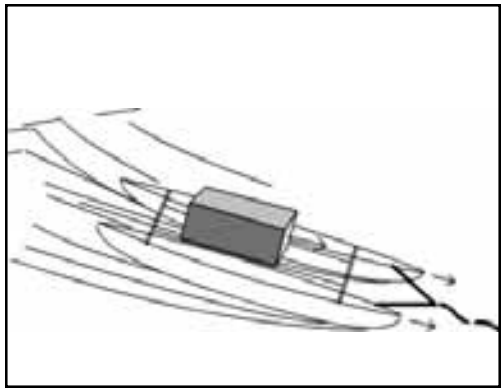
Catalyst

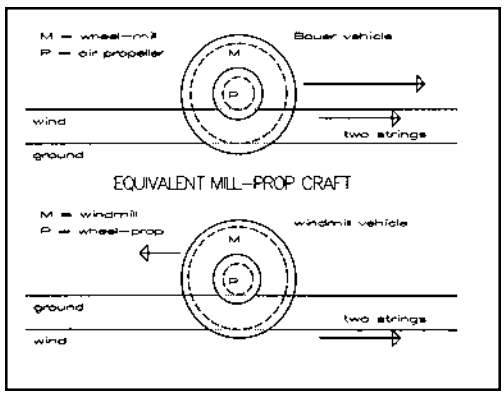
Journal of the Amateur Yacht Research Society

Number 20 April 2005

Features

Regulars





Cover Photo

Mark Stephens & Rob Denney sailing
Elementarry
in Coffs Harbour, NSW Australia
Photo Michele Balharry

Catalyst

Journal of the
Amateur Yacht Research Society

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Kites & Sailing Records

On 8th February, the International Sailing Federation (ISAF) Executive meeting appeared to ban kite-powered craft from competing for any sailing records. Not unexpectedly this provoked some protest. As a result the World Sailing Speed Record Council (WSSRC) issued the following statement:

"To clarify the World Sailing Speed Record Council position ... kite records will continue to be ratified by the WSSR Council in that division and kite speed sailing events will be observed and monitored as normal...

However, ISAF have stated that, at present, a claim on the outright World Sailing Speed Record by a kite sailboard would not be endorsed. This represents no change from the current position."

So kiteboarders can set their own records, but even if they go faster than anyone has before, (and they are getting very close) they will not be recognised by ISAF as holding the world record.

Frankly to us in AYRS this is short-sighted; and it shows more than anything else how much of a gulf there is between the ISAF Executive and those who spend their time making boats go faster. No doubt ISAF will change their position in time, and I know that the WSSRC are working to that end, but in the meantime it is simply something to be borne.

AYRS' own position is that, as sponsors of the Weymouth & Portland Speedweek, which is held every October, we will press for the continued total inclusion of kite-powered craft and boards within the world Speed Sailing Records system, and will ensure that kite power continues to be welcome at Speedweek.

As the Secretary of the Danish Sailing Federation wrote in February - *There is absolutely no difference between the current situation with Kitesurfing, and the situation with windsurfing in the 1970's and beginning of the 1980's. At that time windsurfing was something many of the traditional sailors found was not "sailing". Of course it was – and still is. ISAF took care of this new exciting discipline and national sailing associations all over the world followed the lead. Today, nobody would dare to say that windsurfing is not sailing, and it has been on the Olympic programme since 1988.*

To you our members we would say that if you are in any way involved with organised kitesailing in your own country, or with your national Sailing Authority, then please press for a change in ISAF's stance. As far as we can tell, it has no real rhyme or reason behind it, just a total lack of understanding.

If you are professionally involved in kite sailing, either as competitor, teacher, marketing or manufacturing, then you should already know that Dave Culp is organising a world-wide trade association for kite sailing – an independent organization whose sole purpose is to lobby local, national and international governing bodies for the cause of all those who sail with kites, be they "kitesurfers", "kite spinnaker" users, or even "commercial kite vessel operators". You can contact him by email at <dave@kiteship.com>.

Simon Fishwick
Editor

Concept Boat Design Competition 2005

Cult designer Wayne Hemingway is to front the 2005 Concept Boat Competition, organised by the British Marine Federation with support from the Royal Institute of Naval Architects.

Entrants to the Concept Boat 2005 competition will be asked to design a boat under the theme 'Boating for all'. The international competition runs annually and has been created to foster an interest in designing boats of the future whilst emphasising the value of innovation and creativity. The competition covers both recreational and commercial craft, and each year has a different theme.

To make the competition even more appealing and accessible to all, this year, for the first time, the competition has been divided into three key categories:

- **Concept and design** - Detailed designs that have moved beyond pure concept into a developed concept
- **Pure Concept** – a simple illustration of their concept boat with a brief written summary
- **UK Schools** – for teams of school children to develop their ideas into concepts, as part of the national curriculum

In addition to the traditional emphasis of the competition, which continues in the 'Concept and design' category, the new categories enable entrants to convey simply the concept of their boat through a simple illustration, without the need for supporting technical specifications.

Supported by famous designer, Wayne Hemingway, it is hoped that the 2005 Concept Boat competition will stimulate further interest in forward thinking, innovative boat design.

Hemingway and his panel of judges will be looking for practical, original designs that create a safe, usable yet stylish vessel of the future. Key design features the judges are looking for include:

- low or moderate cost
- suitable for group activities
- a kit for easy assembly
- encourage and appeal to youth participation
- a new boat for sea cadets or similar
- and a new racing concept

Shortlisted entrants will have their designs on display at next September's Southampton Boat Show. The winners will have a prototype of their model made and displayed at the 2006 London Boat Show where they will also be awarded their prizes. In each category there will be two prizes and in addition there will be an overall winner of Concept Boat 2005 chosen from the winning entry of each of the three categories: 'Concept and Design': winning entry £2500 and runner up £1000; 'Pure Concept': winning entry £1000, runner up £500; and the Schools. The winner of the overall competition will receive an additional £2000.

Entries to the UK school category must be received by the end of April 2005 and for other entries by the end of May 2005. For full terms and conditions please visit www.conceptboat.com.

Rigid Inflatables Conference & Exhibition 2 - 3 June 2005, Cowes Yacht Haven, UK

The Rigid Inflatable Boat, or RIB as it is more commonly known, has made a significant impact on many kinds of small boat operations over the last three decades. Its advantages are well proven in practice and a thriving industry is now established around these unique craft.

The conference, organised by the Royal Institution of Naval Architects, will be held in the run-up to, and on the first day of 'RIBEX 2005'. This is a major three-day exhibition organised by RIB International magazine. This will attract professional operators as well as RIB builders and designers from around the world. The venue will be in the newly built conference facilities at Cowes Yacht Haven.

Since RINA's last RIB conference in 1998, the technology has advanced considerably: the trend towards larger and faster boats continues, and there are a multitude of variations on the original RIB concept.

This conference will examine topics relating to the design and operation of RIBs including the following topics:

Design & Construction:
Engines & Propulsion:
Operations:
Rules & regulations.

RINA's Conference Department can be contacted on

Tel: +44 (0)20 7201 2401
Fax: +44 (0)20 7259 5912
Email: conference@rina.org.uk

Help Wanted

I have been offered the opportunity to demostrate the principles of single-oared sculling at the Jan 06 London Boat Show. To this end I have designed a working model of a raft of about 20cm beam x 40cm length for a table-top demonstration.

Some recipients of this message will need no reminding of how inept I can be with things practical, and in any case I hav'n't access to even simple hand tools during thaat greater part of the year when I work abroad. So I am looking for people to help me, at least with the critical components. Of course, I don't expect this for nothing, and am happy to offer professional rates and/or a share in the glory. "The labourer is worthy of his/her hire".

January may seem a long time away, but I shall be in the UK only from mid-June to mid-September, and would like to see the model working by the end of that time. I have already made informal overtures to a few people, and would like to give them a formal decision as soon as I can.

Please email for details and drawings !

Michael Bedwell
<michael_bedwell@hotmail.com>

Mike Bedwell's Mercia Maid
Photo © The Bath Chronicle

Boat for Sale

Those kind enough to remember my talk in London to the AYRS last November will know someting of *MERCIA MAID* ; she is my Tucker-designed/Peter Nicholson-built "Broads Cruiser", as they describe her. Although fitted with a fuel tank and propellor block, she has never been equipped with the diesel engine around which she was designed. But she does have sails and rigging, both gunter and the modified lateen rig I use on inland waterways. She also has the unique stern-sculling gear which was the main topic of my talk.

She is currently moored on the Avon between Bath and Bristol. Her steel hull and lack of engine make her cheap to maintain, but she is still an expensive investment now I work out of the U.K. .

Ideally, I'd like to find a partner who would have use of her for ten months of the year and who would share costs. Alternatively , I'd consider an outright sale. She cost me some GBP16000 back in 1996.

Please email for further details <michael_bedwell@hotmail.com>.

Many thanks
Mike

Call for papers - HIGH PERFORMANCE YACHT DESIGN CONFERENCE 14 - 16 February 2006 - Auckland, New Zealand

Timed to coincide with the arrival of the Volvo Ocean Race fleet in New Zealand, the second international conference on high performance yacht design will be held in February 2006, and will showcase the latest developments in yacht research from around the globe. This conference will be a venue where naval architects, engineers, designers and researchers can present and hear papers on the current state of high performance yacht and power craft technology.

Advances in high performance yacht design are being driven by a range of factors, including development of new racing classes and demand for increased size and performance of racing and cruising craft. Radical design concepts such as innovative new hullforms, moving keels and masts and new approaches to sails and propulsion systems require innovative approaches to analysis, design and experimental verification.

The Conference Department can be contacted on

Tel: +44 (0)20 7201 2401
Fax: +44 (0)20 7259 5912
Email: conference@rina.org.uk

Comments on "Downwind as fast as you like"

I was intrigued by John C. Wilson's article in the last issue of Catalyst. I could not refute the spool-of-thread analogy shown in fig. 1 and yet it seemed to defy the laws of conservation of energy. The thread seemed to impart more energy to the spool than the wind imparted to the sail.

Another curiosity is the direction of rotation of the spool. The tension on the thread would cause the spool to rotate counter clockwise were it not for the opposing torque exerted by the surface on the rim of the spool. The energy required to rotate the spool clockwise is clearly not delivered by the thread. Therefore it does not come from the sail or the wind.

To translate the analogy to a sail craft, a craft flying a spinnaker or a kite could be made to go downwind faster than the wind speed by rapidly winching in the sheets. This would work but, unfortunately, it would not qualify as "sailing". The winches would require power not provided by the wind. Rule 1 states that the craft must be propelled by the action of the wind only.

The concept of the inchworm is interesting and I would like to suggest a practical, if perhaps facetious, implementation. Suppose the craft is suspended under a balloon. By itself it would be borne downwind at exactly the wind speed. It could be made to go faster by "rowing" it with oars having sails instead of blades. This would propel the craft to a higher speed on the back stroke and the oars would be feathered on the forward stroke. Once again, to exceed the wind speed requires an extra source of power provided by the rower. The craft is not "sailing" in the sense that it is propelled by the wind alone.

In conclusion, it is safe to say that it is theoretically impossible to "sail" downwind faster than the true wind speed. A craft can sail at several times the true wind speed but not directly downwind. On any other course, however fast the craft is sailing, the downwind component of the speed cannot exceed the true wind speed. That is to say, you cannot beat this restriction by tacking downwind on very fast broad reaches.

Peter Jefferson
pjjefferson@sympatico.ca

[For a contrary view see the article by Peter Sharp in this issue – Ed.]

In the July 2004 issue of Catalyst (#17) Bernard Coat an Hay writes about looking for the limits for sailboat speed. Peter Jefferson writes about the 50 knot speed "barrier" for sailboats. Any one interested in the limits for sailboat speed would do well to study Chapters 9 and 10 in my book, *Primitive Benchmark: a Short Treatise on a General Theory of Sailing with the Limits for Sailboat Speed* (ISBN 0-9671566-0-2.) Any one interested in achieving a 50 knot speed with a new sailboat would do well to study Chapter 10 of the afore-mentioned book.

