

# Catalyst

Journal of the Amateur Yacht Research Society

NUMBER 47

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*Cover Photo:  
Oracle leads Emirates  
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Photo: ©ACEA/  
PHOTO BALAZS  
GARDI*



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# Catalyst

Journal of the  
Amateur Yacht Research Society

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This is the first edition of *Catalyst* for nearly a year so we have a bit of catching up to do.

Students of the leading edge of sailboat technology had a treat this year. Not only did we get the 34th America's Cup, with its wing-sails and foils on very big catamarans, but we also had that technology trickling down to the C-Class catamarans. Both of these events are reported here, and some of the technology implications explored. These stories are by no means over as new developments are pending even as I write this.

We also look again at an old technology - proas, with Charles Sutherland's final report on his proa experiments. He would like someone to take up the baton and take it forwards. He can be contacted through AYRS.

## More Articles Please

At the moment I do not have enough material to put another *Catalyst* together. I don't believe it's the Editor's job to write articles - just the news items; so I have to rely upon you! Instructions on how to send me articles will be found inside the front cover.

Simon Fishwick



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## Dick Newick, AYRS Vice-President, Dies

Simon Fishwick

Richard C (Dick) Newick, AYRS' American Vice-president, died on 28 August 2013 aged 87.

Although she was not his first design, Dick probably came first to most people's notice with *Cheers*, which he designed for the Singlehanded Trans-Atlantic Race of 1968. A tiny craft, each hull, although 40 feet long, is less than four feet wide, and the accommodation is not much more than a couple of bunks, end to end, *Cheers* was distinctly different. She was like a trimaran that had lost an outrigger. All the accommodation (and therefore most of the weight) was in one hull, the other was just buoyancy. Of necessity she kept that heavier hull (which also carried the schooner rig) to windward, which meant she could not go about, instead she shunted, reversing direction to sail on the other tack. The concept, which Dick named an "Atlantic Proa" to distinguish it from the proas of the Pacific islands (which carried the rig and most of the weight on the lee hull), so frightened the Race Committee that they insisted on design changes to make her self-righting in case she should be knocked down to windward.

*Cheers* was not the first multihull to finish the Race (that honour goes to David Lewis, Mike Butterfield, and Derek Kelsall in 1964), but she was the first to be amongst the winners and indicated that multihull ocean racing had come of age.

In an interview with Tom Cox of NEMA in 2003, Dick told that his first sail on a multihull had been on a passenger-charter boat in the early 50s. He said "It seemed like it would be an interesting way to make a living", which he did later in St Croix. His first multihull design, *Ay-Ay*, (See AYRS #22 dated 1958, and #35 (1960)) was for that trade; and Dick ran a charter business there for 16 years, designing several of the boats himself.

In 1964, Dick sailed his 36 ft trimaran *Trice* alongside the fleet in the Newport to Bermuda race, finishing an unofficial third, beaten only by two very much larger monohulls. And then came *Cheers*. And from thence, there was no stopping him.

He produced more than 130 designs of which more than 100 have been built. The most popular being the Tremolino, of which more than 300 were launched. He said his favourite cruising design was the 60ft *Rogue Wave* (1978) although he had a soft spot for a little 16ft trimaran called *Rev*, his own boat, which carried a crabclaw sail.

Dick's boats are unmistakable. I took Sheila to Walter Greene's yard in Yarmouth, Maine, a number of years ago, and she walked around the laid-up boats saying "That's a Newick, and so's that, and that ...". I knew some of them by name, and knew they were Dick's designs, she just looked at the lines and recognised them. They have sweeping sheers especially to the amas, and a distinctive and seaworthy double curve to the beams (akas). Dick probably did



*Cheers*

more than anyone else getting trimaran design away from the boxy creations of the 1960s into beauty.

Dick drew his later boats using the “master curve” technique, where he defined a single controlling bodysection, and then derived all other body sections from it by sliding it inwards and upwards. This not only produced remarkably beautiful and seaworthy hulls, it also made them easy to build. In fact one of his later designs was built using only a single half-hull mould.

His philosophy was that a boat design had three attributes – speed, accommodation and cost. You could have any two of these three, but not all of them. In other words, you could have a fast, inexpensive boat with limited accommodation; a roomy, fast boat that is expensive; or an inexpensive, roomy boat that is comparatively slow. He maintained though that people sailed for fun, and said that no-one had yet convinced him that it was more fun to sail slowly than fast!

Inducted into the North American Boat Designers Hall of Fame in 2008, Dick was the first multihull designer (apart from N G Herreshoff) to be so honoured. The citation said that his boats were both pure and elegant. They worked, and were incredibly successful and influential. All the multihulls racing around the world would not exist without the work Dick did.

Not that Dick ever claimed to be unique. He maintained that ideas have their time, that the time for multihulls had come that he was just one of many. That may be so, but to those of us who grew up admiring his designs, he was more than a master of his craft. Meeting him was like sitting at the feet of a god.

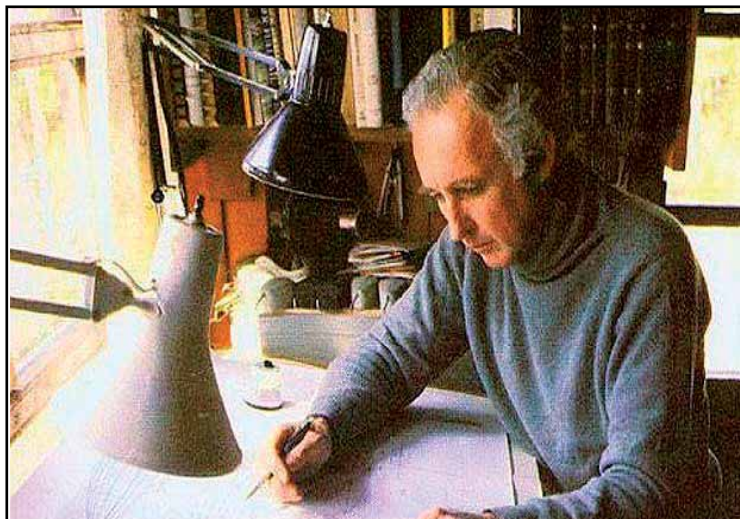
Richard C Newick was born in

Hackensack, N.J., on May 9, 1926. He grew up in Rutherford, N.J., where at age 10 he built two kayaks with his father and brother. At 12, he designed and built two kayaks by himself. After a time in the Navy, he earned a bachelor's degree from the University of California, Berkeley. He lived an itinerant life sailing the oceans until he settled and set up business in St. Croix, in the Virgin Islands. Here he met and married Patricia. They later lived in Martha's Vineyard and Kittery Point, Maine, and in Sebastopol, California, where he died. Dick is survived by his wife, his daughters, and six grandchildren.

He spent a lot of effort encouraging the New England Group of AYRS in the late 1990s and was elected Vice-President of AYRS in February 1995.

When asked where he had got the ideas for the 140 or so designs he completed, Dick, who believed in reincarnation, said he must have been a Polynesian boat builder in a previous life. He called the Polynesians' 4,000-year-old canoes “the wave of the future,” especially as he reimagined them.

There is a lot more information about Dick and his designs to be found on the Web. I am indebted in particular to information from Steve Callahan's article for Professional Boatbuilder, and Tom Cox's interview of Dick for the New England Multihull Association. You can also find a catalogue (although not a complete one) of his designs at <http://www.wingo.com/newick/>.



## 34<sup>th</sup> America's Cup

### Oracle wins last nine races to win 11-8

Race reporting is not AYRS' thing, but we can hardly let the 34<sup>th</sup> America's Cup go by without recording the results.

As noted in previous editions of Catalyst, the race was sailed in 72ft long catamarans.

Emirates Team New Zealand won through the Louis Vuitton Cup to claim the right to challenge Oracle Team USA (the Cup holders).

In principle the competition was to be best of 17 races, the first team to win nine races to be declared the victor. However after some misdemeanours in the AC World Series (which was sailed in one-design AC45 catamarans) the Jury penalised Oracle by two wins – meaning they had to win 11 races to triumph, whereas Emirates NZ had to win but nine. That effectively made it a 19 race series!

There is an article further on in this Catalyst that discusses some of the technical details of the boats, so we won't go into that here. Suffice it to say that although many commentators felt the differences between the boats were enough to be significant, it was surprising how close the racing actually was in boatspeed. It was the tactics employed that made the difference, and, to many peoples' surprise, match racing skills were as important in this competition as they had been in previous ones that were sailed in monohulls.

The races were broadcast live on American television and also over the Internet. The television coverage was excellent, and, for those who missed it, can probably still be found on YouTube. The races were all in San Francisco Bay between Alcatraz Island and the shore, which introduced its own challenge of managing the tidal streams to advantage. And since, following the capsizing of Artemis in the Louis Vuitton Cup preliminaries, and consequent death of British Olympic sailor Andrew Simpson, the teams had agreed to impose an apparent wind speed limit of

around 22 knots, the complications of tide and San Francisco's afternoon sea breeze meant that a number of races were postponed, dragging the suspense out even further!

In practice, by the Race 5, Emirates NZ had pulled out a 4-1 lead, at which point Oracle used their right to take a day off to consider their position and tactics. However, although they had clearly improved, and indeed took Races 8 and 9, by the end of Race 11, Emirates NZ led by eight races to three leaving themselves with just one race to win to take the Cup.



Then the weather intervened, and the combination of wind and the ebbing tide meant that Race 12 was postponed to another day.

At this point it looked to be all over for Oracle. They still had to win eight races, whereas the

challengers needed but one, and certainly to my eyes, it was almost certain that Emirates NZ would secure the one win they needed in the next eight races.

However that was not to be. Oracle won every single remaining race of the series. One could almost sense the swing in morale of the two teams, as Emirates waited for the opportunity to pounce that never came. One the one occasion where they won the start convincingly, the weather went over limits within minutes and the race was abandoned, to be resailed the next day.

So now we wait and see what the 35<sup>th</sup> Series will bring. At the moment the speculation is that it is probable that the racing will continue to be in multihulls, that it may well be in San Francisco again, and that there could be some changes to the Rules with the aim of reducing the cost of competing thereby widening the competition. It is certain though that it will remain a competition between the very rich so if you haven't got a few billions of dollars to spend, don't even think about entering!



## Franck Cammas & Groupama C win International Catamaran Challenge Trophy (“Little America’s Cup”)

Falmouth, UK [September 2013] – With their carbon wings and slender hulls packed into boxes en route to a half-dozen different nations, it’s time to reflect on the 2013 International C-Class Catamaran Championship.

When Cogito emerged on the Little Cup scene back in 1996, her innovative edge-twisting wing proved a massive edge for Steve Clark and Duncan MacLane. Nearly 20 years later, Franck Cammas’ Groupama C showed a similarly game-changing innovation, her stable, simple foiling system helping to propel her to an easy 2-0 victory against Jeremy Lagarrigue’s Hydros. Cammas and crew Louis Viat would become first Frenchmen to ever hoist the International C-Class Catamaran Championship trophy.

