under a little but it has never gone far. Thus I had no notion of what it would be like to deal with a capsized trimaran nor what it would take to right one again, even in this small size.

A buoyant fender was hoisted to the top of the mast, and I proceeded to tip her over alongside the local club dock. It took some doing; she fought back hard! With the aid of a small derrick, it was done. The masthead float and the submerged lee float now held her firmly between them at about 110° degrees from right side up. I was surprised to note that the main hull was almost up out of the water, as the floats of this little trimaran are certainly on the "sharp" side.

1. Capsized 180°

2.

One float flooded

3.





erected Righting 6. 5. Righted Up. Arm retracted 59

This impasse was resolved by removing the masthead float, and then the mast itself, leaving SERENDIP now in a firm 180° upsidedown position.

A Jet 14 class planing dinghy uses a steel plate dropboard about 54 in long and weighing 48 lb. This does not make the dinghy self-righting by any means although it surely helps. Such a board was now borrowed and set into SERENDIP's daggerboard slot to determine how much such a weight could help her get back up. One float was now also flooded. The only result was that SERENDIP now floated at a 170° angle.

However, when I increased this to about 135° (or 45° from upsidedown) by a rather easy push down on the flooded float, she came backrightsideup.

By this time we had to put the boat away, and with a trip away of some weeks and other affairs, it was some time before I got back to any further practical trial. But the notion nagged me that a modest weight set at a fatter part of the stability curve of a keel boat-rather than centred right in the upsidedown dimple-might do the trick.

So poor old SERENDIP was again launched, less stick, and one float flooded and so turned over again on her back. The same 48 lb Jet 14 plate was now clamped to the end of a 4 ft plank in a "T" shape, so that the weight would be concentrated at the end of the plank. The other end was now clamped to the forward cross arm next to the main hull on the side of the flooded float. (See sketch).

The moment that I let go the plate, SERENDIP righted herself in a flash.

Notes

In these simple trials, I became very conscious indeed of the power of the various leverages exerted by floats, mast, and weighted arm. Not only the buoyancy of a float, but its weight when out of the water, or its surface resistance to lateral motion in the water, all act on the cross arms. And 48 lb of steel plate at the end of a 4 ft arm had rather more clout than on an arm of but half that length.

Summary

At least one trimaran practically jumped right side up from total 180° capsize after one float had been flooded and a relatively modest weight set on the end of a lever arm angled over the flooded float.

This at least suggests the possibility of righting larger trimarans if thrown over at sea and concurrently dismasted (the worst possible case). If the stick stands and buoyancy can be run to the masthead, it is an easier case, but the submerged float must still be flooded.

Weight as placed in a fin or keel in the conventional vertical plane on the centreline of the main hull, is less effective by much than the same or less weight angled towards the flooded float, and particularly as concentrated on the end of a lever arm-as is indicated by any curve of conventional keel boat stability.

It is possible that rather simple controls for quick flooding of a float and positioning of a counterweighted lever arm, could get a capsized trimaran out of trouble in short order.

MULTIHULL CAPSIZE

by Derek W. Norfolk

By courtesy of the Editor, YACHTS AND YACHTING

The prejudice against multihull craft by the general sailing fraternity seems to be the question of safety, particularly with the difficulties encountered in the event of a capsize.

There can be little doubt that capsizes will occur and it is up to those who like sailing these craft to devise means to make it easier to right an overturned boat.



It is with this in mind, that I suggest the following method which would seem to make the operation less difficult and require less effort on the part of a tired crew.

Fig 1 Normal position of hull in static conditions showing emergency equipment.

Fig 2 Capsized position. The crew now remove the two bungs to allow the water to enter the one hull.

Fig 3 The hull is now full of water but is kept just afloat by the foam filled section.

Fig 4 A suggested method of rolling the boat over using external assistance. The spar and ropes etc, being stowed on the underside of the bridging structure would be readily available.

The small amount of buoyancy remaining in the hull would require the minimum effort for it to be submerged.

In the event of there being no one to give assistance, it might be possible



to right the boat by dropping the anchor from the outboard side of the nearly submerged hull and use the tidal stream to pull the hull under.