Sincerely,
Jerry N. Selness
4611 Monongahela Street
San Diego CA 92117

Dow Chemicals Blue Styrofoam Insulation

I came across your website this morning and thought I'd contact you with a view to introducing the company I act as product manager for in their foam division.

The company is called Panel Systems Limited and we are Europe's largest fabricator of Styrofoam. We are based in Sheffield, UK.

I am aware that a number of my existing customers that purchase Styrofoam are active in the Marine Industry.

If you believe that your members would be interested in having a direct source for our material please contact me at <gfowler@panelsystems.co.uk.>

I look forward to hearing from you.
Geoff Fowler
Product Manager, Foam Division.
Panel Systems Limited

Self Steering Gear

We have recently completed development on a jib sheet to tiller self-steering gear.

You may be interested to take a look - www.steersman.net

Best regards,
Rob Chicken

New Email Addresses

Please note that AYRS now has a new email address:

For the Secretary use:
office@ayrs.org;

For Catalyst use
catalyst@ayrs.org

The old addresses still work for the moment, but will slowly disappear.

Rushing About on Ivanpah 2004

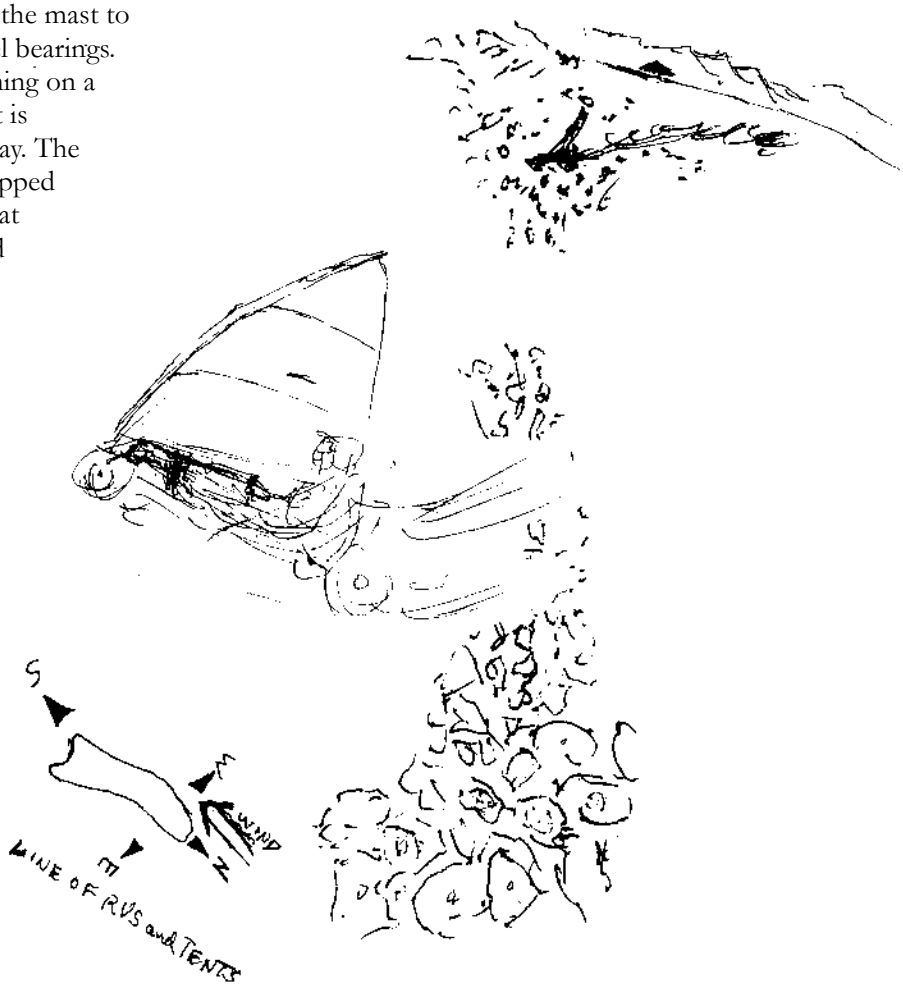
Jerry Selness

Ivanpah is a dry lakebed in California, the shape of a sausage about 1 mile wide and 5 miles long. Mountains surround it. Lumpy hexagonal dirt tiles make up the bed itself, called the clay playa, or just the playa. This year with little rain the tiles and playa are hard. Narrow shallow crack-like gaps run between the tiles, good places for spiders and insects to hide from the sun during the day.

On the afternoon of my arrival it seemed like the cracks had sucked up all the wind. Still a friend, Bob Dill, lets me use his Manta Twin land sailor to whet my appetite for the sport.

The Manta Twin is a three wheeled, tubular, open-framed buggy craft, one wheel in the front, two in the back. The wheels are about the size of a go-kart tire. A pole mast is set behind the front wheel and supported by side tubular frames that extend from a point about $^1/_5$ the way up the mast to the rear axles each side near the rear wheel bearings. The steering is by the feet of a pilot reclining on a black hammock like canvas seat. The pilot is strapped in with a seat belt when under way. The sail is triangular with the leading edge wrapped around the mast. The rear corner is fixed at the outboard end of a boom. The sail and boom are trimmed in and let out by a rope line lead from a cross tube behind the pilot, up to the end of the boom, to the mast, and back to the canvas slung seat via pulley blocks, and held in one or both hands when under way. (See Photo)

Soon I am strapped in and ready to go. An encouraging get-started push from Bob starts the wheels turning and builds a little momentum. Sustained movement is hard to maintain over the hard sand-clay tiles. The first afternoon on the playa the winds are really light. My anticipation for speed does not matter to the craft and the light desert winds. Hanging my feet out on both sides, grunting and shuffling to get the buggy wheels turning has little effect, It is a frustrating first experience, so far I am about the only land sailor out with the many other sailors seated in the shade next to parked RVs and tents parked on the edge of the dry lakebed sipping their mint juleps. A couple of gust-puffs come up and are enough wind to get the craft and my heart rolling at a crawl back to the long line of campers and their tents.



Later that afternoon, pilot Phil Mancell from Oregon, part of the throng of land sailors gathered on the high desert from around the world, told me "land sailors sail for the rush." I would have to wait until the next morning to experience the rush.

About all this afternoon and rest of the day bring is frustration, supper, and the stars at night just before crawling into my own tent hoping the next morning will bring a little more wind.

Up with the sun and outside with feet on the playa, there is a little more wind. I can feel it and see it in the flags flying set from poles on top of RVs. With sunglasses on, and, gloves in helmut and helmet in hand, I stride purposefully from my little tent past a big central pow-wow-tent towards Bob's big RV to find him. He is circling on his bicycle in front of his RV. Seeing me coming, he stops circling, and says, "Jerry, take the Manta Twin out." He has to organize some races - just what I wanted to hear.

I look up at an American flag set on a pole atop of a motor home. It is flapping, flapping and flying straight out. A good sign for enough wind and encouragement not to hesitate, but to strike while the wind is hot on the high desert.

Donning helmet and gloves, being sure to buckle the chinstrap for the motorcycle-like helmet, then, pulling the three-wheeled buggy by its mast with one hand and holding its rope-rein in the other I step eagerly onto the playa. Soon the winds begin to tug the Manta forward, get the wheels turning. I shift a steadying right hand to the left side frame and walk, then break into a trot beside the moving Manta Twin still holding the rope rein in one hand. The winds pull the sail and the craft rolls forward more, and faster too. I feel like a boy walking a snorting horse by its reins (like the lad in Picasso's painting with the boy leading a horse on the sand by the seashore.) The winds tug at the sails again and again. The go-kart-like wheels roll a little faster. I start to jog faster, right next to the tubular frame of the craft just to keep up before taking a deep breath and leaping aboard the horse still holding the reins, trimming the sails. And away we go- "whish," rolling on the desert.

I jump aboard hard and abruptly. The thud on the canvas seat dislodges a big nasty black widow spider from beneath the hammock-like seat. My left foot leaves the steering bar, moves quickly to squish the surprise intruder saving myself from a potential desert danger. Yeow. From then on, the ride gets faster, faster, holding on to a broad reach course across the wind and across the lakebed. The ride is a little bumpy on the hard tiles. I glance ahead. The other side of the lakebed is coming up quickly. Arriving sooner than later, I am a bit excited at the other side of the lake. I turn the craft straight into the wind and stop for a breather.

Stepping on to the playa dirt once more, mainsheet in hand, I lead the Manta Twin onward like Lawrence of Arabia leading his camel. The wind does its job and gets the craft rolling. This time, the wheels begin to turn, go round and round with each fresh tug on the sail by the wind. The buggy begins to snort and move a little faster. I jog a little faster and jump aboard, more smoothly this time, to go with the flow. The rope-rein is firmly in one hand; my feet stretch out and rest on the stubby steering handles near the mast. Toes nudge the steering bar this way and that for easy front wheel steering. Simultaneously I trim the sail slowly using both hands and bring the boom closer to my ear, all the while gathering more speed—straight for a new hazard, a bunch of mini-model radio controlled yachts playing at the far North corner of the lake bed. Arriving very quickly, I fear running into them or taking their precious wind. The best choice is not to go across the wind of their racecourse but rather to come (turn) head to wind, slow down, hop out, and start off walking again. Soon trotting, I jump aboard smoothly, then, I gain head way and pick up speed on a course, away from the model sailors, and away from the line of tents, sailing smoothly towards the far side of the lake bed.

Nudging the craft gently downwind a bit, without changing the trim on the sails, the craft's speed picks up more, the first rush (sudden acceleration) begins just before the galloping front wheel tosses up a piece of brush from the desert floor straight at my head. There is no time to duck the twig. It slams squarely across my sunglasses and bounces off the corner of my helmet back to the desert. I think "Jeewhiz another desert hazard escaped. Whew! This is fun". Catching my breath and steering more towards a downwind direction, at a certain point, speed begins to fall off. Heading back up to a broader reach course regains speed quickly. Running out of dry lakebed it is time to gybe (change course from one side of the wind to the other when going downwind.) Gybing from starboard to port tack is a calm quiet transition. The boom and sail come across smoothly, the sail is full, and the craft regains speed quickly on the new gybe course downwind.


WIND
S
W
N
E
LINE OF TENTS

Glancing over the left wheel, I see the RV tents are far to the left and leave them further behind headed for the far side of the lakebed.

It is time to go back, head the craft upwind to get back to camp. Thinking about the light winds of yesterday, when wearing about (like the old square-riggers going in a 3/4 circle to change tacks upwind) was the only way to tack upwind and keep the craft moving from upwind course to upwind course I decide today with the stronger winds to try tacking through the eye of the wind. On first try, turning the craft hard slows the wheels nearly to a stop before attaining the opposite upwind course. Re-gaining speed on the opposite upwind tack is slow. On the next try I find that a technique of turning less abruptly, maintains momentum through the eye of the wind, and there is still speed when the sails fill coming out on the new tack.

The rush on the downwind course is hard to put into words; yet, every land sailor knows what it is about. The best I can do to describe it is this: it is the sudden transition from moving/rolling quickly to another world of speed with the wind, man, craft, and nature, moving as one, together for a precious moment in time.

Having made my way back upwind, I am tempted to stay out a little longer on the playa just for the rush, one more time, but decide I need to head back to the tents and get Bob's land sailor back to him ready for his afternoon racing starts. I head the Manta twin quickly and swiftly for the line of tents, get there and turn head into wind just before crossing into the line of craft and folding chairs to avoid any spectacular crashing arrival incidents. After gliding to a safe stop, it is a challenge to get the craft back to its parking space.