“We made many, many mistakes this week, and it leaves us quite hungry for another event,” said Lagarrigue, an engineer who has devoted much of his life to the C-Class catamaran over the past year. “Now we can take the lessons we learned from our own performance and that of Groupama and the other teams, and go design a faster boat for the next event.”

Cammas may have been as surprised as anyone at his green catamaran’s dominance, especially with the team having only a few days to sail in her current configuration. “We really had no idea how we would match up against the other new boats before the first race,” said Cammas. Groupama would fail to win just one race, a light-air affair that saw the 18-year old Cogito pass the foiler on the final leg. “There are still many ways to improve this boat, something we will need to do in order to stay ahead of the designers and sailors from the other teams,” said Cammas.

The remainder of the fleet would only sail two races to determine their final order, with 2010 Little Cup Champion Canaan unable to overcome her earlier deficit to emerge victorious despite ending

the regatta with a 1-2 scoreline. Instead, the C-Class seems to have come full circle with Cogito winning the Petit fleet and taking the final podium position for the regatta; the boat whose invincibility nearly killed the Little Cup showed, nearly 20 years after her launch, that she’s still amongst the best of the non-foiling generation. “We tried to avoid the pitfalls some of the other teams had, and just sail a regatta,” said Cogito skipper Lars Guck. “These may be amongst the world’s fastest sailboats, but you still have to sail well to win.”

A fleet including 11 teams from 7 nations meant the biggest “Little Cup” in the C-Class’s illustrious history, and event host Norm Wijker says he is

enthusiastic about the Class’s growth. “Little Cup veterans like Steve Clark, Duncan MacLane and Fred Eaton will continue to help propel this Class to new heights, while newcomers like Jeremie, Benjamin (Muyl), and Franck Cammas will help to shape its future,” said

Wijker. “Only by beating the best can we prove we are the best, and that’s what the C-Class stands for.”

That future includes another ‘first’ in the history of this most historical and extreme Class; it will mark the first-ever Little Cup in Switzerland’s Societe Nautique Geneve – Team Hydros’ home port. “Like Newport and Falmouth, Lake Geneva will be yet another gorgeous venue to showcase these most beautiful of all racing boats,” said Lagarrigue, the 2015 Little Cup’s organizer. “We will be honored to host every C-Class team that wants to come to Switzerland, and we promise you and your team a wonderful experience.”

Fred Eaton has kept the C-Class Catamaran Championship trophy safe for over 6 years, and the Canadian skipper was visibly saddened when he handed it over to Groupama crew Louis Viat. “Take good care of this trophy, Louis,” said Eaton. “We’ll be coming for it.”





## Fun things!

The “Wind Tunnel” app is a software for iOS devices, running on iPhones, iPods and iPads. It turns your iPad/iPhone into a wind tunnel simulator! Draw obstacles and watch the fluid flow around. Experiment with different sizes, shapes, aerodynamic profiles and see what happens!

[algorizk.com/windtunnel/](http://algorizk.com/windtunnel/)  
<https://itunes.apple.com>

## The Vaavud wind meter

The Vaavud wind meter is a deceptively simple anemometer which slots into the head phone jack on your iPhone or Android. Magnets spin in the vane which are picked up by the phone and converted into wind data.

In 2013, Vaavud, a Danish company, funded by a micro-funder “kickstarter” system launched their windvane. I was able to get my hands on a couple of units to test, and it’s an outstanding bit of gear. All you have to do is download their (free) App, slot in the wind meter and start measuring wind speed. In keeping with the gear review philosophy on *Sailing With Kids*, I handed (nervously) my phone over to our 11 year old Helmsman to test.

Peter was able to download the App in a few minutes. Slotting the wind vane into the jack, he then was quickly and easily able to collect data. The App itself follows Vaavud’s minimalistic approach and is easy to use. Pressing the units will change from mph to knots. A single button starts and stops the data collection.

— Barrie North  
[sailingwithkids.net](http://sailingwithkids.net)

## Ruth Wharram

I’m very sad to announce that Ruth Wharram (nee Merseburger) has departed this life in the early morning of 4th September, at the age of 92, at home in Devoran. Her health had been failing over the last two years after a stroke the day after a fantastic 90th Birthday party.

She was a great ocean sailor, sailing with James and Jutta on their pioneering catamaran voyages across the Atlantic in the 1950s, then more Atlantic crossings with Tehini and on *Spirit of Gaia* she voyaged half way round the world. Other friends invited her to join them on their boats, mostly Wharram catamarans, but also other boats, even a monohull. Thus she crossed the Tasman Sea and made more Atlantic crossings. She was a great navigator, managing to find her way across the Atlantic on their first voyage with just a pocket watch and valved radio. Later she was an expert at navigating by sextant in the days before GPS. Besides this she was also an eager photographer, doing her own darkroom work and she filmed the building of Tehini on a hand-wound Bolex cine-camera.

Since 1980 she ran the Wharram office, communicating with customers all round the world, often writing letters late into the night. The big family of Wharram catamaran owners and sailors was her world, she was ‘mother’ to them all. Whilst writing at her desk she would be listening to classical music on Radio 3.

She only slowed down in this work in her mid 80s, when two knee replacements and a broken thigh made her no longer able to travel easily, but she then learned to use a computer and she started to keep in touch with her friends by email, she was also able to follow James and myself on our *Lapita Voyage* via Internet. This unfortunately came to an end by a stroke at the age of 90, which deprived her of the ability to read and affected her memory.

She had a second stroke last May and after spending 2 months in hospital she was desperate to come home. She has been at peace here and has said her farewells to all her close friends.

We all loved her dearly and will never forget her.

Ruth’ funeral was on Friday 13th (September) - a propitious date in the pagan calendar, dedicated to the goddess. Donations were invited for the ‘Tikopian Canoe Project’, which will be used to help Ruth’s beloved people of Tikopia and Anuta in the Pacific.

Hanneke Boon  
 James Wharram Designs

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# Flying Phantom: a hydrofoiling multihull



It had to happen. Following the revelations that Emirates Team NZ tested their foil system on 30ft catamarans, and the display of superiority by the foiling boats in the C-Class Catamaran championships, someone had to put foils on a production day-sailing catamaran at a price that is significantly more affordable than that of an AC72. The Flying Phantom One design is the boat that enables more ordinary people to experience foiling for themselves.

At the Nautic in Paris (formerly the Paris Boat Show) Phantom International launched the Flying Phantom One Design. This revolutionary craft was developed based on an F18... except she flies. She is the world's first series-production foiling catamaran. She provides unprecedented excitement as flying over the water is now something everyone can do, thanks in particular to a clever foil adjustment system. To keep it simple: the foil is connected to the crewman's trapeze. It raises itself up when the crewman changes tack, as soon as he pulls on his trapeze.

So you don't need to be Franck Cammas, François Gabart or Gervan Bontemps – the top champions who tested the Flying Phantom and contributed to its development – to be able to use this new machine. The guiding principle behind this flying multihull is indeed to enable everyone to experience the thrill of flying, balanced on the combination of L-shaped foils and T-shaped rudders. Those, who already know how to sail a racing cat, for example, will soon get to grips with how to handle her. Amateur sailors did in fact also contribute to the development, as the designers' goal was to come up with the first series flying cat aimed at the general public.

## Designed by Martin Fisher

Marketed by Phantom International, a firm launched by the Sail Innovation company run by Alex Udin (whose Phantom F18 was incidentally 2012 World Champion and 2013 Vice-champion), the Flying Phantom took three years of research and development. She is the brainchild of Martin Fisher, one of the designers of Franck Cammas's Groupama Class C, winner this autumn of the Little America's Cup. A team from the "big" America's Cup has in fact already ordered a few of these flying catamarans. While keeping things in perspective, that is only logical as the Flying Phantom works on the same principle as the giant AC72s, which this year thrilled a global audience in the 34th America's Cup.

Some data? The Flying Phantom takes off and rises out of the water in just seven knots of wind and can fly at two and half times the real wind speed. The manufacturers claim it is easy to get her up speeding along at between 28 and 30 knots. Upwind, skimming the surface of the water, she flies from 12 knots at around 55 degrees to the wind. Her price: around 26,000 euros at the moment.

## Specifications of the Flying Phantom

LOA: 5.52 m / 18 feet

Beam: 3.00 m

Mast: Carbon with restraint / 9.50 m

Weight: 155 kg

Appendages: T-shaped rudders + L-shaped foils

Hulls: Carbon honeycomb sandwich

Sails: Mainsail 18 m<sup>2</sup> + Jib 5.5 m<sup>2</sup> + Gennaker 24 m<sup>2</sup>

## Contact

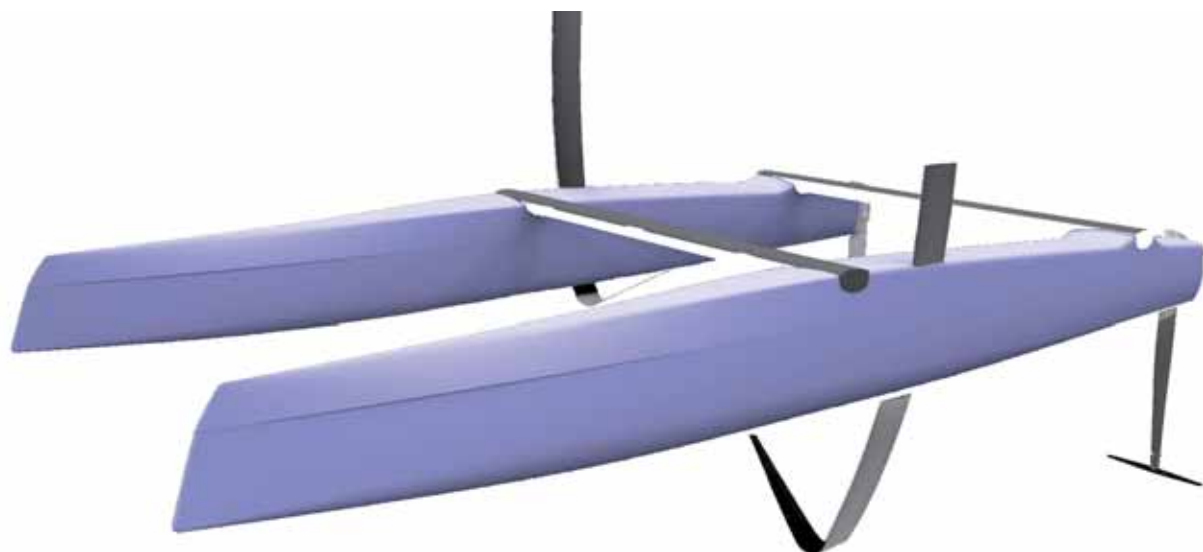
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www : <http://www.phantom-international.com>



FLYING  
PHANTOM  
ONE DESIGN



PHANTOM  
International

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# America's Cup Technology - Explained

By now everyone with an interest in the event will know the story of the 34<sup>th</sup> America's Cup – that it was sailed in 72ft catamarans – how it was meant to be the best of seventeen races – how Emirates NZ won eight out of the first 11 races – and how Oracle won all the rest so retaining the Cup.

We're not going to talk about all that. What we want to explore briefly is the technology behind the boats and where it might be going.