Two ropes would probably be required, one forward and one aft to keep the boat at right angles to the direction of flow.

Fig 5 The hull is shown just after the boat has been rolled over. The water now runs out through the lower tube due to the buoyancy of the foam filled section being greater than the displacement of the water filled hull. As the water runs out, air takes its place entering through the upper tube.

The water has now drained out of the hull and before sailing away, a Fig 6 new small bung is inserted into the lower tube by the means of a thin rod. A new bung is then fitted to the upper tube at deck level.

Letter from: Ralph Martin to John Morwood

The trimaran is generally considered by those who have sailed them as safe sea craft. But how safe is a trimaran on a reef? I was unfortunate enough to find out. I put my 40 ft Piver designed tri SEEKER on the Nasilai Reef in Fiji in the early morning hours of October 18, 1970.

After she hit, the 20 hp Albin diesel was too small to get her off. SEEKER hit head on but was slewed around until the starboard float was taking the brunt of the seas. The surf was really heavy and relentless-waves 4 to 6 ft high.

As each wave came in, it would lift the boat and drop it on the coral reef with a sickening crunch. However, holes did not begin to show for about an hour. Then the bottom of the main hull started to break up and by dawn there were great chunks torn out of the bottom.

As it got lighter we could see more of the damage. It appeared the tri was breaking up at a progressively faster rate. The water was about a foot and a half over the floor boards and getting higher all the time. We had decided shortly after grounding that we should prepare for the worst and had gathered survival stores to take in our dinghy. As none of our flares or other distress signals had been answered and the dawn showed no prospects of rescue we decided to row ashore. The water back of the reef was calm although the breakers were still pounding us onto the reef.

We should have stayed with the boat longer as I could then report what happened. As it is I can only make an intelligent guess. We must have hit with the tide going out. When we left SEEKER it was low water with the tide beginning to turn. As the tide came in it must have gotten under the wing

sections and the waves lifted her over the fringing reef and onto the tidal flat behind the reef.

When I next saw *SEEKER* about 3 pm she had worked her way in toward shore about 150 ft and was well out of the surf line. The bottom of the main hull was ripped open from the forward crossarm to the after crossarm. The port float was holed for nearly the whole length. The starboard float seemed to be intact, and we later found that the only damage to it was a broken fin.

Nasilai reef extends out from land about three miles where we hit and there is an extensive tidal flat behind it. From Sunday morning when we went ashore to Thursday morning when we finally got her afloat she had worked her way in toward the shore about half a mile. Salvage operations were comparatively simple. At low water we floated 13 empty oil drums and a big timber 6×14 in \times 30 ft long out to the wreck. We then lashed the drums to the timber and floated them under the port wing. As the tide came in it lifted the boat off.

For the salvage operation I had the help of 24 men from a village close to where we went ashore and a tug from Suva. After we had all the drums in place and the tide had lifted us off the bottom those men all waded behind the boat and with shouts of laughter and contradictory argument from the "bosses" pushed her to safety. A line was passed to the tug and we were off to the repair yard at Suva.

The damage to both the main hull and the port float was so extensive that the bottoms of both had to be rebuilt. However the structure above the damaged point was sound. There wasn't even any cracking of paint around structural stress points. When I got the boat out on land where I could inspect



Damage to port float

it in detail I was simply amazed at the way the boat had held together under the pounding and stresses it had gone through.

In Piver designed 40 ft trimarans there is a fore and aft stringer about 8 in below the chine line. All the plywood had been broken off just below this stringer. It was jagged in spots but nothing was broken above this line.

All the ribs of the port float were cracked and the planking was broken off in a jagged line about 2 ft down from the deck. However there was enough left of the float structure to make rebuilding practical. In both the main hull and the port float the basic lines were intact so that all we had to do was to replace the ribs and replank.

The sensations of being shipwrecked are hard to describe. There is first the frightening appearance of the surf line pushing you onto the reef. Darkness was an added handicap. But as time passed and the boat held together the first fear dissolved and we began to think of what to do. The tri stayed upright all the time with never more than 15° list. Outside of the hollow feeling in the pit of the stomach there was no real danger. Although I would not like to repeat the experience, especially if the seas were bigger or in storm conditions, I know now that trimarans are incredibly tough boats. In addition to going over the reef the boat went through 12 changes of tides before we were able to get all the salvage material on the site and start getting her off. It takes a lot of pounding to break them up.