Learning to back the Manta Twin while standing in front of it is a necessity for controlled movement along and among seated campers, RVs, tents, other tethered craft and Manta's turned on their sides, sails down against the desert floor and one rear wheel high. Backing the Manta Twin this way and that way between the many already parked craft to a parking spot for Bob to find, is a tricky proposition with the wind blowing strong and nervous owners watching the show. I get the hang of it. Pull the sail in tight, tie it off on the frame, then grab the sail's mast, turn the craft head to wind and let the wind push it backwards is the way to do it. I nudge the wheels a little this way and a little that into an open area before tipping it gently on its side, safe and ready for the next lad or lassie to right, steer into the open Ivanpah spaces, walk next to and jump aboard "for the rush of it."

It is a thrilling sail for me this mid morning. What has Bob been doing all this time I have been having fun with his craft? Soon I see Bob and walk towards him with a big smile on my face and ask, "What can I do for you?" He knows just the thing for a ready volunteer. Ho, ho, ho. The ensuing afternoon, until sunset, is spent standing on the hot dirt tiles in the middle of the hot playa with just enough water to sip as a volunteer scorer for rest of the high tech folks and their real fast custom race machines, together with fleets of Manta Twins, Singles, Fed Vs, Five Squares, New Zealand MiniBlokarts, and other classes.

Before the racing starts members of the ad hoc racing committee place orange traffic control cones spread across on the desert floor to form the ends of a start and finish line and be marks for the race course. The race committee driving back and forth in an SUV places more cones about three miles straight upwind at the far, far end of the playa lakebed towards Arizona and Mexico. Other cones are then set straight downwind at the far, far end of the lakebed towards the main highway, the California-Nevada Mountains and Death Valley's deep desert beyond. The start finish line is situated crossways in the middle of the course near scorers who keep track of the zooming land sailing craft as they streak up and down the course, passing through the official line when making each round of the race course beneath the desert sun. As scorers (Steve Brown and myself), our job is to record the numbers on the sail of each competitor's craft as it whizzes by, speeding through the line. One scorer calls out the number and the other writes it down on a score sheet that is "hopefully" done in the correct order. Both scorers are ready to jump out of the way of a wayward pilot who takes it a little too close to a cone for our comfort while aiming for the official line while moving at 60 plus mph.

The Manta Twin truly had a little gitty-up. Earlier in the day on the same playa, I was moving at 22-mph plus or minus 2 to 3 miles per hour in the day's winds of just 10-mph true wind plus or minus 2-mph. There are not any whitecaps to say the true wind is 13 knots, but the flags are flying straight out indicating 10 mph for the wind. This is a dry lakebed neighbour to the Mojave Desert on which we are sailing, after all. (See Photo and Sketch)

Elementarry - a 7.5 m x 4 m folding sports, daysailing, or camping proa

Reports by Rob Denney & Michele Balharry

Test sail, 7th January 2005, Coffs Harbour, NSW Australia. S to SE Winds, 10 - 15 knots.

I arrived at Coffs Harbour Friday to be met at the airport by Mark Stephens, who took me down to the beach where the boat was nearly rigged and ready to go. Such service! Donned the wetsuit and off we went, through small surf and a near on shore breeze. No problem getting going. I took the sheets, Mark the tillers and shunting was very easy. We played around a bit and practised shunting, then inadvertently capsized.

The boat lay on its side, but was easily righted with help from a passing fisherman (sorry no pictures, Ed.). Top GPS speed 15.6 knots, wind according to the local yacht club wind gauge, peaked at 15 knots. The sails looked a lot better, but still weren't perfect. The booms bonded to the masts worked brilliantly, and the new rudder bulkheads made the rudders far stiffer and stronger.

Had another sail on Saturday and took family and friends sailing. Both Bain (Harry builder) and Michele mastered shunting and two tiller steering very quickly. Mark and I spent half an hour buzzing upwind and down between two buoys a couple of hundred metres apart and managed to convince ourselves we were ready to race. Tack shunting was improved again, to the point that I reckon we could go from hull flying hard on the wind on one tack to

hull flying hard on the wind on the other tack as quickly as a beach cat. No breakages to fix.

Sunday

Sunday morning headed for Point Manning for their annual marathon race (no photos of the race). 34 kms/18.5 nautical miles of mostly downwind sailing in a narrowish tree lined river. 50 boats, 12 in our class, two very hot F18 cats with spinnakers and double trapezes, two nice A cats, a couple of Hobie 18's, a Taipan 5.6 and a couple of one-offs. Breeze very gusty and changeable, max was probably 20 knots in the puffs. We got there an hour before the start, and were ready to go in 40 minutes. Tying in the battens takes a large part of this, perhaps a reason for having a bolt rope mast.

We got a mid-fleet start and blasted off on a broad reach, at similar speeds to everyone except the F18's, one of which was very quick under spinnaker. The reach became a run, and we ended up on the light air side of the river, very slow. Shunting to get to the other side was far slower than the others gybing so we lost ground, although we picked it back up once we got the breeze. The boat was marginally slower directly downwind than the H18's and A-cats gybing back and forth across the river when we were in the same breeze, much slower when we were on the no wind side. We may have been quicker if we had gone wing and wing. Shunting was totally controlled and safe, at least two of the cats capsized during their gybes.

We had not fitted sheet cleats and Mark (who had never raced a boat before) and I are really too old for this sort of racing so we sat side by side half way along the beam, easing the sheets, luffing or bearing away each time we flew a hull. Fit young fools in an optimised boat would have been moving in and out with cleated sheets and sailing much, much quicker. They would also have moved aft on the lee hull during the shunts to speed them up. They would also have lifted the forward rudder as soon as the breeze was aft of the beam, something we only did occasionally.

The rest of the race was in pretty much the same vein, apart from us going aground to prove the kick up rudders work and a very short stretch hard on the wind when we sailed higher (and much faster) than a hot 14' dinghy which had started an hour before. We also had a very quick broad reach, definitely the fastest the boat had yet gone, but the GPS had turned itself off, so we've no idea how quick we were.

We finished 5th; might have been third if we hadn't run aground. Elapsed time was 93 minutes; the hot F18 did it in 73, a difference of about 25%. Can we find another 25%? With ease! A more active crew, optimised sails and controls, and better tactics would easily supply the deficit.

Improvements

We then did some thinking and decided that, if we fitted trapezes, the boat could be a metre or so narrower, which would make downwind shunting faster. This would make it 3m wide. For the loss of another 500mm, we could also make it in one piece, saving a lot of weight, cost and complexity. The next day we tried it untelescoped. Rigging was easier and it felt much easier to sail, according to Mark on the tillers. It was certainly much easier to fly a hull, which we did with gay abandon until we got over confident and capsized. We were unable to right it; due mainly to water in the pocket luffs, so we tossed out the anchor, removed the sails from the masts (another reason for a track on the masts) and easily flipped it back up. We were about to start paddling in when the police boat came and offered us a tow. Interestingly, with a beam wind, no sails and only one rudder down, the boat was moving very nicely at right angles to the breeze, we could have blown/'sailed' ashore.

Further thought led to the idea of a seat outside the windward hull. Along with a righting pole system, these mods will be made in the next few weeks and we will try again.

The boat is a rocket, very easily sailed and controlled and quick to rig/derig. We now need to fine tune the controls, try different widths and options and learn how to sail it fast.

How did the schooner rig work? Extremely well, at this stage of the game. Shunting is very easy, we can luff the boat head to wind until it stops, then pull the foresail to windward, bear away with the rudders and go sailing. With the Easyrig, this would not be possible after about 25 degrees from head to wind. The schooner seems to go upwind well (need some serious windward work to test this) although how much of this is due to the near rectangularity of the sails, I don't know. Our sails/rigs looked awful compared to all the other boats, we need to get the sailmaker involved in the fine tuning of masts, booms and sails asap. Having said this, the masts flex nicely and seem to have very low drag when the tops are feathered. Once we decide how wide to make it, we can look at fine-tuning the bend characteristics. We are producing a mast in an afternoon now, so this is no big deal.

The steering also works very well, as long as you hold on or sit inboard during any violent course changes. This is a good idea as a matter of course, as the boat accelerates in the slightest puff.

The boat sails nose down when pressed, but this does not affect the handling. The bow shape rises through any waves with ease. Can't wait to try it downwind in big seas/breeze.

The fishnet trampoline is a pain to rig and keep tight. Lots of options to explore here, but all that happens is wet feet, so this is not urgent. The triangular beams are great, deflecting water downwards, although at speed it is still a wet ride.

We did not try the kite, although I think I have now figured out how it can be flown, after a week's practise on a leadmine.

Is it a Tornado beater? Not yet, but it certainly has the potential to be. Is it fun? Absolutely, with far less stress on the sailors than Tornado racing.

Rob Denney

Sandwich maker goes sailing too!

Michele Balharry

Yes, I did eventually get a short sail after various combinations of Rob, Mark, Bain and our friend Tim, took turns to zoom around the harbour on the *Elementarry*. They *were* very appreciative of my sandwiches and I *was* taking photos so I felt content watching their obvious joy. The wait was worth every bit of buttered sliced bread.

Mark (captain and husband, in that order) and I on board, we quickly left the shore. Mark on the sheets near the leeward hull and me sitting at the 'rear end' (as in the end furthest from where we were headed) of the windward hull holding a tiller in each hand. Now you will appreciate that I am no sailor. Floating around the river on my self-made Bolger designed sailing dingy doesn't count for much although it has given me the beginnings of understanding about the wind - water - boat relationships required by a sailing person. Besides, I had full faith in Capt. M.

Two rudders make this boat very manoeuvrable, especially when you don't know what you're doing - o.k. when *I* didn't know what *I* was doing - so following clear instruction I held the fore rudder parallel to the hull and steered with the rear rudder. Easy. Whilst the beam obscured my view of the fore rudder somewhat it was possible to feel when the rudder was parallel and not fighting the water. Along we went.

Capt. M. on the sheets was controlling the speed we were going…hmm, straight towards the rock wall and a lot faster than my dear dinghy could ever dream of going. I'll admit that my faith in Capt. was about to waver as the wall got a lot closer before he began to do something with the sheets (I'll get to understand that next time), and said "we're about to shunt, get ready to turn the rudders". I did so immediately, which was too soon - better to wait until the boat slows down, that way Capt. doesn't get drenched and fall over on the tramp as the boat virtually stops dead and the rudders make a 'noise'.

Next time I was ready. Capt did his thing to the sheets. Boat slowed, I turned the rudders around from where I was sitting by pushing, then pulling with the tillers in a circular motion. Capt. did something to sails and tightened sheets while I slid smoothly-ish along the windward hull to the new 'rear end' all the while grasping the tillers and staying on board. That was it - faster than it took you to read this paragraph - shunt complete and off we sped in the other direction. It really was that quick and easy.

Indeed, we sped across the harbour, faster and faster until up she went, flying a hull. This I was not ready for, and being instantly over excited by my new perspective I steered off the wind and down we came, as in, the boat . . . then me, with a thud and I'm sure I heard a small chuckle from husband. Once I'd collected the tillers and myself, I paid more attention to what I was doing with the rudders. Making Capt. promise not to sheet in harder I was able to manoeuvre the boat until the point of balance shifted and the hull lightened i.e. lifted, but not totally out of the water, not just yet. That excitement I will wait for until next time. And I think I have to do some sit-ups.

A few more shunts around the harbour and Capt and I headed happily to shore. It was someone else's turn to have some damn good fun.

The Wave Rocker

Ken Upton & William Groombridge

Technical Description

Most people think about the sea and waves as something that moves up and down and something that rushes in and out. These observations are correct, but there are many other facts about sea and waves. Two of these are very useful ones; one is the *length* or pitch of the waves, the other is the *moving mass* from the renewable energy passing through them. Things that most people do not know much about or even consider when it comes to extracting renewable energy from wave power.

There are a few types of wave energy machines in the market that use the water rushing in and out of a tube to move the air mass in it. This normally drives a Wells turbine. Others use flotation in various forms using water on a Wells turbine or pumping serpents moving with the waves etc.