## General Arrangement

The first things that needs to be realised about these boats is that they were really big – even if they did not look it on the television. The hulls were 72ft (22m) long, which apparently enabled them to be loaded on to container ships easily, but more importantly was about the biggest that it was thought could be managed by manpower alone without recourse to engine-powered winches etc. As a result at all times about 9 or 10 of each crew were employed pumping up the pressure in the hydraulic systems that actually moved the sails and foils.

The sails themselves were solid wingsails. They consisted of multiple elements from luff to leach (or should that be “from leading to trailing edges”?) and each element (especially the trailing edge) could be divided into multiple segments (from top to bottom). Each part of the sails could be individually adjusted, giving the crews control over angle of attack, camber and twist. Both boats also carried jibs most of the time.



©ACEA/Photo Gilles Martin-Raget

Beneath each of its hulls, each boat shipped a daggerboard and a rudder. Now when the Rules for the 34<sup>th</sup> Cup were written, flying on foils was discussed and deemed to be too risky – so the Rules banned any form of moveable trim tab on the daggerboards, and the trim

of the rudder blades (which also carried foils) was not permitted to be moved during racing. The thought was that these restrictions would make sustained stable foiling impossible, and effectively keep the boats in the water. The Rules however did not ban adjustment of the daggerboards during racing, nor did they restrict the

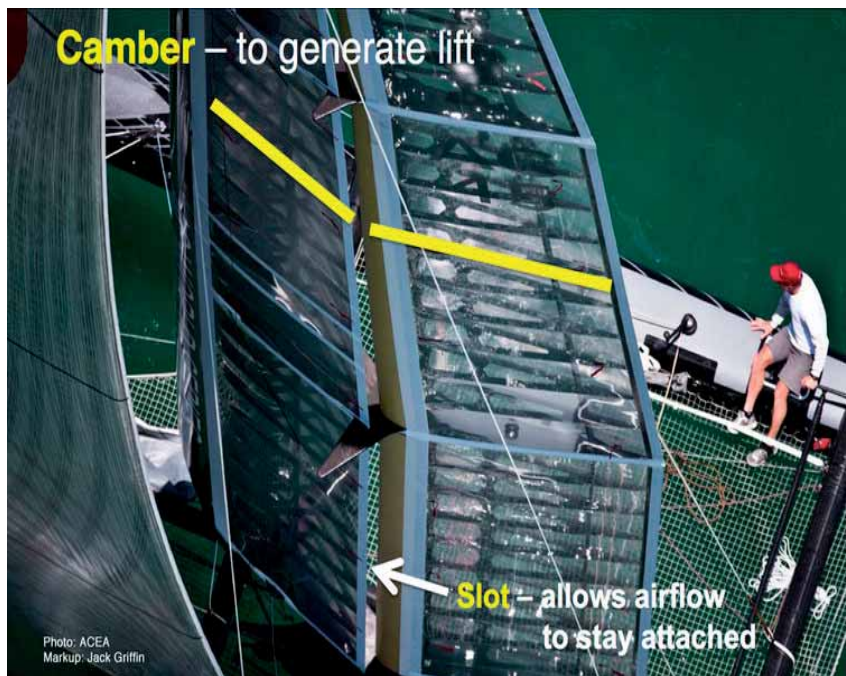
number of axes about which they could be adjusted. As we will see below, Emirates NZ realised that stable foiling could be achieved, and developed a foil system to do it – a system that had to be hurriedly copied by Oracle once they found out about it.



## The Rigs

As noted, the rigs were huge. Each was 131ft (40m) high, which means that each was bigger than a Boeing 747 wing (which is a mere 30m from fuselage to tip). The degree of control is probably unprecedented. The elements of each wing could be controlled in camber, and the camber could be varied (by trimming the various trailing edge elements) all the way up. It's not clear whether any of the sails had a movable flap on the leading edge (indeed it is not clear if that was allowed under the Rules) but Oracle certainly had a movable "tab" on the trailing edge of the front element allowing them to open or close the slot at will.

As far as one could tell, each sail was "sheeted" as a whole although the camber control allowed effective twisting in response to different apparent wind direction up the wing and also allowed the top element to be set with reverse camber so reducing the heeling moment at the expense of thrust high up. Whether either team used this ability to balance the boat is not clear from the videos, but they must have done something of the sort, as one cannot keep a 72ft catamaran upright merely by moving a few bodies around (and indeed nobody tried).



*AC72 Rig Controls*

### The Foils

Each boat was allowed a set of 10 foils (throughout their campaign). They were carbon-fibre of course, and very expensive - rumour has it that Oracle's foils cost up to \$400,000 each. Both boats had sets of varying shapes and often apparently carried mixed foils from different sets. The foils were of various shapes – straight, curved (various curves and often not varying along each foil) and the J- and L-shaped foils that Emirates NZ introduced and everyone else copied.

The Rules did not allow any moving surfaces on the daggerboards, but they did not prohibit moving the foils as a whole. As a result, the daggerboards could be moved not only upwards and downwards, but also swung (raked) fore and aft (which allowed control of the angle of attack of the bottom, lifting, part of the J- and L-foils. They could also be swung laterally – altering the angle of *cant* of the foil.

This novel idea of trimming has a significant effect upon the lift produced by the foil. With a straight, or “conventional” curved daggerboard, altering the angle of cant varies the amount of force developed in a vertical direction relative to that developed horizontally. This especially if used in conjunction with the ability to



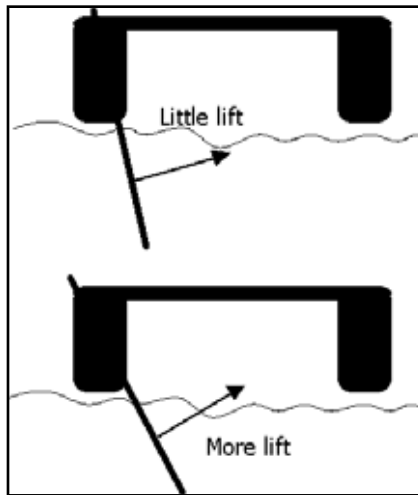
*L-Foils on Oracle*



*SJ foils on Groupama - S-shaped riser with curved lifting surface*

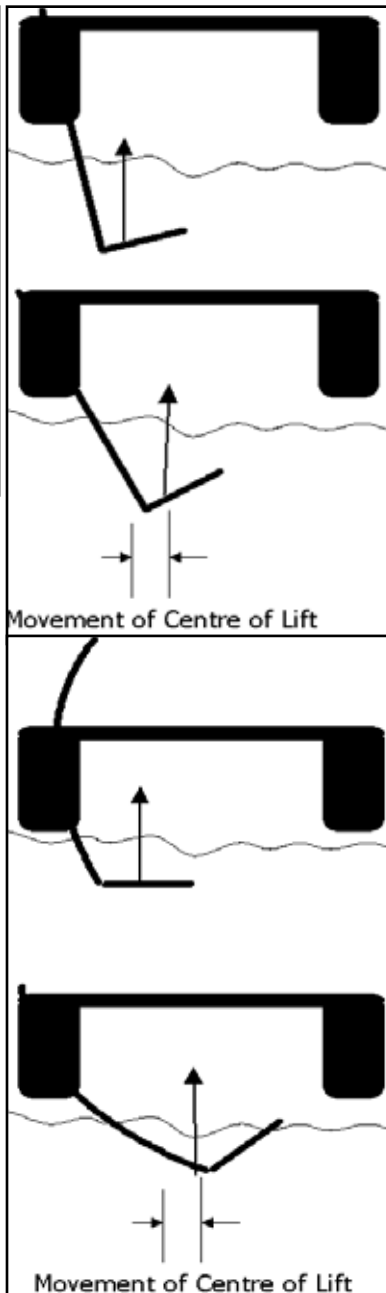


*Curved L-Foils on another C-Class Cat*



*Effect of cant control on straight and L-foils*

*Curved foils can achieve similar control by being pushed deeper. With well designed foils, cant control may not be necessary.  
??Groupama??*



adjust the foil around a vertical axis (toe-in or toe-out) would allow a high degree of control of the lift on each hull from straight foils.

With J- or L-shaped foils however the lift produced is more or less insensitive to the angle of cant because as the main part becomes more upright, losing vertical lift, the bent tip becomes more horizontal, producing more lift. Varying the cant angle allows for the centre of lift of the foil to be shift laterally. The same thing can be achieved with a very curved L-foil. As you push it down, the centre of (vertical) lift moves towards the centreline of the boat.

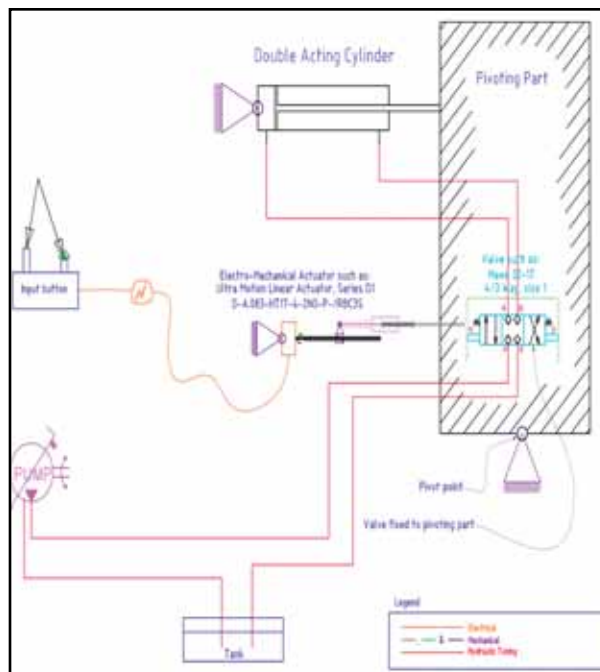
These boats were flying on a single main foil. They needed to be kept upright. Sail trim alone was probably not enough – the more you trim your sail for balance, the worse its lift/drag ratio becomes so the worse your pointing ability. Someone on those boats must have been working overtime keeping them balanced by a combination of sail heeling moment control and foil lift and position. At times it could clearly go wrong as witness Emirates NZ near-capsize in Race 8.