Letter from: Raymond Reitz to AYRS

February 4, 1970

Gentlemen,

I intended to contact you last year in September, when I was building *TRI-BIDON* but could not find your address. I only obtained it late in November and could not find time to write before sailing off.

In August 1966 I sailed away from Europe, with my wife Tati, aboard our trimaran *BAGALI*, with the intention to go to Australia to see one of my brothers. Finding opportunities in the Canary Islands, we stopped here. We sold *BAGALI* to an American and crossed the Atlantic, landing in St Croix Island, to deliver the boat to the buyer. Crossing the Atlantic under sails, in the Trades Winds, is nothing to brag about.

Last year we had the intention to cross the Ocean once again on board a

trimaran, but a quite special one . . . built of 50 and 12 gallon drums, ordinary oil drums offered by Shell Co. We built the trimaran *TRI-BIDON* entirely by ourselves with the elements available in the Canary Islands: main hull, floats, cabin, masts, rigging, sails . . . We launched her on October 17th with the intention to give her one month test but I immediately found that the rudder blade was too small and that she was difficult to steer. She did not reach and was hard to come about. Few days after, when I was ready to fit her with a larger rudder and centre blade, she broke her mooring and landed on some rocks on the beach. We managed to float her back but I had to pull her out to check and repair the damages, light by luck.

On November 25th a crane lifted *TRI-BIDON* back into the water and we sailed off the Canary Islands. Because I did not have time to test the boat



TRI-BIDON being put back in the water

under sails I thought it would be safer to follow the coast of Africa before tacking West toward the Cape Verde Islands and the West Indies. In case of repairs or changes we had the possibility to reach some ports, Villa Cisneros or Port Etienne. Up the November 30th everything went alright. *TRI-BIDON* was easy to handle, steering by herself almost to the rearwind. The cabin was comfortable and cosy, very dry. She floated high on the water in spite of the load she was carrying. She was quite fast and gave a strong impression of safety.

Late in the afternoon the wind shifted to the cast and started blowing hard, raising high waves due to the shallow water. We were 20 miles off the coast with only 20 fathoms. I put a sea anchor and the trimaran, facing wind and seas, hove to perfectly. At night we had the surprise to find ourselves in the centre of a circle of more than 200 trawlers, fishing the banks. It gave us a recomforting impression of presence. We slept, checking from time to time if any of the boats was dangerously close. The wind was force 6 and the waves 15 to 20 ft high. At the first hour of December 1st, the sea anchor cable broke and the trimaran started drifting across the waves. They were so short and high that every ten seconds the starboard float was hitting the water with terrific force. After a pair of hours of astounding blows the eight 10 mm connecting rods started to break. I managed to secure the float with cables. We started being in danger, in case the waves spinned the trimaran around, to capsize. I lit two red flares with no other result than badly burning my hands. I send SOS signals with a torch in the direction of the boats which seemed closer. One of the boats came so close that we were afraid a net she was towing hooked the port float . . . but she did not stop to rescue us. At