When you look at the waves, you may think they are coming in. They are not coming in as such though, it is the effect of the renewable energy passing through the mass of water that in itself is just moving more or less up and down and back and forth in a circle. What moves the water mass are the tides and sea currents, what you see on the shore is the same water, moving at the speed of the tide and currents with the renewable energy passing through the water making the waves. This energy comes from the winds caused by the sun.

The accumulated power the wind drag has built up over the distance it has travelled to get to the shore is released in the breaking waves. That's why there are big waves in the Pacific Ocean and short steep waves in the Mediterranean and very little ones on an outside boating lake. Distance and wind speed drag on the surface determine the wave size, the angle of the shore where it comes in gives the final result.

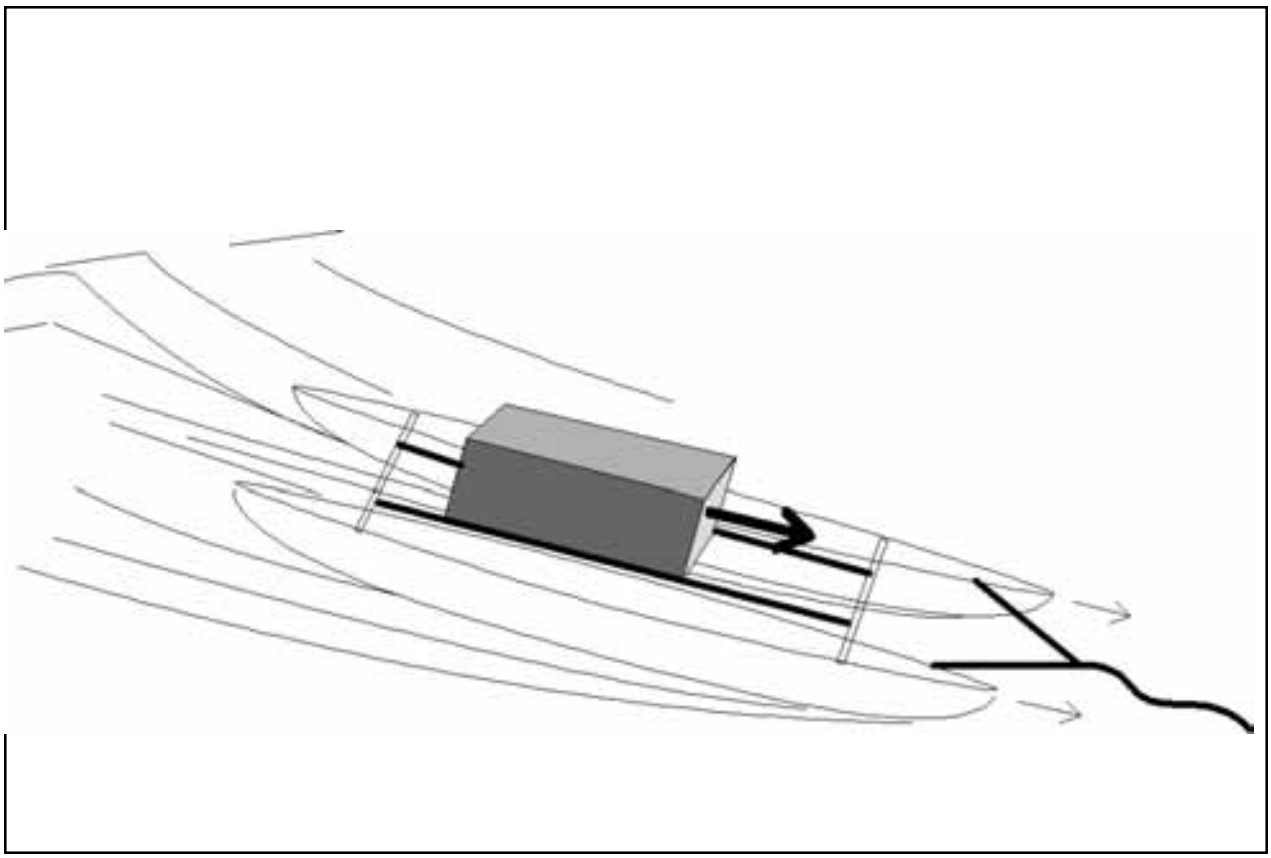
The pitch is the distance between the waves, which makes the basic wave pattern. A craft will change its angle going up the front of an approaching wave until it gets to the crest. The normal angle of the wave face varies between 10º from a wind of 2 m/s and 30º from 10 m/s. That's a good blow if you are a sailor. It can be steeper near the shore just before it breaks.

When the craft is making the effort of going up the wave face, its weight and the water drag hold it back down the sloping face of the wave. Once the craft is at the top, which is more or less the neutral position from all the forces of the wave that wanted to take it with it, being liberated from those forces, it speeds up as it surfs down the other side. This can be exhilarating or very frightening in a small sailboat in a big sea, or in a bigger faster boat in an even bigger sea. Like some folks say when we are very happy and enjoying the ride: "They are riding along on the crest of a wave".

If we anchored a craft or any floating object, it would want to go backwards as it fought its way up to the crest of the oncoming energy force in the wave. At the top, it becomes level and its centre of gravity moves amidships. Going up the wave, the centre of gravity (being above the waterline) moves aft making it "drag its ass "as they say. Which puts up the resistance on the anchor and tackle. Using an elastomeric mooring system the drag effect can be used to give a better and more useful result.

From the sum of these forces, acting on the hull of the craft, Renewable Energy (RE) can be collected and stored up in an elastomeric mooring system. This is like when you use your muscle energy to pull back the rubber on a catapult or a stretched elastic band to ping across the office.

After the craft has fought this energy that was trying to push it back (as much as 70 kW per m^3 average), it then reaches the crest and starts to go down the backside of the wave. The centre of gravity moves forwards, helping to accelerate the craft, and with the help of the collected energy



stored in mooring, the elastomeric effect is released; i.e. "The chain sinks or the nylon rope recovers" in normal moorings. Then the craft starts to move faster down to the trough of the wave pattern, recovering this collected energy as itspeeds up, only to be stopped by the wall of water of the next oncoming wave.

This effect can be amplified by adding vortex drag foils or a special shape to the hulls in the lower stern. To increase the drag factor that can help the collection of this Renewable Energy (RE), a special type elastomeric mooring system is used. When this drag energy is released, the extra speed has an effect on the craft ~ like a truck slamming into a concrete wall or your body on the safety belt when you have to do a emergency stop. Lots and lots of energy that has to go somewhere or be absorbed. This RE can be used in our new revolutionary 4p-wave machine to make a cleaner better world.

For the most beautiful thing about Renewable Energy is that it does not pollute, spoiling our world and mankind's chance of survival. It makes the poor inhabitant of this planet independent of all the powers that wish to be in control and are destroying it with the polluting forms of energy that are having such a devastating effect on our one and only planet and all the life Mother Nature has put on it. And being renewable, it is endless; it will be there and available as long as our world turns.

As the old saying goes: "Money is the root of all evil". Maybe! And perhaps that's why it's so difficult to raise money to invent, research, develop and build machines in this sector for concerned and capable individuals or small organizations like our charity that work in this field.

How foolish is the greed of the happy few in power! Their families as well will suffer alongside all of us, because these poor little rich people mistake their greed for love and understanding for their loved ones and our world. Just this makes our planet collapse, which it will do soon, if we do not change our ways. It is already showing major signs of what is to come! Just look at the world news each day if you doubt my words. In the news headlines every day we see a little of what is happening, and that is just a fraction of what others see and know about. Others who are not so lucky to live where we do, really do have to suffer because of the effects of this ignorance and greed etc etc.

But this article is not about the moral behaviour of our elite few or the ignorant masses that are brain washed by them. So, dear reader, let's go back to the core.

Now you have to think about a wagon on wheels connected to a reciprocating pump. The wagon goes up and down the length of the flat deck of a catamaran boat making the pump work, the piston rod is connected to the wagon and the cylinder end is connected to the bows.

You should now know all the forces that are going to be combined to make a clean, cheap, very powerful Renewable Energy machine. Like you can only make a good meal with common sense and a little bit of love, if you want your loved ones to stay fit and well.

We all know the effect of cargo, something like a large truck, loose in a ship's hull, and the damage it can do, acting like a battering ram topunch a hole in the ship hull, capsizing it or sinking it. Or the old sayings of a loose cannon etc. We all know what the slosh effect is, which in addition could be used to amplify the tilt angles of the craft, just as water ballast trim tanks can be added and used to adjust the sensibility to suit the wave conditions and output RE wanted.

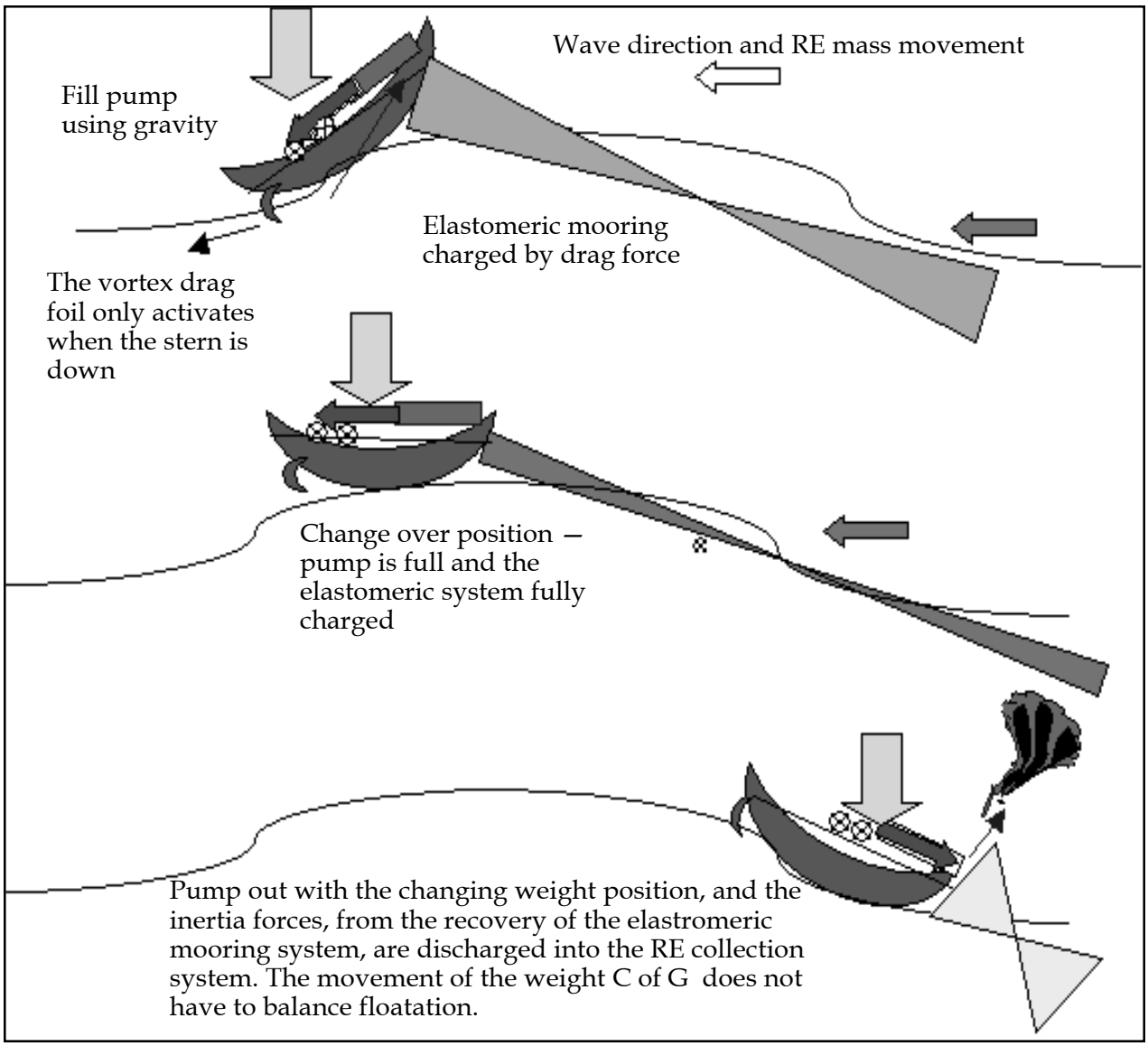
We also all know what is a child's rocking horse or granny's favourite rocking chair and how they move, but do you really know why? Well, they normally have two curved rockers touching the floor. So if we have the hulls of a catamaran made so that they make the same effect on the water, there is never a time it stops moving, because the rider or granny or the waves passing underneath the craft are always changing the centres of gravity & buoyancy. All the free weight can change its position as well, that's why to date, with our simple shoestring R&D, we think a Catamaran type hull the most suitable for this job — "All rock and no roll!"