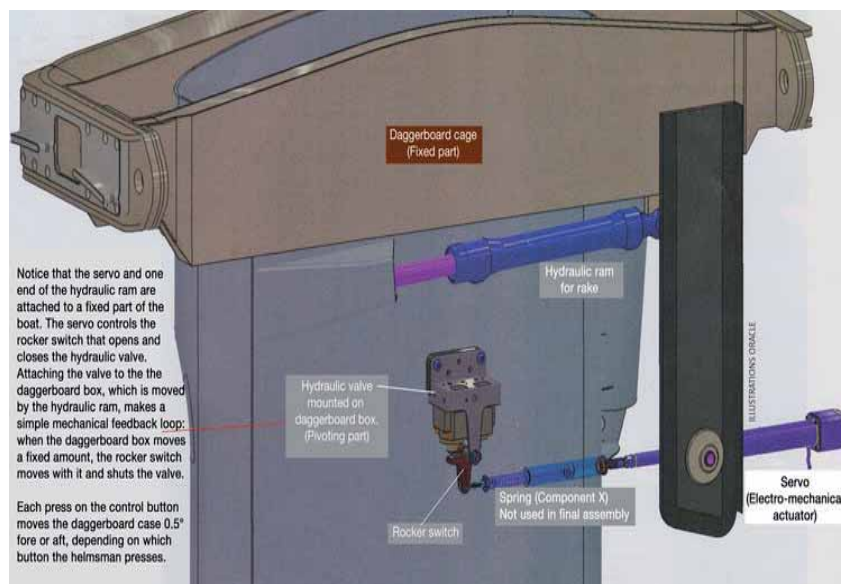
## Power & Control Mechanisms

These boats were not controlled by people pulling on ropes or winding on winches. All the control were hydraulic. Because the Rules banned auxiliary power (as had been used by Oracle's trimaran in the 33<sup>rd</sup> Challenge), the hydraulics were all driven by hand and it took at least eight guys on each boat constantly working to keep the pressure up in the hydraulic reservoirs. They could have been replaced by a 4hp pumping engine, at some significant saving in cost and complexity.

The Rules did not allow any form of electronic automation; however they did allow for electrical actuation of valves in the hydraulic system, provided that the control signals were ultimately generated by a human pressing buttons. On Oracle, the electrical control of the trimming system was assisted by a simple *mechanical* feedback system (similar to the power-assisted steering in your car) that permitted adjustment of the foils etc to within half a degree of angle. In fact so effective was this system that Emirates accused them of using an electronic computer control – an accusation that was thrown out by the Jury, not only because it was out of time, but because it would have failed anyway.



(Above) Oracle's mechanical feedback system for controlling foils (cant and rake). The buttons (centre left) controlled a small servo fixed to the hull, which operated a valve fixed to the moving daggerboard case. Once the servo had moved the valve lever to the desired position, the hydraulics moved the daggerboard case until the set itself to the "off" position. Simple, and quite legal under the Rules. Emirates challenged the presence of a spring between the servo and the valve. The challenge was quite rightly rejected as the servo exerts negligible force on the daggerboard case.



(Left) The rake control on the daggerboard case (schematic)



So where do we go from here?

As you have seen, Groupama C and other competitors used a similar system of foils for the International C- Class Catamaran Championships, and they are already being fitted to Formula 18 catamarans – although whether that is class-legal remains to be seen. However, as with the Moths, once someone has shown that it can be done, and not too expensively, then the pressure will be there to make them class-legal. There is after all nothing much new with canted surface-piercing foil systems on sailing craft. *Icarus*, *Mayfly*, and other boats carried them many years ago in Weymouth Speedweeks. They proved to be stable and effective. The difference now is that many more sailors have been exposed to the idea, and will be keen to try it out.

The big AC72s also carried wingsails. Whilst with that size, sophisticated engineering and matching budget, wingsails become a practical choice, it cannot be denied that on a smaller scale and with significantly smaller budget, wingsails still present some major problems, not the least of which is what to do with them when you've finished sailing. You cannot just roll them up and put them away like you can a soft sail. Until that problem is addressed I don't expect that we will see many solid wingsails in use amongst the small boat fraternity. Not that we may need to.

The photograph below shows a pair of catamarans used by Emirates NZ to develop their foil system. They are otherwise (I believe) standard SL-33 hulls designed by Morelli & Melvin. You will note they are foiling successfully, using 50% soft sails. There is hope for the rest of us yet.

Simon Fishwick



#### Acknowledgements

The photographs used in this article are copyright to their photographers and to the various event organisations that commissioned them, and are used with permission. The annotated drawings of Oracle are by courtesy of Jack Griffin, whose website [www.cupexperience.com](http://www.cupexperience.com) contains much more detail than we can reproduce here. The mechanical feedback system drawing is by courtesy of the America's Cup organisation. All errors are mine. - SF

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# Three small proas

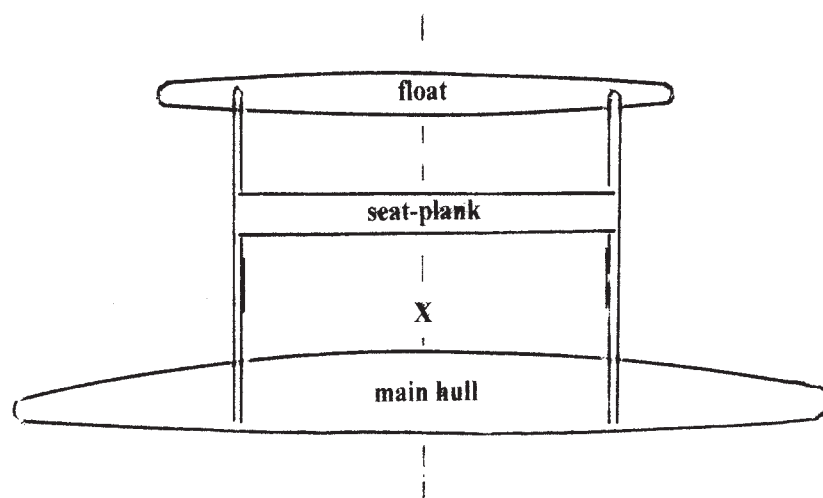
Charles Sutherland

Years ago I started thinking about a 'better canoe': One which could be paddled, sailed and carried ashore by its single-handed crew. In time, I reached what seemed to be a workable compromise in the form of my third small boat CINNAMON. The essential features were a long lean lightweight 16 foot single outrigger canoe of about 8 feet overall beam. The boat was a proa, which reverses or "shunts" instead of tacking when sailing. There are many kayaks and open canoes which can be both paddled and sailed by one man; but not easily portaged by him. This was the starting point of many years of trial and error development, leading to Cinnamon 2 and 3.



I knew I could carry two 20 kilo suitcases, one in each hand: 40 kilos or 90 pounds in total, but split in two. A single outrigger canoe seemed promising, because the centre of gravity must lie in mid-air, somewhere between the float and the main hull, close to the latter.

If one could lift it from there, in both hands, back-strain would be eliminated. It would have been easier to build an ordinary single outrigger canoe, with conventional rig and rudder, in which the float provides stability by its weight on one tack, or by buoyancy on the other.



*Fig 1 The general plan of all three boats*

The reversible proa form was chosen because of the research potential of designing to cope with the side force of sailing, which should always be on the same side. The Micronesian Canoe or Pacific Proa uses a short heavy float which is flown to windward to provide stability by its weight. (Our President HRH Prince Philip sailed in a proa from the Solomon Islands in 1959. It had a tilting mast and crab-claw sail, with six crew inboard and one on the float.) The problem lies in devising a sail rig and a steering system which are reversible, without the aid of several agile Pacific islanders.

A proa consists of a number of components joined together, and I decided to try improving each in turn, in the hope of getting the whole to work. There were other design requirements to make a practical touring single: The boat should be easily dismantled for transport on the roof rack of a family car, and the parts re-assembled by hand, without the need for tools. There should not be vulnerable ends or underwater parts, so that unfamiliar waters could be explored. All these were finally achieved.

Each of my boats consisted of a slender low-drag main hull connected by two cross-beams to a float, which should be to windward when sailing, giving stability by its weight. Of course the float gives ample stability for pad-

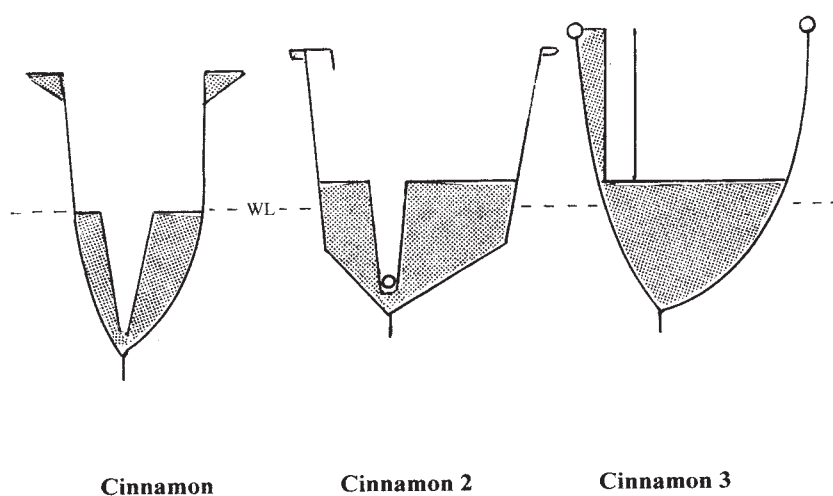
dling; either sitting or standing up for a better view. There is also a 'seat-plank' parallel to the main hull and about two feet from it. The general plan was the same for all three boats, and is shown in Fig 1. The main hulls were 16ft overall and 15ft 6in waterline. The keel line was a circular arc in all three designs. The cross-beams were spaced apart by 7ft 6in to allow the use of a single bladed paddle. The main hull of each boat was slender and easily driven, but with deep unsymmetrical

cross-sections throughout: The lee-side was everywhere half as wide as the windward side: i.e. A fat side and a thinner side, so forward motion should generate a force to windward. There was no vulnerable projecting keel, just a tapered rubbing strip, two inches deep amidships, to act also as a fence between the two sides of the hull.

Returning to Fig 1, the whole craft has a thwartship plane of symmetry (shown dotted) with the two halves as mirror-images. There are exceptions in sailing, which will be described later. There is a key point X which is the centre of gravity of the whole system, the centre of resistance to forward motion, the middle of a paddle stroke, and the place where one can lower ones legs to find the bottom, and then lift the whole boat and carry it ashore with a straight back and half the weight in each hand.

## Cinnamon

My first boat 'Cinnamon' was the most extreme in having a waterline beam of only 9 inches (i.e. 6 on the 'fat' windward side of the straight centre-line, and only 3 on the thin lee side.) All the underwater hull cross-sections were of two quarter ellipses; one twice as fat



*Fig 2 Midships cross-sections of the main hulls*

as the other, like a Spitfire wing, and made of foam covered with glass cloth. The waterline Length/Beam ratio was 20.7; a very slender hull shape. In particular, the asymmetry should give horizontal 'lift' to windward.

The upper parts were of 4mm marine ply. The gunwales were triangular ply boxes, filled with foam, and provided a seat of sorts. The floor was at the designed waterline. The cockpit extended between sloping bulkheads, providing strongpoints to attach the cross-beams. The lifting handle formed in the gunwale was too high, so the boat had to be carried with one's arms bent. The main hull was stiff, light and very uncomfortable to sail. Different forms of wooden cross-beams were tried; always seeking adequate strength with minimum weight. The third longitudinal member, I called a seat-plank, provided the other lifting point, and was originally intended to be a seat to windward.

Some different floats were tried, and also a tilting mast: A gust took the mast overboard, kicking a hole in the side of the main hull. The cross-beams, seat-plank, float and connectives caught the wind when stationary. These outboard parts need to be somewhat streamlined, otherwise when left to itself the whole boat

tended to blow around until they were to leeward. Sail balance was another problem. In spite of the fore and aft symmetry, once the boat started to move, the centre of lateral resistance clearly moved forward; perhaps by two feet. Hence the use of tilting masts in native boats. (AYRS AIRS No4 "Outriggers" had CINNAMON at Weir Wood as cover picture, a few decades ago.)