Raymond Reitz's three oil drum hulls



TRI-BIDON under way

dawn we were alone and drifting fast westward. The wind was force 9 then, and the waves more than 30 ft high, the sea was white with foam. We inflated life raft and donned the jackets. We were not really afraid, probably anaesthetized by the noise of seas and wind and the shake the trimaran was giving us. My wife managed to put some of the things we had aboard in three bags. A japanese trawler came at less than half a mile and ran parallel to us but did not stop in spite of the signals I gave her with an orange awning. She was so close that I clearly saw the men on deck and on the bridge. I was so mad that I cussed them with the dirtiest words I know in several languages . . . around 10 my wife yelled that she saw a small boat behind us. A small spanish trawler was fighting the seas and the wind, pitching wildly. I made frantic signals . . . and we let a big sigh when we saw her swerve and come across the seas, rolling, towards us. It took us one and a half hours to get a towline aboard. One second we were 30 ft higher and afraid of being washed aboard by a wave, the next second her prow was towering over us and we were scared of being crushed underneath. With the rubber raft my wife was easily transboarded. The men pulled the safety line and when a wave put the raft 6 ft over the rail they pulled it aboard. The trawler started towing me aboard the trimaran and I took punishment I am going to remember. Water slapping my face every ten seconds, eyes burnt by the salt, wet and cold. Climbing on the waves the boat stopped, almost vertical, and fell splashing foam and it gave the tow line terrific pulls. The port float had been damaged when hitting the boat's hull and the two crossbeams, $2\frac{1}{2}$ in Tes, bent 20° backward. The connecting rods started breaking: I'd try to catch the float with cables. It tore loose and floated away. I was left balanced just on the three pipes of drums of the main hull, with the masts swinging overhead. It was terribly dangerous and the boat stopped. I managed to save two of the bags we had inside the cabin but did not dare enter the narrow door, afraid of getting caught if the boat capsized. I tried to step into the rubber raft but the wind stole it under my feet and I fell in the water. The men pulled me aboard the trawler. At night we reached the mooring of the factory boats but the weather was so bad it was impossible to transboard and even to pass them the towing line of the trimaran. She capsized half an hour after I had left her. The trawler anchored with the wreck secured aft. It was still dark when the man on guard told me that the trimaran broke her mooring and

floated away. The fishing boats were notified of the danger of the wreck. We stayed overnight aboard the trawler, eating seated on the floor, braced against the walls of the berth to try to catch some sleep. The next afternoon only we acrobatically jumped into a launch to transboard to a factory boat who put us ashore in Villa Cisneros.

We had lost the boat and almost everything we had aboard; all hope to be the first to cross the Atlantic aboard a trimaran built of oil drums, all hope to make a leisurely cruise in the West Indies . . . but we were alive and it was the most important. My wife is not very enthusiastic about starting again the same expedition, specially after the financial loss this one had been but I am quite sure other people will try and succeed in crossing the ocean with a trimaran copied or inspired by *TRI-BIDON*. I will anyway advise them, for

safety sake and rest of mind, to fill up all the drums with plastic foam and to over-reinforce the connections between the floats and the cross beams. We had the bad luck to meet that extraordinary storm, but the good luck to be close from the coast and within the limits of the fishing banks. People on the Canary Islands told us that it was years since they had seen such a bad storm. It caused heavy damage all over, tearing off 500 ft of the new breakwater under building. The waves were breaking clear over the pier at the port we started from, leaving 3 ft of water on the quay and preventing all work . . . the oldest men did not remember it happening before. Several yachts suffered damages in Las Palmas port and two local inter island schooners lost their masts. A Zodiac rubber raft, manned by a crew of three, was turned over by a huge wave during the Sunday night. The crew spent 10 hours on the over-turned boat before being rescued by a tanker . . . the rubber raft was found several days after by a fishing boat who did not know what happened to the crew.

I am quite sure that the wreck of *TRI-BIDON* is still afloat, drifting across the Ocean with masts and cabin in the water. It will finish by reaching the West Indies and probably will be destroyed on the reefs. More than a dozen of the 24 50 gallon drums of the main hull were still intact and it is more floatation than necessary to keep her afloat.

If you, or readers of your magazine, want more details, plans and informations of the building of *TRI-BIDON*, I will be glad to send them. I wrote a complete report in French covering the building and the badly ended cruise. I have the intention to translate it in English, but did not have time to do it up to now.

I send you some photos. I have a lot more, but the photos taken during the few days we were at sea were ruined by sea water.

Hoping to read from you, I remain, Gentlemen, very sincerely yours.

Raymond J. P. Reitz

KLIS

Bernard Rhodes describes the last lap of his lone voyage to New Zealand

By courtesy, Editor: SEA SPRAY

Our arrival in Tahiti was not as it should be according to the books. In fact, Didier first sighted a dim shadow of land among the dark clouds, then it was blotted out by heavy rain, accompanied by head winds, then no wind, the sails slatting wildly and our nerves jangling. We finally entered the pass at midnight in an interlude between two rain squalls, and thankfully anchored close to the leading lights.