As the craft (cat) goes upwards on the oncoming wave, the centre of its balance moves towards the stern, making it dig in its backside to resist. This puts a drag force on the hull that is connected to an elastromeric mooring, thus stretching it like it is loading a catapult. Now if there were a weighted wagon on the deck, it would also want to move backwards down the slope of the deck as the bow comes up. just like a car rolling backwards on a hill. To stop the wagon going overboard it is connected to the piston rod of the pump, so with this backward movement it sucks in its input charge. (Or a limit stops it for direct linear electrical generation and safety). This working fluid charge helps to start to balance the craft as the cylinder end of the pump is connected to the bow fills. When the cat gets to the crest of the wave the charging is finished. It then starts to go down the other side of the wave, and the weighted wagon wants to move to the other end where the charge already is, because the centre of gravity is changing. Just like that car on a hill needs no engine to go down the hill. The wagon starts to push out its working charge as it moves towards the bow. Also something else has to move with all this renewable energy that has been collected. The effect of the wagon going forwards levels and speeds up the cat as it goes down the backside of the wave. Helped by all the other collected energy that is being discharged from the elastic mooring system, which is now getting back to its unstressed position, as there is no drag load. When the cat reaches the trough between of the wave pattern, it then wants to dig in its bows. Because most of the weight is now at the wrong end to go up the coming wave, the digging of the bows into the oncoming wave will stop the speeding cat. The weighted wagon, which is still free to move in forward direction with the inertia forces acting on it, move the rod and the piston that is pushing into cylinder, giving the final compression force on the rest of the working fluid charge to empty the cylinder. Or make a super charge surge of linear renewable electrical energy (LREE.)

The renewable energy output then can be used to do many useful things. Like driving a hydraulic motor connected to a generator to make electricity, pump seawater out of dykes, or make fresh water from the sea through a reverse osmosis system powered by the waves, while at the same time this fresh water made on board can all be piped from the craft to where it's needed by this real positive power the catamaran is floating in. Different pumping and linear generation systems etc. can be in the hulls and on numerous decks in the craft if required. The practical size of the craft would be to suit the sea site, where it was stationed.

In the oceans the distance between wave crest is about 80 - 100 metres. So a craft of 30-50 m long could be used with very heavy wagons moving the pumps etc. Being a boat it self-adjusts to the water level and can be moved to where you need it. This makes it also ideal for emergency use. Besides, it can easily be serviced by taking it back to port or out of the waves in the lee of a breakwater.

This new renewable energy principle and type of machine, which is now working in experimental forms, when fully developed, will give us all a little more hope! Hope for a cleaner and more efficient world. It is probably the most effective way to use the positive energy of blowing wind anywhere it makes a wave.



Technical footnote:

All foils extracting renewable energy work on the same dynamic principle. The power ratio comes from the density of the fluid flow they are working in and the angle of attack of the foil to the flow. Forward facing wind turbines can never work in the higher angles of attack where they can extract the much higher work values. The stresses are too great and bend the blades, plus there are very high shock loads from the pressure difference as the blades pass the support tower. These bending moments, huge loads and stresses cause fatigue that will destroy the blades if they extracting energy from the best part of the dynamic power scale.

Water has 800 times more density than air Therefore it has 800 times more potential for renewable energy extraction for the same working size of foil, plus the added advantage of more constant forces in rivers and tides. Gravity, which is constant, moves rivers, and the external forces from the Moon, also constant, make the tides. The wind blows when it wants to and is also the weakest force to use in the power scale of fluid dynamic natural forces for the collection of usable energy. Water power is much better.

[Ken Upton and William Groombridge work for 4P, a small ecological charity based at Marina Alta, Alicante, Spain. AYRS understands 4P has patents pending on the priciples of using wave slope and wave-motion-generated inertia to make energy. Potential manufacturers should expect to pay 4P a reasonable sum for licensing. After all, they are *a charity (and the fee is probably tax-deductable). Ed.]*

The Power Alternating Sailing (PAS) Principle and the Mill-Prop Principle;

A critique of "Downwind as fast as you like", plus new examples

Peter Sharp

In his article, "Downwind as fast as you like", Catalyst 19, Jan. 2005, John C. Wilson offers a principle to explain sailing down wind faster than the wind (DWFTTW). He begins by stating that no one has offered a unifying principle to explain sailing DWFTTW. His assertion is incorrect. The Power Alternating Sailing (PAS) Principle, which I invented (Catalyst 3, Jan. 2001), and the Mill-Prop Principle, which I discovered (Catalyst 13, July 2003) are sufficient to explain all craft capable, in theory, of sailing directly DWFTTW (and other craft as well, and other directions as well). I will use them to critique Mr. Wilson's "new" principle for sailing DWFTTW.

For the purposes of this discussion, I should mention the following:

1) There are three basic sailing media: gases, liquids, and solid-surfaces (or the equivalent). These may be combined into 18 pairs which represent the media contexts of sailing: 9 pairs where the "top" medium is moving while the "bottom" medium is stationary, plus 9 pairs vice versa.

2) I define Sailing as: *Craft propulsion by extraction of energy from the relative motion between two material media (external to the craft) by interacting with both media simultaneously. The material media must have indefinite extension, and the media flow must be essentially continuous (like the wind) rather than essentially oscillatory (like passing waves).*

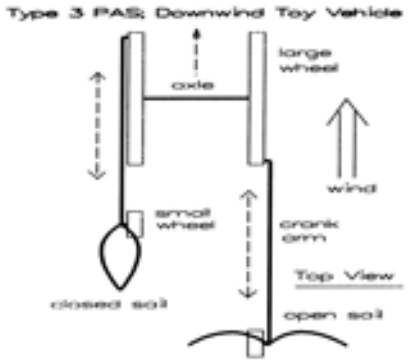
3) Sailing craft may make use of additional forms of propulsion or locomotion that are not strictly sailing, such as drifting, coasting, gliding, soaring, and dynamic soaring. But only craft that satisfy the definition of sailing are sailing craft.

4) There are four fundamental principles of sailing: Direct Sailing (a sail, kite, or kite-sail produces thrust directly in conjunction with a lateral resistance device — or not, as when sailing directly downwind), Mill-Sail Sailing (a mill powers a device that creates thrust like a sail), Mill-Prop Sailing (a mill in contact with one medium directly powers a prop in contact with another medium), and PAS (the primary energy conversion devices move aft or slow down when "on", and move forward especially rapidly when "off").

5) At present, PAS includes five major subdivisions (techniques): Regenerative Sailing (short-term energy storage), Drag Resailing, Lift Resailing, Rewindmilling, and Rekiting. (These techniques are more fundamental than, and replace, the "Types" described in my original PAS article.) The prefix "Re" is from "regress", meaning "to move aft".

Wilson's Premise

Mr. Wilson states that my PAS examples "may seem unconvincing" because they are difficult to analyze, and he finds them difficult to analyze because they use electricity or rubber bands. Mr. Wilson's statement implies that he was distracted by the specifics of my examples and missed their point, which was to illustrate basic physical principles for how to sail either upwind or downwind, or both, faster than the wind, not to engineer specific craft. The specific mechanisms are arbitrary. For example, the twin craft concept illustrates that two sailing craft, if efficient enough, could work together as a team to power each other so as to achieve speeds in any direction in excess of what either could achieve alone, and faster than the wind on average. The energy storage concept illustrates that an efficient enough sailing craft which stores energy can achieve speeds higher than it could achieve otherwise, and potentially faster than the wind on average.

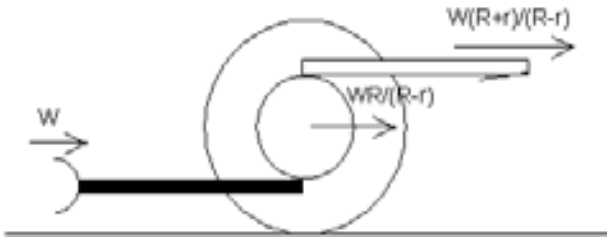


Mr. Wilson's "New" Principle

Since Mr. Wilson considers my PAS examples to be "unconvincing", he proposes a "new" principle to explain sailing DWFTTW. He illustrates his "new" principle in his Fig. 6. Astonishingly, his "new" principle is my PAS Drag Resailing technique that I presented five years ago in my original PAS article. See my drawing "Type 3 PAS: Downwind Toy Vehicle". My drawing shows two drag sails that alternately oscillate fore and aft, to oscillate connecting rods that crank two large wheels fixed to the same axle. The propulsive drag (thrust) of the drag sails pushes the wheels, and the wheels in turn provide the power to oscillate the sails. As a result, the sails move aft relative to the large wheels when the sails are "on", and forward faster than the large wheels when "off". Since the large wheels have a larger radius than the crank pins' radius, the large wheels force the "on" sails against the wind.

Mr. Wilson's Fig. 6, his key drawing, which is intended to illustrate his "new" principle, is merely a schematic version of my drawing. Same concept. My PAS Drag Resailing technique may be implemented using other mechanisms as well.

My drawing "Mechanical Analogue of Bauer Vehicle" in my PAS article, and my drawing "Mill-Prop Craft (Solid Surface / Solid Surface)" in my Mill-Prop article, which are essentially the same drawing, both illustrate how a ruler can be used to propel a vehicle with different diameter wheels faster than the ruler, as shown in Wilson's Fig. 6. The difference is that the rulers in my drawings are treated as the moving, propulsive medium — rather than as a crank mechanism as in my downwind toy vehicle — so the vehicles are Mill-Prop craft rather than PAS Drag Resailing craft. The addition of drag sails, and means to oscillate them, converts a (solid-surface/solid-surface) Mill-Prop craft into PAS Drag Resailing craft. It is important to note that PAS



Wilson's Fig. 6 Inchworm: end of pushing phase.

designs often use complete or partial Mill-Prop craft as sub-units.

Mr. Wilson states his "new" principle as follows: To sail DWFTTW: "...part or all of the propulsion mechanism must be going less than the speed of the wind, at least part of the time. Of course, it must not always be the same part, or else not all the time: otherwise that part will get left behind. Therefore, the mechanism has to be oscillatory in some way."

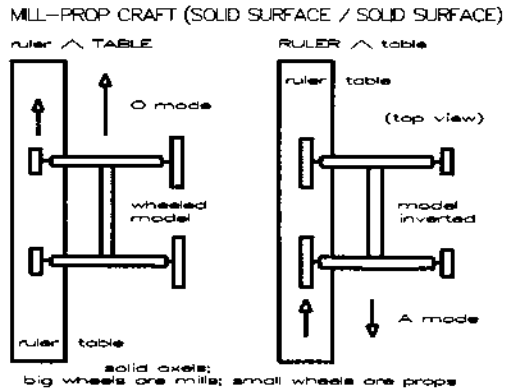
First of all, that is not true for Bauer craft, which can sail DWFTTW with no parts moving slower than the speed of the wind. So his "new" principle fails as a universal explanation of sailing DWFTTW.

Second, my Power Alternating Sailing (PAS) Principle, by definition, implies that the mechanisms must be oscillatory in some way.