When a proa 'shunts' everything, including the crew has to face in the other direction.

The incurable fault in Cinnamon was the lack of room for the owner's feet in the very narrow hull. After a few minutes in a contorted position, there was little pleasure left. (If the function of a yacht is to give pleasure to its owner, this was a very poor yacht.) The designing of the new boat began with some amateur ergonomics in the form of a mock-up of the cockpit, which was of course to be amidships in a hull symmetrical end for end.

## Cinnamon 2

My second design was less radical or more sensible, and certainly more comfortable. The open single chine main hull again had the 2:1 asymmetry throughout its length. It was made of 4mm marine ply joined with epoxy and glass tape. The midships cross-section of all three designs is sketched in Fig 2. There was a floor two inches above the designed water level, and it was self-draining. One lifting handle formed part of the floor. The space below was filled with empty plastic bottles, giving ample reserve buoyancy. There were alternative seats, close together, facing each other amidships, above a tapered well reaching down to a ring bolt in





*Fig 3 Seats and Mast step in Cinnamon2*

the keelson (Fig 3). The foot of a 10 foot 9lb hollow wooden mast had a spinnaker pole fitting to lock onto the ring bolt. At gunwale level, the mast was restrained in a track between two padded stops by a tackle with strong shock-cord. In fact a multi-part tackle also provided some welcome resistance to the fore and aft movement of the mast, carrying a 16 foot 6lb yard and simple lateen sail. In shunting the rig, the sail powered itself forward until the mast crashed into the stop, causing violent pitching of the whole boat. Nothing broke, but there was a clear risk of crushing a hand or foot, and I would not feel able to lend the boat to anyone. Tilting masts are not safe in single handed boats: They also lack a simple socket for a burgee.

The mast in Cinnamon 2 was then fixed vertically between the seats of the main hull. Various wooden structures were tried for both the seat-plank and the cross-beams before giving up the idea of sitting outboard. I would keep my own weight, the largest force in the system,

in the main hull. I was trying to evolve a portable cruising canoe, not a racing machine. The only remaining purpose of the 'seat-plank' was to carry the second lifting handle.

The troublesome wooden cross-beams were replaced by light alloy tubes: 6 feet long, 1.5 inch diameter x 16 swg, anodised and then reinforced where required by wrapping with epoxy GRP. The inboard ends plugged through the locally reinforced plywood hull.

The cross-beams were 12 inches above the designed water level. The outboard ends had a foot-long streamlined GRP fairing which attached to the new float. Each end of the new cross-beams was secured by a drop-nose pin, without the need for tools. The 'seat-plank' was a ply-foam-ply sandwich, with a retractable lifting handle, matching the handle in the floor of the main hull. This outboard handle must be out of the way for paddling: The other means of moving the boat.



*Fig 4 Cinnamon2 carried in two hands*

## The float

The float has to be light for portaging, is better light for paddling, but also needs weight for stability when sailing. Water ballast was the obvious answer, to be added after launching and jettisoned before lifting the boat ashore. The simplest form would be a few 2 litre plastic bottles, lashed on top of the float. However, a 90 degree capsizes leaves the boat sitting stably on its nearly flat lee side, with the float directly above the swimming crew. A 2 kilo bottle falling six feet could be lethal, so this idea was scrapped. A new float was designed: 10 feet long, 7 inch beam and 9 inches total depth, half below the designed waterline. Above this was a 7 litre water tank. It could be filled with a bailer through a central hatch, before embarking. The ballast could be dumped while afloat by pulling a loop of cord with the paddle. This lifted a bath plug at the bottom of the water tank, and the water left through a side port. A more complicated system for adjusting the ballast could be devised, but was not found necessary. Seven feet to windward of the mast, a little ballast was very effective. Without ballast, the float weighed 12 lbs. The upper part was streamlined so there was less tendency for it to blow around to leeward. Cinnamon 2 is shown being carried, with half the weight in each hand, in Fig 4.

## Steering

A satisfactory method of steering was finalised for Cinnamon 2, and is shown in Fig 5. A special paddle was made, just over six feet



*Fig 5 The steering system*

long, with a short wide spade-like blade of some 160 square inches. The blade, made of Core-cell foam covered with glass cloth, was buoyant and would float almost immersed. The edges of the blade are strong enough to trail on the bottom, when coming ashore. The use of a plastic spade handle is crucial, and allows the steering paddle to be controlled with one hand, leaving the other free to hold the sheet. There is an inverted notch under each cross-beam. The steering paddle is held up into this notch by a shock-cord, assisted under way by the water pressure. For simplicity, only one steering paddle was carried. The shock-cord allows the steering paddle to be withdrawn from the cross-beam and redeployed on the now 'aft' cross-beam when shunting: In a proa, this of course takes a little longer than tacking with a conventional rig. The steering paddle in its notch, can also be used to scull the stationary boat around to a new heading. An ordinary single-bladed paddle was always carried for use when required. (An alternative long paddle, still with a spade handle, but with a flexible shaft and fishtail blade can function as a 'yuloh'.)





*Fig 6 Cinnamon3*

Cinnamon 2 was much more usable and comfortable than my first effort. However, the 16 inch-high ends and open hull tended to catch the wind.

## Cinnamon 3

The cross-beams, steering gear, float and water ballast system were adopted unchanged. The seat-plank was reduced to a stout bamboo strut, used only for carrying the boat ashore. A new lighter and lower main hull was designed. It is decked, with a bow height of 9 inches: More like a kayak than a canadian canoe. The central cockpit was roughly cubic in shape and again had a pair of alternative seats facing each other. (The forward seat was always empty.) A square tube mast step, offset to lee, left enough room for one's feet. The floor was two inches above water level and self-draining. The outlet served also as the main hull lifting point.

Cinnamon 3 is shown in Fig 6, with the final mast, but a small trial sail. The structure was an amateur attempt at a space-frame: Two 8 foot long, 37mm carbon fibre tubes connected the seats, cockpit and mast step to the cross-beam mountings. Triangular frames, made of Core-

cell foam covered with carbon fibre tape connected the tubes to the laminated cedar keelson. A strut also connected the cockpit floor to the keelson. The rest of Cinnamon 3 main hull was of light weight foam covered with glass cloth.

A new mast was made, 10 feet long to plug into the tubular mast step. Made of Core-cell foam with epoxy saturated carbon fibre tape both along its length and spirally wound, it weighed only 4 pounds; less than half that of the tilting hollow wooden mast of Cinnamon 2. The top carried two cheek blocks: One for the external halyard, the other for stays to the ends of the cross-beams. There was also a socket for the invaluable AYRS burgee.

## The 'one-sided' sail

Throughout the development of the hulls, trials were made of cheap temporary sails, using bamboo spars and heavy polythene or thin poly- cotton sheeting. A 16 foot yard had been made by butt-jointing two stout bamboos with a grp sleeve. This formed the yard along the hypotenuse of a right-angled isosceles triangular sail. At first it was hung symmetrically with the halyard in the middle of the yard. By pulling down one corner to become the tack, the other rose up to be the peak: I called this a 'seesaw lateen'. The sail could pull in either direction for shunting, but the area was too far aft for sail balance. This was followed by the tilting mast experiments, which proved unsafe.

Next, two lugs were made on the yard, six feet apart. They were loosely joined by a rather longer wire strop (Fig 7) The halyard ended

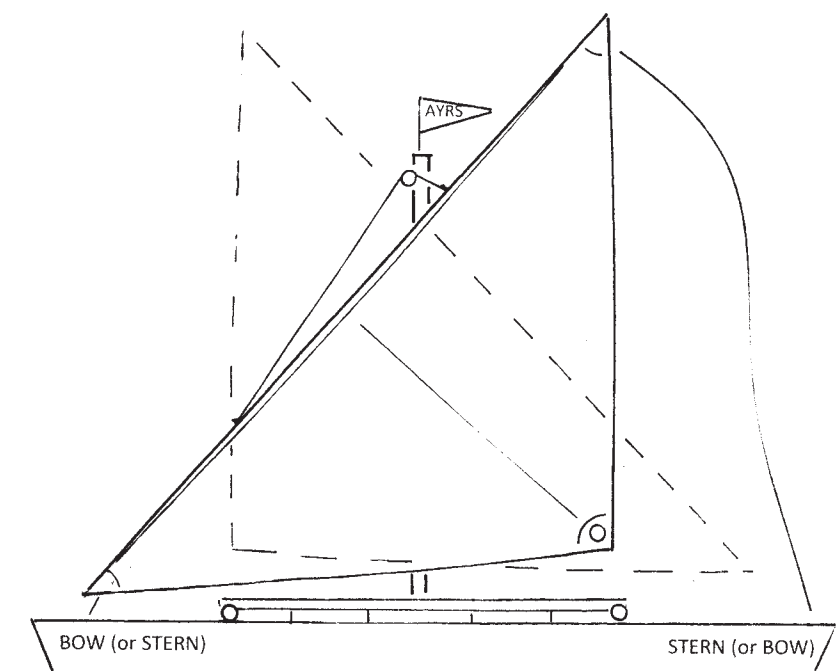


with a block, running on this strop. When first hoisted, the symmetrical sail hung with the yard horizontal, and the sail lifting and flogging. When one end of the yard was pulled down, as before, that corner of the sail became the tack of a lateen, and the other the peak. But in particular, the sail area moved towards the new bow. The wire strop allowed the sail to move forward without moving the mast. The sail always took the wind on the same side, and so was a 'one-sided sail'

The cheap cotton cloth sail was replaced with one of 5 ounce heat-set polyester, as I described in 'Amateur Sailmaking: Catalyst No 12. A thick new yard was made with an asymmetrical teardrop cross-section, to exploit the one-sided sail, and provide something like the leading edge of an aerofoil. It was mostly made of Core-cell foam, with a softwood tail (Fig 8) The tail was shaped to provide a slot for the luff rope and tabling, enclosed by a thin plastic strip. The strength of the yard was provided by a sheathing of glass cloth and epoxy over the structural foam and wood.

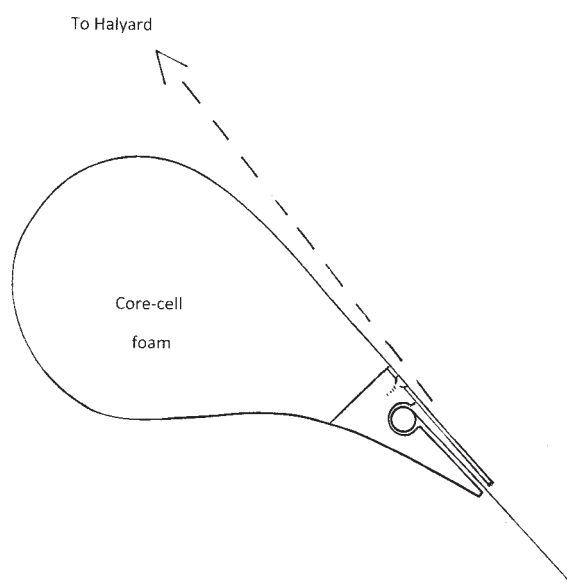
Although quite bulky, the new yard 14'8" long weighed only 8 pounds. The new sail is mitre cut and is a right-angle isosceles triangle with two 9'2" sides. The roped luff is 13'0" and the area 42 sq.ft. to which can be added about 3 for the shaped yard, making some 45 sq.ft.