Papeete's traffic scared us half to death after four months' tranquility, and everything was, as we had been told, very expensive. Didier left to go to work; and I soon also found a part-time job, and made new friends. I spent the hurricane season in Tahiti and despite its brash modernisation, grew to

like it a lot. The island is still beautiful, and so are the vahines, and I love their music. I moored at the Yacht Club about four miles outside Papeete, where it was very pleasant and the members gave me a great time. Five times altogether I visited Moorea, a haven of peace after the rush of Papeete, and, moored in Robinson's Cove (said by many to be the most beautiful anchorage in the world) I found a deep sense of fulfilment and content.

A notable characteristic of yachtsmen is that whenever they forgather to swap yarns, the talk nearly always turns to gale stories, whereas in fact, most ocean cruising contains only a tiny proportion of rough weather. Something to do with the inner psychology, I suppose-however, as a trimaran sailor I was duly regaled with gruesome stories of the then current crop of multihull accidents, and was getting a little tired of giving the same old arguments in reply. An Amateur Yacht Research Society publication, called MULTIHULL CAPSIZING finally caught up with me and gave food for thought. Actions speak louder than words, and conditions were ideal, so I stripped KLIS of her furnishings, ballasted her to compensate, and with the aid of seven men, turned her upside down in the lagoon. Then using only the ship's gear and a method I wanted to test, I proceeded to right her singlehanded and bail her out. It took two hours' hard work, but I got some good ideas as to how it might be done in the open sea. The full findings should be published in the AYRS issue, MULTIHULL SAFETY STUDY. For myself, I never expect to have to use the information, but it would be comforting knowledge if ever I struck really bad weather in KLIS.

I left Tahiti singlehanded, at the end of March 1969, and for four months cruised the Iles-sous-le-vent, or Leeward Islands of the Society group-Huahine, Raiatea, Tahaa, and Bora Bora, my favourite for its sheer beauty and the friendliness of its people, where I stayed for two months. Eventually, my visa ran out and money was pretty low, so it was time to leave. I had an American boy Willie Callan crewing as far as Rarotonga. We called at Aitutaki first in the Cook Islands, and there had a very friendly reception; a bevy of pretty girls piled aboard, grabbed my guitar and were soon singing the beautiful island songs. They were followed by their brother and sisters, until water started welling up through the daggerboards trunks, and we had to order "all kids ashore" before KLIS sank. At one stage there were twentyfive people aboard! We spent a very pleasant two weeks there-it was a change to speak English after ten months in French Polynesia-then sailed south to Rarotonga. Here Willie left, and I stayed to watch the annual Constitution Celebrations, a fortnight of dancing, with groups from most of the out islands arriving on the traders to take part. Again I made many friends, and had a lot of fun. However, the stay was marred by cold weather-worst winter for 25 years, they said-and the exorbitant harbour fee of \$1.00 per day after the first two weeks. The harbour is very poor anyway, almost untenable for a small yacht with the wind north east.

I decided to go and visit Tom Neale who has lived many years alone on Suwarrow, in the Northern Cooks. I'd heard a lot about him, and of course read his book AN ISLAND TO ONESELF and also thought the weather should be better 500 miles further north.
The passage up was pleasant enough, but I found the atoll the hard way by running on to the reef in the middle of the night! At the time *KLIS* was working her way slowly to windward under jib alone, standing offshore as I thought and she actually ran on to the lee side of the atoll. It was pitch dark with rain squalls but luckily the surf wasn't very high, though it soon had her firmly planted on the reef. My initial horror turned to rage at myself for being careless enough to let it happen. Of course, plenty of other ships are lost on these atolls, but that should be all the more reason for caution. Two hours' struggling failed to shift her, then I realised the tide was falling. I made cocoa to try and cheer myself up, then turned in to wait for daylight.

Back to square one

Next morning at low tide I laid an anchor out to the edge of the reef, rigged a tackle on it and led the fall to the sheet winch. Then I inflated the dinghy, unloaded some of the heavier items of gear into it, and jettisoned most of the fresh water. Then it was an anxious wait, hoping the next tide would be as high as the last.