Third, his statement of his "new" principle is technically incorrect even for PAS. For example, it would not apply to a land yacht broad reaching at a Vmg downwind greater than the wind speed, while storing energy, and then turning directly downwind to use its stored energy to further increase its Vmg to many times the wind speed. The vehicle could use one of its wheels to generate and store the energy in one of various ways. No part of the vehicle need move at less than the speed of the wind, at any time, while broad reaching or while sailing directly DWFTTW. So his "new" principle fails again.

The PAS Principle

To state the PAS Principle, it helps to use of a concept called "the average location" of the craft as a whole. The average location is, under steady state conditions, equivalent to an imaginary point moving at the average speed of the craft as a whole. Therefore: PAS craft make use of one, two or more primary energy conversion devices (such as drag sails, lift sails, kites, kite-sails, or windmills) which oscillate fore and aft relative to the average location of the craft (such devices move aft when "on", and



ahead when "off"); or, when storing energy, the craft as a whole moves aft relative to where it would otherwise be (it slows down). That statement applies to all of the five PAS techniques, and it is not in conflict with the Mill-Prop Principle.

PAS craft also make use of lateral resistance devices. When advancing against or with the moving medium, some require additional resistance devices in the stationary medium to stabilize the "on" primary energy conversion devices in the moving medium.

The reason for oscillating the primary energy conversion devices is to maximize their power or thrust when "on", to minimize their retarding drag when "on", and to minimize their retarding drag when "off" and advancing especially rapidly. The advantage of PAS is its potential for higher speeds and/or higher average speeds. The disadvantages of PAS are the complexity and inertia of the energy conversion devices. In general, although not in all cases, the four fundamental principles of sailing (in the order listed above) are characterized by increasing degrees of complexity and versatility.

A comment on the PAS Regenerative Sailing (short term energy storage) technique is in order. The stored energy can be used to head directly upwind, or downwind, faster than otherwise. When reaching under varying wind conditions, the stored energy can be stored during strong winds and expended during weak winds so as to increase the average speed of the craft. The stored energy can also be used operate onboard devices.

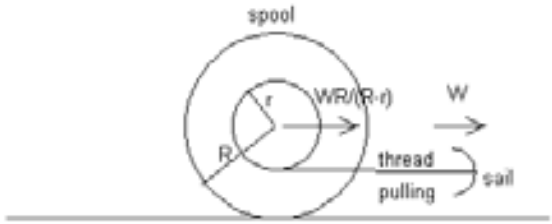
Wilson's Fig. 1

It is important to note that Mr. Wilson's Fig. 1 (a spool of thread moving faster than the thread that pulls it) shows a partial Mill-Prop craft (not a complete Mill-Prop craft). The thread can wind up only so far onto the spool, thus limiting the distance the spool can travel. That is why the spool is only a partial Mill-Prop craft and not a true sailing craft. (Many PAS craft would incorporate partial or complete Mill-Prop craft as sub-units.)

I believe the first example of a partial Mill-Prop craft propelled by wind was Theo Schmidt's model boat that was pulled DWFTTW for a limited distance by a kite (AYRS 100). It should be possible for kite buggies to briefly accelerate to very high speeds by using an onboard spool, powered by one of the wheels, to wind in the kite lines very rapidly. Such a kite buggy would be a Direct Sailing craft combined with a partial Mill-Prop craft.

Unfortunately, Mr. Wilson abandons the spool of thread concept instead of modifying it to make it a complete Mill-Prop craft. To make it a complete (true) Mill-Prop craft, it must be able to travel an indefinite distance, without an inherent theoretical limit. That could be easily achieved. For example, just loop a continuous string once around the spool so that the string crosses itself at the bottom of the spool. Then tie a small weight to the trailing end of the string, thus giving the string traction around the spool when the string is pulled taught. Finally, extend the string an indefinite length ahead of the spool. The spool could then travel an indefinite distance, and it would be a complete Mill-Prop craft, a true sailing craft. It would then be able to sail continuously "down string faster than the string".

Note carefully that the spool takes its energy from the string but takes its power from the ground. That insightful distinction was made by Victor Korepanov when discussing Bauer vehicles ("Four Times Faster than The Wind", Catalyst 18, Oct. 2004). The distinction applies to all Mill-Prop craft where the mill-medium is regarded as the stationary medium. (It would not apply to a Bauer vehicle on a conveyor belt since the moving belt is the source of both energy and power.) Note that the improved spool would be a true model sailing craft in its own right, not just an analogy. That is because sailing is possible without wind or even air. The fundamental principles remain the same even when applied to a craft that extracts energy from the relative motion of two solid-surfaces (a string may function as the equivalent of a solid-surface).



Wilson's Fig. 1. Spool-of-thread analogy

The speed of the improved spool would probably be less than 4 times the speed of the string due to friction, no matter what gear ratio were used (the relative lengths Wilson's "R" and "r"). This estimate is based on Theo Schmidt's results for a Mill-Prop craft sandwiched between two planes (AYRS 100). It too used a wheel-mill to rotate a wheel-prop, and its design was quite efficient. As "mills" and "props", wheels can be more efficient than turbines and propellers, and propellers are usually much more efficient than turbines.

The Mill-Prop Principle

Mills include windmills (gas turbines), water-mills (liquid turbines), and wheel-mills (a wheel, or an equivalent device such as a passively oscillating [side to side] skate-mill, whose drag is used to generate power). Wheel-mills work on solid-surfaces or the equivalent, such as ground, ice, or strings. Props include gas (air) propellers, liquid (water) propellers, and wheel-props (driven wheels or equivalent devices such as active skate-props). By definition, mills always interact with the mill-medium, and props always interact with the prop-medium.

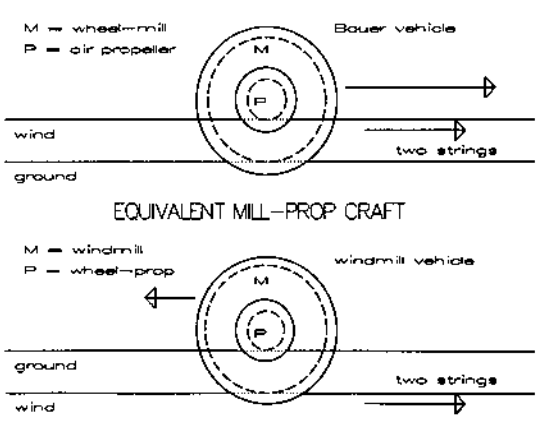
A Bauer vehicle uses a wheel-mill and an air-prop, so its mill-medium is the ground and its prop medium is the air (blowing or not). A windmill vehicle uses a windmill and a wheel-prop, so its mill-medium is the air (blowing or not) and its prop-medium is the ground. Both a model windmill vehicle and a model Bauer vehicle could function normally if placed on a moving conveyor belt in a windless room. The Bauer vehicle could move against the direction of the belt faster than the belt (and has actually done so). The windmill vehicle could easily outrun the belt (by using the relative wind). A Bauer vehicle outdoors takes its power from the "relative moving ground" — but its energy from the wind — just as a windmill vehicle on a conveyor belt would take its power from the relative moving air (wind) — but its energy from the belt.

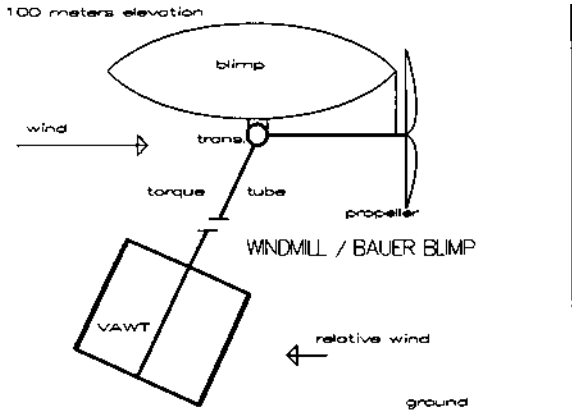
If we ignore the manner in which they are supported against gravity, and ignore whether or not they make use of a lateral resistance device, all Mill-Prop craft work alike. They are all, in principle, the same abstract craft. The mill (in or on one medium) directly powers the prop (in or on the other medium) — regardless of which medium is actually moving— and the craft can sail directly against its mill-medium. When sailing against its mill-medium, the mill-medium is usually the faster medium relative to the craft. Mill-Prop craft, like other sailing craft, are "blind". They sense only the relative motion between their two material media used for sailing. They cannot "tell" which medium is actually moving. They do not "care".

In my drawing, "Equivalent Mill-Prop Craft", I show two images of the same combined spool — a small spool (P, the prop) fixed to a large spool (M, the mill). The mill (M) always rotates the prop (P). The combined spool rides on two strings. In the top sketch, the spool combination moves to the right faster than the top string while the bottom string is stationary. In the bottom sketch, the spool combination moves to the left against the direction of the bottom string while the top string is stationary. With minor modifications, it is possible to construct a working model of such a sailing vehicle.

The string in contact with M is the mill-medium. The string in contact with P is the prop-medium. This combined spool is a complete Mill-Prop sailing craft in its own right. It is also analogous to a Bauer vehicle and to a windmill vehicle, respectively, outdoors in the wind. It shows that Bauer vehicles and windmill vehicles are, in principle, the same abstract craft. In both cases, the mill in one medium, rotates the prop in another medium. It is only when the abstract craft (the Platonic ideal) must exist in the real world that it must take on specific forms for its mill and its prop — such as a windmill to interact with wind, and a wheel-prop to interact with the ground or a string.

To understand the difference between a Mill-Prop craft and a PAS Drag Resailing craft, compare my drawing with Wilson's Fig. 6 (my Drag Resailing technique). Note that in a windless room, the spool shown in his Fig. 6 could advance against the





direction of a moving conveyor belt faster than the belt — if the craft were efficient enough. In that case, the belt would be the moving medium, and the sails would function only as a crude propeller since there would be no wind. It would work like a Bauer vehicle except for the additional oscillations.

Even in a true wind it is possible to combine a windmill craft and a Bauer craft into the exact same craft so as to illustrate that they must be based on the same principle. See my drawing "Windmill/Bauer Blimp". The craft consists of a blimp with a propeller at the bow (but with no tail fins since they would turn the blimp into the wind), and a vertical axis wind turbine (VAWT) suspended far below (100 meters), near the ground (or water). The VAWT is suspended by a very long and light torque tube that is connected to the propeller shaft using a type of universal joint that permits the torque tube to swing fore and aft from the transmission without pitching the blimp. The VAWT powers the air propeller. Since the blimp is powered by a windmill, it is a windmill craft. Since the blimp uses a propeller to outrun the wind, it is a Bauer air propeller craft.

Due to the wind gradient, the drifting blimp would pull the VAWT along faster than the wind near the ground (or water). So the VAWT would experience a relative wind from ahead. The VAWT could convert that relative wind into power to rotate the blimp's propeller. That would enable the blimp to sail a little faster directly downwind than the true wind around the blimp. Since this craft is, simultaneously, both a windmill craft and a Bauer air propeller craft, it demonstrates that both types of craft must be based on the same fundamental principle of sailing, the Mill-Prop Principle. Note that if the true wind is used as the frame of reference, the blimp may be seen to be sailing directly upwind rather like a (upside down) windmill boat.

The Mill-Prop Principle may be stated as follows: "A Mill-Prop craft is powered by a mill interacting with one material medium to directly power a prop interacting with another material medium." It does not matter which medium is the moving medium as long as the movement is in the correct direction. When moving laterally relative to the mill medium, the craft will usually require an additional lateral resistance device in the prop medium.

Since all Mill-Prop craft are based on the same principle, it should be possible to formulate a single, generalized, mathematical statement to describe all Mill-Prop craft, based on their mills and props in general (not on their specific mills and props, such as windmills or water propellers), and on their mill-medium and their prop-medium in general (not on their specific media, such as wind or ground).