For this 'one-sided' sail to set correctly, the halyard and the wire strop must be offset to be in line with the a tangent to the sail itself (Fig 8) This should provide a smooth airflow along the back or lee side of the sail. Special fittings were made to realign the wire strop.



*Fig 7 The one-sided sail*

Setting up the boat for sailing involved leading a long line from one corner of the sail, through blocks at each end of the hull, then to the other corner. There was a small cubby at each end of the cockpit, with fairleads and cleats for this line. The sheet was doubled, running around the mast.



*Fig 8 The asymmetrical yard in cross-section*

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## Discussion

I have no numbers to quote for the performance of the final sail plan. It seemed to be balanced, close-winded and effective.

The cross-beams of the first Cinnamon had extended a foot or so to leeward. They were cut off flush with the gunwale to prevent ropes becoming entangled with them. All three designs then lacked any place on which to prepare the sail rig. The sail has to be hoisted from the lee side, where there is only water to support it. Of course the boat tends to drift to leeward, and can run over the sail. Two leeside extensions were made to clip onto both later boats. The leeside should have been flared out, well above the waterline, looking like an aircraft carrier, to provide some work space.

The 'space-frame' concept of Cinnamon 3 was fleshed out with foam and covered with epoxy and glass cloth. Cheap polystyrene

foam had proved satisfactory in the first Cinnamon. Offcuts of thermal insulation foam, saved from landfill, were used for Cinnamon 3. It was very light, showed negligible water absorption, and was compatible with epoxy resin. Unfortunately, months after this foam had been shaped and covered with glass cloth, it began to shrink, rather spoiling the appearance of the hull.

## Conclusion

The proa form in general has its problems in steering and sail balance. The reward for solving these is a boat better able to reduce leeway, by deliberate asymmetry of hull shape.

My original aims are achievable, but I have run out of time. I hope any interested AYRS members will visit me, and help themselves to the many usable bits.

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# Detachable watertight pockets

Mark Tingley

A dry-suit keeps clothes dry by sealing them within a watertight shell. Water is kept out by restricting ingress to just a few seals: around the neck, wrists and entry zips. Indeed a convenience fly zip is helpful as a way to remove forgotten items from within one's trouser pocket. Most clothes have pockets. These safely hold loose items together in a dry state and are convenient to use. Why should that be different at sea? Unfortunately dry-suit pockets are poorly thought through. They may be completely absent, or fitted with draining holes that just let them fill from the bottom quickly; or so small and inconveniently placed as to prevent useful use.

I bought a dry-suit with neither hood nor pockets and got Hammond Drysuits to custom fit my own pocket design. They are:

- Positioned just above the knee when kneeling down;
- Deep, so my sunhat's brim is not screwed up to fit within;
- Easy to access when sitting down,
- Gusseted to take bulky items,
- Protected from mainsheet scuffing,
- Have a fold over the top to deter water with luminous reflective flap, and
- CAN BE ENTIRELY REMOVED FROM THE DRY-SUIT.







If need be I can wade chest deep in the sea with certainty to find pocket and contents safely dry later. Hook and loop Velcro is used to secure the pocket on the suit leg. The soft 'loops' part is on the suit to stop entanglement with seaweed. On return I attach pocket to leg with Velcro wrapped over onto the side of the pocket. Thus it is held below and on top. This stops weight/bulk in pocket peeling it away from my leg when walking.

Two identical thigh pockets were made. I tend to put hats {sun, souwester} in left leg pocket and hanky, tissues, food in right. An improvement would be to have the rear surface of one slightly different in colour or texture to the other to ensure they are put back on the correct leg without having to first examine the contents with wet hands.



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# MY CATAMARAN

Stuart Large

After a period of extreme despair I needed to find something to occupy my mind and restore my sanity, I thought it would be nice to sail off alone and visit some of the beautiful islands here in Palawan. It was then I remembered the two GRP outrigger canoe hulls rotting on the farm, so I brought them to my house and proceeded to strip out all the rotten wood and fittings back to bare GRP.



The hulls were 22ft 10 inches long with a lot of rocker, and a tendency to hobby-horse in a chop, so I decided to stretch them. I measured, drew a line across the centre of each hull and cut them with a cutting disc, amazingly this only took about 10mins. I then set the two halves 4ft apart and used steel sheet to make a mould to cast and join the halves with CSM and cloth, fitted internal gunwales and bulkheads to strengthen and stiffen the hulls, which gave me 26'10" hulls. An 8ft plywood deck would give me a 12ft beam, which seemed reasonable

Now this took lots of thought and was occupying my mind all day and sometimes in the night. I had not much capital and huge

debts (I had given up worrying about the debt), but I was worried I would run out of cash and not be able to finish the project; so I had to innovate and find ways to design and build by the cheapest method. For example a 30ft aluminium mast and stainless rigging would cost more than I had, so an 'A' frame mast made from 2" anodized aluminium tube that was available and cheap here in the Philippines (it was filled with octagon shaped timber for extra strength), was substituted. It was free standing but supported fore and aft with running rigging.

Auxiliary power was a problem. An outboard would be nice but not affordable, and I couldn't



find any secondhand units here. However a friend from [pinoyboats.org](http://pinoyboats.org) was building longtail surface piercing units (called “scorpion drives”) and he agreed to build me a 12ft stainless steel prop shaft/tube/propeller for me at £240UK. A Chinese clone diesel set me back £230UK, and the unit could be mounted mid deck with the prop tube running under the deck. The whole unit was set up to pivot up and down but restricted from sideways movement, see attached photo.

My plan for the cabins was to build Wharram type plywood ones, but one day when looking at my upturned hulls and admiring the stern shape, I had an idea and cast a female mould on the stern hull, which I used to mould the cabins. The female mould was later altered, shortened and used as a pod fitted under the diesel engine.

For sails I was torn between a lug and a lateen sail. A lug could be reefed, but reefing the lateen is not so easy, so in the end although I decided on a lateen but added a flying jib. In the event of heavier winds, I would drop the jib and move the lateen forward to restore CE balance, and in storm force drop the lateen and use a trisail. The advantage of this set up with an ‘A’ frame mast is the number of settings:

the lateen can be set up as a balanced sail, or moved up and back in lighter winds, the centre of effort is low down, and with twin halyards, I can use one as a running backstay.

Circumstances have stopped me from doing much sailing, so for now I cannot report on how well it sails, but the first trip, from the beach where I assembled it to the boat club where it is moored, taught me something. The weather that day started from a medium breeze building to much stronger winds, and the last 5 miles to the boat club was nasty – not big waves but short and sharp. The boat was pitching a bit, but the prop was holding at its own determined level in the water by the unit pivoting, the resulting undisturbed water flow over the prop gave it a smooth power output. (An outboard or conventional stern prop would have been cavitating badly.) I was surprised and pleased.

Another innovation is that the daggerboard goes through the deck on the inner side of the hulls (I could not bring myself to cut holes in the hulls) and I think leeboards look ugly.

This project saved my sanity and helped my situation enormously, I doubt now that I will go off sailing into the distance on my own now, as I have found a girlfriend with two wonderful children (an instant family) and will only be using it for recreational sailing.



## AYRS Newsletter February 2013

I'm not sure if my request for information about the Moxey 12 Catamaran at Plymouth was the reason but the only response I had from the last newsletter were the details from Stuart Large of a project which helped him recover from the psychological and financial problems after the death of his wife from serious illness, and the wonders of the internet as a form of communication are demonstrated as he lives in the Phillipines.

### London International Boat Show

As usual we had a stand at the LIBS where our publications and membership were being sold and of course opportunities look around at new equipment and visit boats (see how others live!)

The Show this year occupied only the South Hall and Dockside at Excel and was almost divided into two parts by the huge Princess Motor Yachts stand power boats, engines, navigational equipment and lifestyle stands being towards the East and sailing boats, chandlery, chartering, and clubs being towards the West. The Dockside display was mainly brokerage large boats but included the c 1902 Walton and Frinton lifeboat (sails and oars when she was first built) although soon given a petrol engine (a diesel now) but retaining her original rig, there were also demonstrations in the dock.

The large motor boats were like palaces for the owners and guests,



*Stars racing in the dock*



*JetLev [www.jetlev.com](http://www.jetlev.com)*



*Cooper 800*



*Smart boat*

### Fred Ball

one I visited had in the saloon what I can only describe as a smart dining room and below the master suit had a sofa in the bedroom and the ensuite had his and her hand basins, wc, bidet and large shower! The paid hands accommodation was the complete opposite with a pair of cabins each side of a small toilet/washroom reached from the laundry room and immediately aft of the large pair of diesels!

There were two rather more eco-friendly motor day boats relying on light weight construction and slim lines to give performance using moderate power.

The Smart Boat had neat rectangular fenders that were stowed inboard ready for use in recesses below the gunwhale just needing to be flipped outboard to be ready for use one advantage of her modern style of construction compared to the more traditional style of the Cooper 800.

The Dragonfly 28 trimaran I felt was an exciting boat well laid out with great potential for racing and fast cruising.

The top pair of pictures (overleaf) show cockpit detail including the high sill at the companionway entrance and the recessed mainsheet track; the middle pair are of the interior of Grand Soleil 43' and the lower pair the interior of another 40+ footer; well used space and some useable hand holds; I find many cruising boats have large spaces and nothing to hang on to when the going gets lumpy!



*Dragonfly 28*



*Grand Soleil 43*



*Small boats*



*Smaller boats, r/c racing on the pool*

The other side of the Dragonfly were some examples of some serious cruising boats including *MingMing*, a Coribee 20 with a junk rig which has covered over 20,000 miles of ocean sailing; many more miles than most cruising boats.

AkzoNobel the makers of International yacht paints have introduced a value for money range of Yacht paints all are single pot and the range only uses two cleaners or thinners. The "Nautical" range has an eroding antifouling (3 colours) a gloss enamel (10 colours) a clear gloss varnish, a primer undercoat for above waterline and an under waterline primer. [www.nauticalpaint.com](http://www.nauticalpaint.com)

The Flexdel Corporation from the USA (they have a Danish contact address) were exhibiting a range of paints several of which were water-based, including primers and antifouling intended for marine use, and also included paints for PVC buoys etc. [www.aquagardboatpaint.com](http://www.aquagardboatpaint.com)



*For those tired of pedalling Hobie kayaks; a version of the Torquedo electric outboard that fits in the slot! Torquedo have also introduced a LARGE (c80 hp) outboard for commercial use; the battery packs cost so much that to justify it your annual fuel bill needs to be huge*





*MingMing*



*www.flyingfishhovercraft.co.uk*



*A display of forging by Wichard*



*AYRS stand*

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## AYRS Newsletter May 2013

I'm finding creating newsletters regularly difficult, as I seem to have to write everything myself! Tim Glover helps with his hints and tips, but it would be helpful if other people contributed: just a paragraph or two on your projects, requests for help, information or physical, even wants and for sale items would help!