She started to come okay lifting as the wave crests passed under her then bumping down again, leaking a little where the keel was strained; then just as she was nearly off the anchor dragged home, and we were "back to square one". The second try got her off, but as the undertow washed her out, the anchor fouled and prevented her drifting clear. She swung broadside, and the next wave flung her against the reef with a sickening crash, pitching me overboard. Before I could cut the warp the anchor cleared itself and we drifted clear.

I could feel her settling under me—obviously holed badly—and found the cabin already half full of water. I salvaged the dinghy and contents and found its bottom all cut up on the coral, then made sail. Supported only by the two floats, the wings were just clear of the water, and she made 2-3 knots close-hauled in the smooth water—but was she a pig to steer! Staying as close as I dared to the reef, to keep in smooth water, I beat slowly around the atoll looking for the entrance (I had no chart). By nightfall I still hadn't found it, and was very puzzled and tired so had to stand offshore till daylight, praying the wind wouldn't get up as she couldn't have gone to windward in any sea in that state.

Next morning I continued working along the reef, and eventually saw Tom Neale walking along the beach of one of the inlets. He came out in his outboard dinghy and showed me the way through the pass. At anchor, just after midday, he came aboard, and was aghast at the mess in the cabin, which was indeed not a pretty sight. He immediately invited me to stay with him, and we unloaded my valuables into his dinghy. Ashore at his house, he gave me some "duff" and a cup of tea, and I promptly fell asleep.

Recovery, cleaning up and repairs took ten days; we unloaded everything and stored it in a little shack on the beach, then rigged a tackle to a palm tree and hauled *KLIS* out on rollers. Repairs were a temporary job, as I had no glue or resin, but afloat again, she made very little water. Tom was wonderful

71

to me, it was a privilege to know him. I supose if I had to go and get stranded on a coral island, I couldn't have picked a better place!

I spent a few more days waiting for bad weather to pass—writing meantime, and going spear fishing and trolling with Merv Lippiatt of the 50 ft catamaran LONGSHIPS who had just come in. Then when I left it went dead calm! After three days of virtually no wind a light breeze filled in from the sou'west so instead of going to Tonga as planned, I ended up in Pago Pago.

Time was getting on now, and money was really low. I wanted to be in New Zealand by mid-November, before the hurricane season. During a week's stay in Pago Pago I met the schooner *MARIE CELINE* of San Francisco, and had some good times along with her crew. Then on to Apia, where I also stayed a week, then a light weather passage to Suva. Here it rained a good deal, but the wonderful hospitality of the Royal Suva Yacht Club was the saving grace. Several more ocean-cruising yachts were in, including many old friends, and we passed many a pleasant hour sipping beer, swapping yarns and watching the rain come down.

Another American boy, Dan Heron, joined me for the passage to New Zealand. He'd never been sailing before, but was keen to learn, and we got on fine. We spent a few days around Kandavu in company with the *MARIE CELINE* and had a glimpse of Fijian out-island life, but it kept on raining, so we set sail together for New Zealand.

Quite rude

Poking our nose out from behind Cape Washington we found the Trades a full force 6, with seas to match. Soon we were down to storm jib alone, and still doing 5 knots, very uncomfortable! At night the wind rose to force 7, so I sheeted the jib flat and put the helm a lee, which cut her down to about 2 knots and 15° leeway, and made life more tolerable. It was quite a rude initiation for Dan!

Four days this carried on, then the sky turned blue and the wind went down, and the second half of the passage was a really nice sail. We entered Russell on 11th November to find *MARIE CELINE* in a day ahead of us. A bigger boat is definitely more comfortable in rough going, though not necessarily safer.

Ocean cruising is over for KLIS for the time being, but weekending is a

lot of fun in a country where almost everybody seems to sail.

Having sailed half way round the world, crossed two oceans and known a great loneliness, *KLIS* sailed with friends aboard, among 1,000 or so other yachts in the world's biggest regatta. It seemed like a home from home.

72

Ed: Bernard Rhodes is now back in England, writing a book.

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