Jon Howes has mathematically described a Bauer vehicle on a conveyor belt (Catalyst 12, April 2003). The special advantage of his description is that it focuses on the wheel-mill as providing power and makes no reference to wind. It should therefore be possible to generalize the definitions of his terms so that his mathematical statement will describe any Mill-Prop craft sailing directly against its mill-medium (not just the Bauer vehicle). His generalized terms would then be defined as follows: Vw = speed of the mill-medium; v = increment by which the mill-medium is exceeded; F = drag on the mill; T = thrust of the prop; n = efficiency of the drive train and prop; and P = power in or out of the system. So, we now have a verbal and a mathematical statement of the Mill-Prop Principle.

Wilson's Figs. 6 and 7

As mentioned, Mr. Wilson's Fig. 6 is equivalent to my drawing of the "Downwind Toy Vehicle" in my PAS article. Therefore, Mr. Wilson's Fig. 6 may be described as an abstract approximation of one of the many versions of the PAS Drag Resailing technique — wherein two or more drag sails oscillate fore and aft by using the propulsive drag of the "on" sail both to propel the body of the craft and to advance the "off" sail faster than the body of the craft. Then the cycle reverses and repeats.

My drawing of the "Drag Resail Land Yacht" is from my 2003 entry for the Hogg Prize. (My 100 page entry was too long to publish, but copies were made available to AYRS members by our editor, Simon Fishwick. My book will update and expand that material and make it more widely available.) My drawing is merely an improved version of my "Downwind Toy Vehicle". Two circulating belts are mounted on pulley wheels fixed to the ground wheels and to the axle, outboard of the wheels. (The pulley wheels have a smaller radius than the ground wheels so that the ground wheels can force the pulley wheels to rotate.) The belts serve to increase the stroke length and cycle time of two oscillating drag sails so as to increase the efficiency and speed of the vehicle.

This vehicle is counterintuitive. Note that the push rod of the "on" sail would push against the bottom of the belt which is moving aft relative to the craft. And the "off" drag sail would be pulled forward by the top of the belt. To understand this vehicle, it helps to focus on the "on" drag sail and to regard the rest of the vehicle as a step-up transmission to propel the body of the vehicle (and the "off" drag sail) faster than the "on" drag sail.

Drag Resailing Boats

For PAS Drag Resailing boats, a similar mechanism using a paddle wheel instead of ground wheels would work, although a simpler alternative is shown in my drawing "Drag Resail Catamaran with Double Ended Paddle". The paddle is like a kayak paddle where one blade or the other dips into the water while the paddle shaft oscillates. The paddle blade in the water serves as a fulcrum (and temporary sea anchor). The "on" (open) drag sail next to it serves as the point of effort. And the boat serves as the point of resistance. When the advancing "off" drag sail exceeds the speed of the wind, it folds back into an aerodynamic shape to minimize its aerodynamic drag.

If the "on" drag sail is half way between the paddle in the water and the boat, the boat must move downwind at about twice the speed of the "on" drag sail. If the sail moves downwind at more than half of the speed of the wind, the boat will sail DWFTTW. Mounting the sails closer to their paddles will decrease the true speed of the "on" sail, will increase the propulsive drag of the "on" sail, and will increase the speed of the boat — until the retarding drag forces equal the thrust of the "on" drag sails. It is important to note that the paddle in the water does not create a retarding hydrodynamic drag to slow the boat. Nor does it function as a paddle to propel the boat. It serves only as a temporary sea anchor and fulcrum. (I have invented additional ways to reduce the hydrodynamic drag of both PAS boats and Mill-Prop boats so as to enable them to sail DWFTTW.) Conceptually, the double ended paddle may also be regarded as an oscillating, passive "paddle wheel".

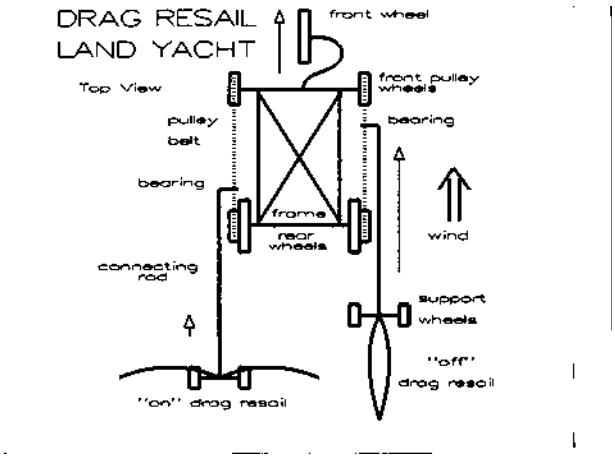
Rewindmilling Boats

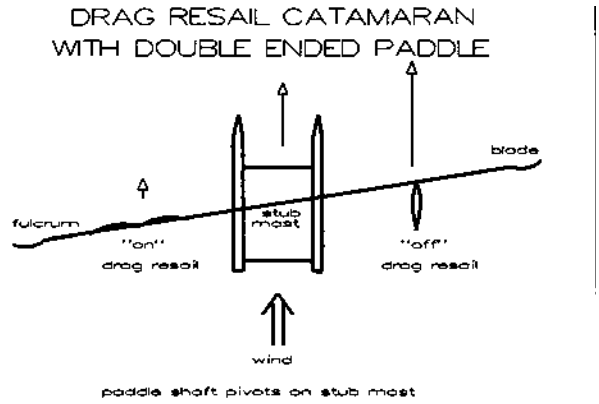
The same sort of oscillating double ended paddle could be used to oscillate two VAWT. A blade (not shown in the drawing) would be lowered into the water below the "on" VAWT to serve as a temporary sea anchor. The blade would be perpendicular to the direction of travel of the boat. The boat would also use a conventional lateral resistance device. The "on" VAWT would propel the boat by means of a drive belt to the boat's propeller shaft. At the end of its "stroke", the "on" VAWT would be turned "off" (feathered) to reduce its drag, and the opposite VAWT would be turned "on".

When reaching, the VAWT blades could be converted into wingsails to increase the speed of the craft. Since the VAWT provide power, the craft could be a hovercraft with a centerboard and rudder. In principle, this Rewindmilling craft would be capable of sailing in any direction faster than the wind.

Wilson's Concluding Remarks

In his concluding remarks, Mr. Wilson gives examples of craft he believes would be similar in principle to his Fig. 6 (my PAS Drag Resailing technique). The first is a land/ice yacht that sails downwind on a broad reach and then turns to coast





directly downwind. It would briefly exceed the speed of the wind while slowing down. Mr. Wilson suggests it is related to his Fig. 6. It is not. It is merely an ice yacht coasting directly downwind.

All sailing craft coast at some time, so coasting does not define their principle of operation. It is true that the acceleration of the ice yacht stores kinetic energy in the mass of the ice yacht, and that the energy is dissipated during coasting. But that is true for all sailing craft, so it is not definitive. It is not, for example, equivalent to PAS Regenerative Sailing (short term energy storage) wherein a land yacht, after using one of its wheels to generate and store energy in an energy accumulator while broad reaching, could turn directly downwind and then accelerate (rather than coast).

Also in his concluding remarks, Mr. Wilson proposes the use of a vertical axis wind turbine (VAWT) to sail DWFTTW since the blades on the side moving against the wind could be moving downwind slower than the wind, even if the VAWT as a whole were moving DWFTTW. That would not work. The VAWT would simply run out of wind as it approached the speed of the wind. What would work is a vertical axis propeller. But then the craft would be a Bauer craft, which uses the Mill-Prop Principle, not the PAS Principle (Drag Resailing) as in Mr. Wilson's Fig. 6.

Mr. Wilson also suggests that a paddle wheel turbine on its side with its shaft perpendicular to the wind would work. It would not. As before, it would run out of wind. However, it would be possible to modify a special kind of paddle wheel to sail DWFTTW. It would be rotated by one of the wheels of the vehicle. The vehicle would be another kind of PAS Drag Resailing craft.

Note that if efficient enough, this or other PAS Drag Resailing land yachts, if placed on a moving conveyor belt in a windless room, would be able to advance against the direction of the belt faster than the belt, like a Bauer vehicle. The sails would function as a crude propeller. If the sails were large enough and light enough, they could be efficient. Note that Mill-Prop craft would use paddle wheels as units — as mills or props. But PAS craft could use paddle wheels as a collection of oscillating blades that turn "on" and "off". For example, a Drag Resailing boat could use a conventional paddle wheel in the water as a mill to rotate a modified Janko' paddle wheel with sails in the wind. A Mill-Prop boat could use a conventional paddle wheel as a mill in the water to rotate a conventional air propeller. The key difference between PAS Drag Resailing craft and Mill-Prop craft is that Drag Resailing craft employ some form of "on" and "off" oscillations, whereas Mill-Prop craft do not.

It is important to recognize that the drag sails of a PAS Drag Resailing craft can function simultaneously as sails, a windmill, and a propeller — depending upon the perspective of the analysis. They function to produce power like a windmill, and thrust like a propeller.

Mr. Wilson concludes by strongly insisting that a "Bauer vehicle" does not use the same principle as shown in his Fig. 6, and he believes that some other principle must be involved. That conclusion is correct, but quite obvious. The Bauer vehicle is based on the Mill-Prop Principle, which I have explained in great detail. His Fig. 6 is merely a schematic illustration of one of the many possible ways to implement my PAS Drag Resailing technique.

Regenerative Sailing (short term energy storage)

Since we have two new fundamental principles of sailing to work with, we can use them to evaluate new types of sailing craft. I will briefly mention two examples of new, real-life, sailing craft based on the PAS Principle and the Mill-Prop Principle.

A company called HaveBlue has integrated components from various high technology manufacturers to create two ocean cruising yachts, a monohull and a catamaran, that use a concept they call "Regenerative Sailing". Regenerative Sailing is equivalent to my original PAS Short-Term-Energy-Storage, so I have adopted their term.

Regenerative Sailing eliminates the need for a conventional diesel engine and greatly reduces the amount of diesel fuel carried on board for the back-up generator. The boat's propeller(s) is driven by an electric motor(s) that can function as both a motor and a generator. The propeller functions as both a propeller and a water turbine. During strong winds, the propeller is used as a water turbine to generate electricity, which is then stored on board. Generating electricity reduces the hull speed by about 1.5 knots. During light winds, or no wind, the stored energy is used to propel the boat — at up to 8 knots. Consequently, the average speed of the boat during the voyage can be increased by 0.5 to 1.0 knots, although that depends upon many variables.

The water turbine is capable of providing all of the electricity for lighting, air conditioning, electronics, cooking, water desalinization, and hot showers. Since the energy storage devices are charged and drained in short cycles during the voyage, they function as energy accumulators; they smooth out the flow of available energy. I would say that they "distribute" the available energy over time.

The electric motors are run constantly so that they spin the prop just enough to eliminate its drag. When climbing a wave, the motor/generators help to propel the boat. When gliding down a wave, the motor/generators feed electricity back into the energy accumulator. The result is noticeably smoother sailing.

Regenerative Sailing boats are no longer limited by the amount of fuel they can carry. One of the crews believes that all energy could have been derived from the wind during the voyage. If it is, the sailboat remains a pure sailboat, a PAS boat.

Anders Ansar's "Stripkite"

My second example is actually a prediction based on my Mill-Prop Principle. A long (about 20 meters long, as best I can determine) strip kite has been used to sail directly upwind and directly DWFTTW on ice. The kite is extremely simple. Anders Ansar, the Ice-Wing innovator, developed it. I call his kite, for lack of a better name as yet, an "Ansar stripkite". It is a very long strip of flat plastic material with some stiffness, and with a stiffening rod located at each end, like a batten, that serves as a handle with which to change the pitch of the stripkite. Two ice skaters hold the opposite ends.

For sailing directly upwind, the skaters face into the wind with the stripkite between them, and pitch the stripkite up by twisting the ends. It rises to form an arc. In the process, it pulls the skaters toward each other. The skaters angle their skates so that for each meter they move toward each other, they must move 5 meters forward — until the stripkite peaks in an arc. Then the skaters pitch the stripkite down so that it descends and becomes straight between them again. At the same time, they coast away from each other to take up the slack. By repeating this two stroke cycle, they can sail directly upwind. The kite, when arched, is 30 degrees from vertical, indicating that it has a lift to drag ratio of 2. Mr. Ansar gives no upwind speed ratios.