Which reminds me that at the end of my garden is a Minisail donated to AYRS by Su Lewis for someone to experiment with. There is no sail, but all the spars

are with it, the rudder, dagger board and sliding seat are wooden and suffering from woodworm damage but are useable. I have sailed it with a Topper rig, and the Minisail web site has notes about using a Laser rig ([www.minisail.org.uk](http://www.minisail.org.uk))

Catalyst, the AYRS journal, also needs articles, so if you have an interesting article submit it to [Catalyst@ayrs.org](mailto:Catalyst@ayrs.org), the worst that can happen is that the Editor will make some suggestions to improve it or ask for more pictures!

### Fred Ball

#### The International School of Yacht Design

I posted a note in December about a course of evening classes (6 x 4 hours) being held in January and February this year by the ISYD. I attended the Southampton venue (the London course was cancelled as it was undersubscribed). The course was based on the book "Principles of Yacht Design" 3rd edition by Lars Larson and Rolf E Eliason, and the 1<sup>st</sup>, 3<sup>rd</sup> and fourth lectures were given by Lars Anderson





(Professor of Hydrodynamics at Chalmers University of Technology, Gothenberg) and the others by Giles Barkley and Robin Luscombe from Southampton University. I enjoyed the course, and feel that it was worth attending as I now know much more about the process of designing a yacht although I am far from a qualified designer. The book itself is very informative, each chapter working through the process of design with the formulae needed and worked examples for the YD-40 design, however you should wait for the next edition which should appear soon and will be based on a more recent design and explain current rules and regulations.

If you are really interested in yacht design I would recommend the course, it is also valuable to those interested in performance calculations and rating rules. For more information and details of courses planned visit [www.isyd.org](http://www.isyd.org)

## RYA Volvo Dinghy Exhibition

Mainly racing dinghy classes but



lots to interest me, as usual there were lectures and demonstrations, the ability to use flexible rigs to show what happens when tensions are adjusted really does clarify what is described in articles on sail trim and one of these demonstrations should be watched just to remind one of what can be done, a little faster not only wins races but when cruising means that tidal gates can be achieved or the pub might not have closed!

Things that particularly caught my eye were the Wayfarer that had cruised from UK to the Baltic, a carbon fibre luff tube allowing dinghy foresails to be reefed, the contrast between the classic National Twelve and the modern version; the 'A' class Catamaran, the test rig for Clamcleats, and the Sea Sure aluminium rudder blade/centre board section. (I hope to get some offcuts; it apparently comes as a 3 metre length)

The Wayfarer trip was written about in Practical Boat Owner of November last year; Wayfarer class contact [www.wayfarer.org.uk](http://www.wayfarer.org.uk). The carbon fibre luff tube was made and exhibited by Aero Luffspar



Systems [www.aeroluffspars.co.uk](http://www.aeroluffspars.co.uk). The National 12 class [www.national12.org](http://www.national12.org) builder of wooden ones Good Wood Boat Co. [www.goodwoodboat.co.uk](http://www.goodwoodboat.co.uk). A Class Catamaran [www.a-cat.org](http://www.a-cat.org) or [www.aaclasscatamaran.co.uk](http://www.aaclasscatamaran.co.uk); Sea Sure [www.sea-sure.co.uk](http://www.sea-sure.co.uk)

## Beale Park Boat Show

This was most enjoyable, the AYRS stand was next to the Frankton Dinghy being exhibited by AYRS member Martin Walford. ([www.franktondinghy.co.uk](http://www.franktondinghy.co.uk)) Mike Howard who is experimenting with a tethered kite rig was with him and provided us with some display material describing and showing progress to date; I'll try and write a report for my next Newsletter.

## Hints and Tips from Tim Glover

### First a BIG Don't!!

I was planing with an electric plane. To get the plane into a very confined space I removed my hand from the front handle and gripped the plane on the underside. As I worked I first felt a draught on my right thumb and I remember thinking there is no fan down there!! A little later on I felt my thumb being cut away!! I withdrew my thumb very quickly and held on to the cut part with my index finger very hard!! I did not dare look for some time; since the pain

was not very great I chanced a quick LOOK at the cut area and to my surprise and delight there was only a very small cut indeed!!

WOW .....was I LUCKY!!!!

SO no more planing without both hands on the handles provided!

I was told about TORX Wood screws ie screws that have a TORX drive hole in the head and not a Posidrive or Philips head.

Locally, they are sold by Toolstation. The best thing about them is that as the TORX drive is in the form of a parallel shaft, there is no component to push out the TORX bit out of the screw itself as it is being screwed in! NO more horrible jumping of the screwdriver coming out of the head as it is being tightened up!!

If you buy a box of 200, they give you a free TORX bit with it.

If you have not tried these out, do try them and let me know what you think. (NB They are not stainless steel, so may not be suitable for all boats.)

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## AYRS Newsletter September 2013

I've had a busy summer with only two sailing trips, one with each of my sons Julian and Tim. Both were most enjoyable, but most of my summer has been spent removing an old timber framed asbestos garage and renewing the roof of my brick built one. However I did get to The Beale Park Boat Show and Seawork, and also made time to help Slade on several occasions to inspect his prototype floating wind turbine generator and also help him decommission it.

As well as sailing with Julian, I helped in raising the mast on his cruising boat. That was complicated by the fact that the coach roof prevented the mast from being lowered anywhere near horizontal, so the usual method of an "A" frame and hoisting it using the jib halliard was out of

the question. The local boat yard couldn't help at a weekend; so the scheme used was for two similar sized boats (one advantage of a friendly club) laying alongside and hoisting a tackle using their main halliard and becoming a crane. Fortunately the Saturday chosen was calm, and it all went according to plan and the stays were all attached, and gently tensioned with advice from bystanders to get the mast vertical laterally and normally raked fore and aft (six people all with a different viewpoint!)

Beale Park boat show was enjoyable as usual and the AYRS stand was reasonably busy. On the adjacent stand, AYRS member Martin Walford was exhibiting the Frankton Dinghy which he had designed as an entry in the Royal Cruising Club/Yachting Monthly competition last year

### Fred Ball

([www.rcc.org.uk/RCC\\_Dinghies\\_Report\\_of\\_Judges.pdf](http://www.rcc.org.uk/RCC_Dinghies_Report_of_Judges.pdf)) and built to demonstrate its versatility. [www.franktondinghy.co.uk](http://www.franktondinghy.co.uk)

The Cordless Canoe Challenge took place in two classes: an out and out race over 600 metres, and a limited power 300metre race. The results and an excellent description of the competing boats is in the issue 101 September/October 2013 of Water Craft magazine, where there are also details of next year's rules. Both events were won by Joe Rutland in *Velociraptor*, and an innovation prize was awarded to John Tilley with *Whimsy*.

The Amateur Boat Building Awards entries were as usual interesting and beautifully constructed, I was particularly impressed by *Nightmare* designed and constructed by two



*Frankton dinghy sailing*



*Whimsy arriving*



*Whimsy afloat*





*Support Boat 2 x 25v 2,685Wh batteries!*



*Mini paddles for dinghy cruiser's tender*



*Demonstration of Skep's fold away keel*

schoolboys, using a Laser 2 rig on a 7' 6" hull; and Skep, a 25' Cruising boat designed by Stuart Roy and built by Will Staynor who had designed a drop keel which splits along its length to retract into a centreboard case entirely within the main keel structure.

## Seawork

As usual there was much to see and the attention paid to detail of the working boats was most impressive, the helmsmans instruments and controls always placed well VDU providing all round vision, in one case I saw "wing mirrors" fitted as well presumably in case of failure or to allow a crew member to keep an extra pair of eyes on things.

The boat that especially caught my eye was the amphibious tender on the CTruk workboat, it was one of the eight wheeled all terrain vehicles (similar to an Argocat) with a floatation collar around its body and an outboard to propel when afloat. There was a ramp for launch and recovery reminding me of the Italian Job (There was also a crane, I suspect the ramp was only usable in calm weather!) [www.ctruck.com](http://www.ctruck.com). The amphibian is CTruk Avenger and the parent vessel CTruk 20T MPC.

As far as equipment was concerned I was impressed with lock washers shown by Nord-Lock Ltd. which were essentially a pair made with grips on the outer surfaces and matching radial ramps on the inner surfaces, so that once the nut over them had been tightened any tendency to undo by vibration would engage the ramps which would thicken the pair of washers so preventing loosening. [www.nord-lock.com](http://www.nord-lock.com).



*CTruk with amphibious RIB on deck*



*Bridge wing mirror*



*Sharp Bulb bow on RIB type workboat*



*Another one, a catamaran with a substantial boat shaped centre pod just clear of the water had a large aperture in each of the bows to allow spray from water disturbance a way out*



*Aperture in bows*

*Some photos from Beale Park*

The other piece of equipment that I felt would be useful to the amateur boat owner was the MLS Fuel Purifier exhibited and available from Landau UK Ltd of Southampton. It works by a swirl induced by fixed vanes separating contamination, which sinks to the bottom of the unit where it can be drained off periodically. I felt that for larger engines it would be very useful. The smallest model was for engines of up to 150hp and cost £378. [www.landauuk.com](http://www.landauuk.com)

### Inflatable Repairs

In the middle of August I helped Slade decommission his prototype floating windmill which was interesting as we were able to watch a large slipway being used, and was handy as my 10' RIB we had been using to check the windmill on its mooring needed attention. On our last trip out we had to re-inflate twice an hour! So I have brought it home and investigated. One of the past patches was leaking badly so I peeled it off (worryingly easily, maybe 3 years lying in a damp heap in the shipyard softens glue) and repaired with a fresh patch and retested. I found another large leak coming from the "rubber"



*The hole!*



*The other side, how it should be*

moulding sealing the end of one hull so off it came, again very easily, only to reveal a 6cm diameter hole. The moulding was not just being protective!

I attempted several ways of patching it without success; but eventually used a wooden disc 6 cm diameter to which I stuck an 8cm diameter patch using double sided sticky tape with a large screw as a handle on the outer side. I applied thixotropic contact adhesive to the inside of the hole and around the perimeter of the patch and after the usual



*The plug in place*



*As it looks now*

5-6 minutes wait for initial tack formation inserted the block and patch through the hole and gently aligned things up pulling the patch into the correct position and then gently working round pinching the glued surfaces together. I was then able to gently inflate the tube and wait and see. The next day all seemed well so I inflated to normal working pressure and am able to report all seems to be well; I plan on over patching this repair with proper two-part Hypalon glue.

## Don't Forget

### AYRS All-Day Meeting on *Your* Projects

09.30 - 1600, 26th January 2014,

Thorpe Village Hall, Coldharbour Lane, Thorpe (near Staines),  
Surrey, TW20 8TE.

General discussion on members' projects; if you have something to talk about, please come prepared! Bring your lunch as well - tea and coffee available. Donations invited to pay for the hall. Venue details from Fred Ball, tel: +44 1344 843690; email: [fball@ayrs.org](mailto:fball@ayrs.org).



## AYRS North West UK Local Group -- 'Paddle down the Cut'

After a week full of sunshine and light winds, Saturday 24th August started out dull and overcast with frequent showers of heavy rain! By 10.30 am five intrepid members of the AYRS North West Local Group had gathered at the launching ramp at The Moorings in Christleton, a small village to the East of Chester. Brian Shenstone, one of the AYRS members, had arranged for them to launch their various craft and enjoy a paddle on the Chester Branch of the Shropshire Union Canal.

The craft they had brought with them reflected the diverse range of boats that can be used under such circumstances. Brian Shenstone sported a splendid glass fibre Canadian canoe while Peter Gilchrist arrived with an exquisite eleven foot long lightweight skin on frame canoe/kayak which sported a tiny but effective lug sail. Mike Howard inflated his Pathfinder open canoe which, much to his surprise, was regarded as 'fit for purpose' by the other members. John Shuttleworth had brought an Aqualine Sport, an inflatable multi-purpose canoe/windsurfer/sailing dinghy. John had bought it on a whim a couple of years previously but had never had it out of the bag since. Much amusement was enjoyed as John attempted to paddle his 'floating mattress' which wanted to spin round in circles. However, once he had inserted the dagger board and rudder, his strange craft was quite controllable.

However, the star of the show was undoubtedly John Alldred's unusual outrigger complete

with his prototype 'Flip Flop' propulsion system. The main hull, which John designed himself, consists of a 'single sheet of plywood' hull, which incorporates a unique multi angle chine log system devised by John. The outrigger is in glass fibre and was taken from the mould of a scaled down catamaran hull. John's 'Flip Flop' is a horizontally mounted variable shaped blade attached to a mechanical arm which requires an 'up and down' pump like movement to activate it. The shape of the blade changes on both the 'up' and 'down' stroke so that it is producing power in both directions.

Much of the first hour was spent watching and assisting John to put his prototype craft together and make some final adjustments. We were all privileged to watch John surge away from the quayside on his maiden voyage. The 'Flip Flop' was highly effective and drove the tiny outrigger at a good speed. However, as the hull had quite a bit of rocker the action of the 'Flip Flop' tended to make the tiny hull 'hobbyhorse'. John returned to base and conducted several 'on the spot' modifications which we all watched and assisted when asked. Our efforts did not go un-noticed. A number of resident narrowboat owners and passers-by on the towpath stopped to watch these eccentric and often noisy gentlemen!

By the time we all got underway, the rain had stopped, the sky had cleared and we enjoyed bursts of sunshine although the wind increased in strength later on. We paddled East, Peter Gilchrist using

his sail to good effect. The canal was quite busy with a number of narrowboats on the move in both directions. As lunchtime approached we made our way back to The Moorings. John Alldred had suffered a mechanical breakdown so on the final stages of his return journey he was assisted by a push from Mike Howard.

After retrieving their boats and stowing their gear, the five members walked up through the village of Christleton to the Ring O' Bells public house where they each enjoyed a light lunch washed down with a welcome pint of beer. A lively discussion on a variety of subjects accompanied their lunch and so this 'outing' was deemed to be their Autumn meeting. A further outing is planned for October.

Once again, a break from the traditional type of meeting where we all sit around in comfortable chairs and have a discussion over a cup of tea and a biscuit proved to be both enjoyable and stimulating. As John Shuttleworth aptly put it, "it's just good fun to mess about with boats." The whole day, to my mind was very much in the spirit of what AYRS is all about.

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# Catalyst Calendar

This is a free listing of events organised by AYRS and others. Please send details of events for possible inclusion by post to Catalyst, BCM AYRS, London WC1N 3XX, UK, or email to [Catalyst@ayrs.org](mailto:Catalyst@ayrs.org)

## October 2013

### 12th-18th Weymouth

#### Speedweek

Portland and Weymouth Sailing Academy, Portland Harbour, Dorset UK See [www.speedsailing.com](http://www.speedsailing.com)

### 16th "Speedsailing" AYRS

#### Weymouth meeting

19.30 for 20.00hrs, at the Royal Dorset Yacht Club, 11 Custom House Quay, Weymouth. Map: [www.rdydc.freeuk.com](http://www.rdydc.freeuk.com). Contact: AYRS Secretary, BCM AYRS, London WC1N 3XX; check the website [www.ayrs.org](http://www.ayrs.org) or email: [office@ayrs.org](mailto:office@ayrs.org) tel: 0780 820 0987 before going just in case the location changes!

## January 2014

### 4<sup>th</sup> - 12<sup>th</sup> London International Boat Show

EXCEL Exhibition Centre, London Docklands. AYRS will be there. Helpers are wanted to staff the stand, sell publications and recruit new members. If you would like to help (reward: free ticket!) please contact the Hon Secretary on 01727 862268 or email [office@ayrs.org](mailto:office@ayrs.org)

### 26th All-Day AYRS Meeting

9.30am-4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey (off A320 between Staines and Chertsey – follow signs to Thorpe Park, then to the village).

Tea and coffee available but bring your own lunch. Donations invited to pay for hall. Further details from Fred Ball, tel: +44 1344 843690; email: [fredcball@btinternet.com](mailto:fredcball@btinternet.com).

### 26th AYRS Annual General

#### Meeting

4pm, Thorpe Village Hall, Coldharbour Lane, Thorpe, Surrey (as above). Details from the AYRS Hon. Secretary tel: +44 (1727) 862 268; email: [secretary@ayrs.org](mailto:secretary@ayrs.org)

Note: Items to be considered by the AGM, including nominations for the Committee MUST be received by the AYRS Secretary before 12th January 2012 (post to AYRS, BCM AYRS, London WC1N 3XX, UK, or email: [secretary@ayrs.org](mailto:secretary@ayrs.org))

## February

### 19<sup>th</sup> AYRS South West Area Meeting and visit to the new Marine Building and wave tank facility at Plymouth University

Meet for lunch, possibly at the cafe on the University Campus; Visit the Marine building; travel to John & Josephine's house at Wembury for light refreshments; Evening meeting for members presentations and discussion. Come for any part of this program, or for all of it. When we have more information from the University staff, more detailed times and locations will be published on the AYRS website [www.ayrs.org](http://www.ayrs.org). It would be good to get an advance idea of the number of people interested in this, please contact me at [j\\_perry@btinternet.com](mailto:j_perry@btinternet.com)

## March

### 1<sup>st</sup> - 2<sup>nd</sup> RYA Dinghy Show,

#### Alexandra Palace, London

Many sailing dinghy classes and beach cats will be on display, dinghy skill lectures and demonstrations, new fittings and bargain sailing kit. For details see [www.rya.org.uk](http://www.rya.org.uk)

## April

### 27<sup>th</sup> Beaulieu Boat Jumble

The National Motor Museum, BEAULIEU, Hampshire, UK. AYRS will be there!

## May

### Date to be arranged Boat trials, Weymouth

Probably at the Portland and Weymouth Sailing Academy. Contact: Norman Phillips email: [wnorman.phillips@ntlworld.com](mailto:wnorman.phillips@ntlworld.com); tel: 01737 212912.

## June

### 6th - 8th Beale Park Boat Show

As usual we will have a stand and would appreciate small exhibits and display material and of course offers of help to run the stand. Contact: AYRS Secretary, 01727 862268, email [office@ayrs.org](mailto:office@ayrs.org)

# AYRS Annual General Meeting 2014

Notice has been given that the Annual General Meeting of the Amateur Yacht Research Society will be held on Sunday 26th January 2014 in Thorpe Village Hall, Thorpe, near Staines, England, starting at 16.00 hrs (i.e. at the conclusion of the All-Day Meeting on Projects which starts at 09.30). All members and their guests are welcome to attend, but only paid-up members may vote on resolutions.

The business of the meeting will include the following, not necessarily in this order:

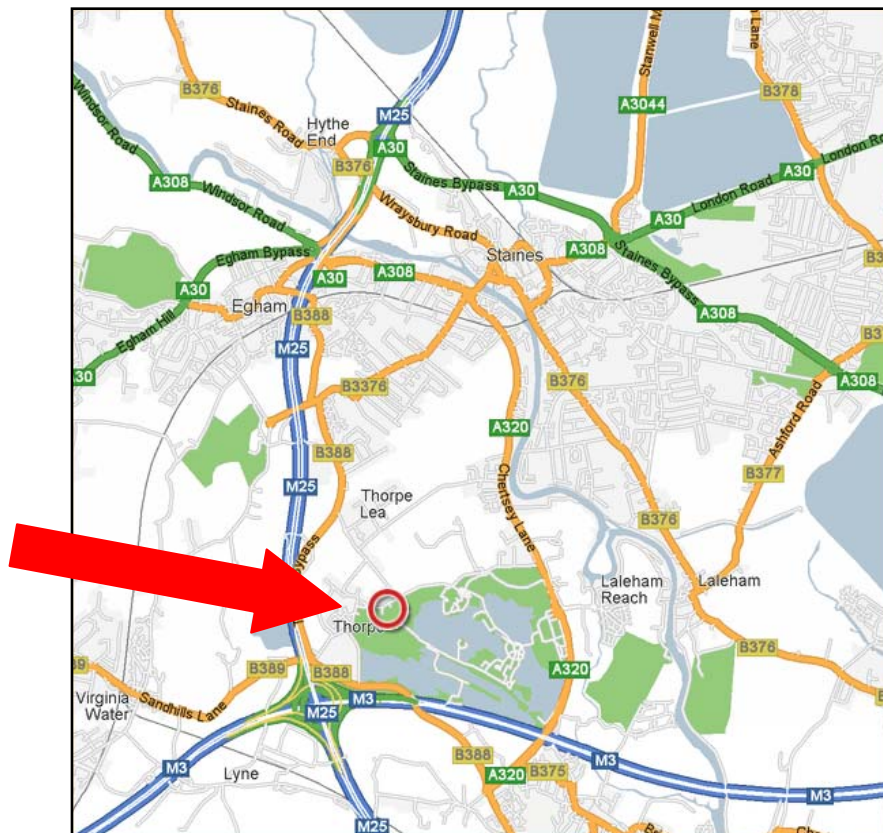
1. Receipt of apologies for absence
2. Minutes of the previous AGM
3. Chairman's Report
4. Treasurer's Report and Approval of Accounts
5. Election of Officers and Committee members
6. Appointment of a Reporting Accountant
7. Any Other Business

Relevant documents will be posted on the AYRS website [www.ayrs.org](http://www.ayrs.org).

Matters for discussion under Item 7 should be notified to the Hon Secretary as soon as possible.

Email [hon.sec@ayrs.org](mailto:hon.sec@ayrs.org)

Any queries should be addressed to the AYRS Office, email [office@ayrs.org](mailto:office@ayrs.org).



Catalyst — *a person or thing acting as a stimulus  
in bringing about or hastening a result*

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On the Horizon . . .

More sources and resources: reviews, publications and  
Internet sites

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