Sailing DWFTTW is more astonishing. The skaters skate directly downwind until they exceed the speed of the wind. Then they begin repeating the cycles as before, and they continue to sail DWFTTW. Mr. Ansar suggests that the stripkite uses the relative wind from ahead to propel the skaters.

However, a different explanation is needed to explain the stripkite's downwind performance since the existing explanation could lead to perpetual motion machines, which are not possible. In other words, the current explanation implies that, under windless conditions, the skaters could skate forward to create a relative wind and then use that relative wind to propel themselves. That would not be possible since there would be no source of energy (other than the skaters themselves). Sailing requires a relative motion between two material media, such as wind and ice.

I explain the combination of the stripkite and skaters as based on the Mill-Prop Principle.

Specifically, when moving directly upwind, I suggest that they function as a pulsed-power-windmill ice yacht with a coasting recovery stroke. The power stroke is the stripkite's upstroke. I predict that the speed directly upwind will be no more that 0.5 times the speed of wind because the stripkite is functioning as a windmill, and windmill craft typically cannot exceed about 0.5 times the speed of the wind when heading directly upwind.

When they are sailing DWFTTW, I predict that they function as a pulsed-power-Bauer-air-propeller ice yacht with a coasting recovery stroke. Now the power stroke is, I predict, the stripkite's downstroke — even though that is not what Mr. Ansar reports.

In other words, when sailing DWFTTW, the stripkite becomes a flapping wing propeller (like a bird wing) during its downstroke, and the power to flap it comes from the ice as the skaters angle their skates in order to move apart — even though their propulsive energy is ultimately derived from the wind. They work like a Bauer air propeller vehicle where the propeller is powered by a wheel, and the ground is the source of power, even though the energy comes from the wind.

Since we now have an example of a kite that can sail directly upwind as a Mill-Prop windmill craft, let us consider how to construct a PAS Rekite boat that could sail directly upwind faster than the wind, at least in principle.

The boat would use two or more kites that alternately pulled their kite lines downwind. The "on" kite would pull downwind to propel the boat and the "off" kite upwind. The "off" kite would be placed in a low-drag configuration so as to minimize the power consumed when pulling it rapidly upwind in preparation for its next power stroke. The pitch angle of the kites would need to be remotely controlled, perhaps by radio control. The "on" kite line would spin the boat's propeller via a drum and a transmission. A matching drum (below the drum in the drawing) would haul in the lines of the "off" kite. A paddle blade in the water would serve as a temporary sea anchor to resist the downwind pull of the "on" kite, while the other blade was lifted out of the water and advanced to its new position in preparation for the next power stroke. The boat itself would not be retarded by the high downwind drag of the "on" kite.

I hope my comments have helped to clarify the PAS Principle and the Mill-Prop Principle, and to demonstrate that they can explain all craft capable, in theory, of sailing DWFTTW.

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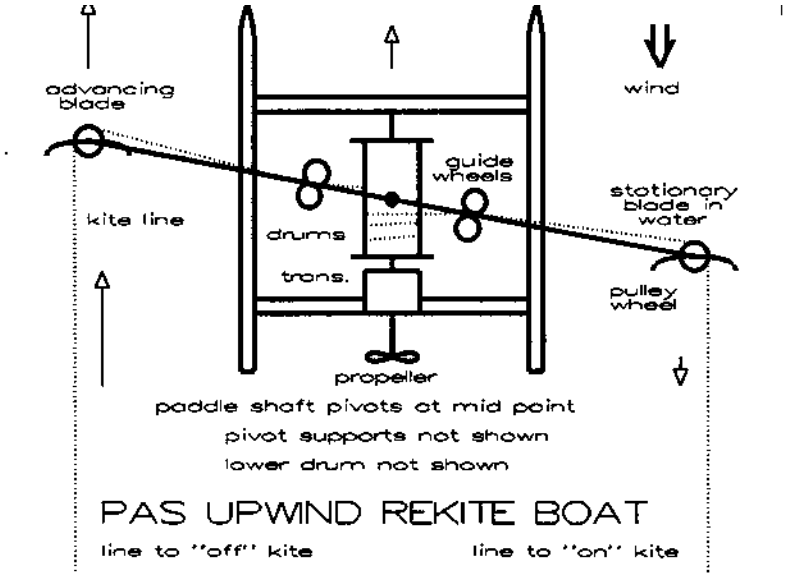
4 February 2005



A Suggestion, and an Offer

Somewhere between 1832 and 1898 a mathematician said the following:
"The time has come," the Walrus said
"To talk of many things:
Of shoes – and ships-…."

So now we might talk a bit again about Down Wind Faster Than The Wind. There has been a plethora of abstruse articles on this, but now it is time, I suggest, that we get on with this project and, using a term with pejorative connotations, form a COMMITTEE! The Committee could be formed of some or all of those individuals who have written articles about this subject since the inception of the Catalyst. The duty of the committee would be two-fold:

1. To outline strictly the test procedures that any DWWFTW machine would have to pass.

2. To sort out all of the developed theoretical data and come up with an actual rough DESIGN that could be turned into a mechanical drawing so that a full sized vehicle could be built.

It appears the vehicle could perhaps best be a wheeled vehicle that could be tested on dry flat land. It would be as small and as light as possible for easy transportation to and from any test site and for ease of construction. As was previously suggested by an interested individual, dry land is the choice test site so as to keep "hull/water" friction out of the equation. Better yet, an abandoned narrow gage railway would be better but wind direction is of course a problem here. I envision something on three bicycle wheels but from then on we need the input from the committee. Further, if we should possibly even get this far, I would volunteer my services to actually DRAW UP a mechanical drawing since I have a straight edge, and compass and dividers and with the blessing of Euclid, I could even add a few more drawing aids, perhaps adding a planimeter, an item to measure degrees, and a graduated scale even though the dividers would suffice here, and maybe even an erasure. The humble design engineer would be grateful to the Committee for rough sketches of any complex design ideas such as variable pitch windmills, etc.

Hopefully, the drawings would be reviewed by the Committee; and adjustments made if necessary so that a final approved set of drawings could result. At that time, we could then start to think about actually constructing the vehicle.

I further SUGGEST that a list of the components be developed and that the Committee farm out parts of the machine to those volunteer individuals who have expertise in fabricating some of the components. For instance, I have at the Toad Hill Boat Shop a lathe (not made in China) with an eleven-inch swing that could be used for turning bearing housings, etc. I also have a halfway decent wood shop that is capable of turning out 17 foot boats (not considering energy input). I envision we members fabricating these parts and sending them to some location in the UK or the western desert of the U.S. for final assembly. Once assembled then, of course, the machine could be turned over to the testing Committee. And this is when the real fun starts! What say ye all? Should we all not get busy? Please hurry as I am running out of steam.

Congratulations on the A.Y.R.S.'s 50th.
Frank Bailey

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**

April

6th AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Office, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: office@ayrs.org

24th Beaulieu Boat Jumble
AYRS will be there on Stand R320/9.

24th BMMA Meeting
Yeovil: Start times will be 10.30. Sailing is free to BMMA members. Non-members are offered the choice of joining the association or paying a £5 sailing fee. Visitors are welcome but please contact Robbie Nevitt on 01963 370058 prior to the event as some venues have restricted access. Directions to the venues are available from Robbie and most are available via the MYA website (www.mya-uk.org.uk) Further information about the BMMA is available by contacting Robbie.

May

16th-20th AYRS sailing meeting
Portland Harbour, Dorset, UK. (Neap tide, going to Springs). Shore location to be confirmed. Contact Bob Downhill, tel: +44 (1323) 644 879 email: icaruswr@tiscali.co.uk

21st BMMA Meeting
Portishead: See above. Contact: Mike Dunkley on 01252 721439 for details

June

5th AYRS Trophy Race
Worthing SC, UK. Open to all kinds of boats, fastest round the course wins. Contact: Charles Magnan, email: crmagnan@yahoo.co.uk

12th BMMA Meeting
Guildford: See above. Contact: Mike Dunkley on 01252 721439 for details

July

2nd BMMA Meeting
Cotswold: See above. Contact: Mike Dunkley on 01252 721439 for details

August

13th BMMA Meeting
Woodley: See above. Contact: Mike Dunkley on 01252 721439 for details

October

8th-14th Weymouth Speedweek
Portland Sailing Academy, Portland Harbour, Dorset UK. Contact: Bob Downhill; tel: +44 (1323) 644 879 email: icaruswr@tiscali.co.uk

12th AYRS Weymouth meeting
Speedsailing. 19.30 for 20.00hrs at the Royal Dorset Yacht Club, Upper Mall, Weymouth. Contact: AYRS Office, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: office@ayrs.org

22nd BMMA Meeting
Gosport: See above. Contact: Mike Dunkley on 01252 721439 for details

November

2nd AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Office, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: office@ayrs.org

December

7th AYRS London meeting
Subject to be confirmed. 19.30 for 20.00hrs at the London Corinthian Sailing Club, Upper Mall, London W6. Contact: AYRS Office, BCM AYRS, London WC1N 3XX; tel: +44 (1727) 862 268; email: office@ayrs.org

AYRS John Hogg Memorial Prize Award 2005

The AYRS announces another award of a £1000 Prize in memory of John Hogg, the distinguished amateur yachting researcher, who died in 2000.

The aim of this international award is to encourage and recognise important amateur contributions to the understanding and development of sailing performance, safety and endurance. Preference will be given to on-going work where the prize money is likely to benefit further development. Other than nominations for a "lifetime achievement" award, the work should have been performed within the last few years. Work that has previously been entered for the John Hogg Prize is not eligible, unless in the intervening period significant advances have been made.

Nominations, whether of oneself or another, should be submitted to the Honorary Secretary, Amateur Yacht Research Society, BCM AYRS, London WC1N 3XX, UK, to arrive by **1st October 2005**. Nominations may be made by or for anyone, whether or not they are a member of AYRS. Those nominating someone else must obtain the written agreement of the nominee .

'Amateur' in this context means primarily work done as a pastime and largely self-funded. Details should be given of any grants or other funding or assistance received. Work carried out as part of normal employment is not eligible, neither is paid-for research where the researcher does not own the results, but subsequent commercial exploitation of research need not debar work carried out originally as a pastime.

Whilst it is not essential that any innovations embodied in the work be demonstrated and "debugged", the work must have some practical application, which should be made clear in the entry.

The submission shall cover the following:-

- A summary, of not more than one page, identifying the nominee and the work submitted, and including a short statement of its merits to justify its submission.
- The description of the work itself, its novelty, its practical application, its degree of success to date, and (briefly) your hopes for the future.
- Submissions must be made in English, in hard copy, to arrive by the due date. FOUR COPIES ARE REQUIRED – one for each of the three judges and one for the Secretary.
- Diagrams, graphs and photographs may be used, video material on VHS PAL videotapes or DVDs can be helpful supporting material. Programs and presentations on disk may be entered as part of a submission. Appendices may be used, e.g. for mathematical workings.
- Entries should be printed on A4/letter paper in a legible font.
- Separately, a brief biography of the nominee(s) should be included, and their amateur status and qualifications should be explained.
- Nominees may care to say how they will use the prize should they win.
- AYRS will wish to publish brief summary accounts of entries, and may also seek further articles from entrants. Grant of permission to publish such articles is a condition of entry. To this end it will be helpful if entries can (if necessary) readily be abridged for publication in *Catalyst,* and if a computer disk copy of the entry is included. However any information received as part of a submission will be treated 'In Confidence' if so marked.

The winner and runners-up will be announced at the London Boat Show in January 2006. All short-listed entrants will receive one year's free membership of AYRS and a certificate; the winner will receive a cheque for £1000. The Judges, whose decision shall be final, will co-opt experts as required to assist their deliberations.

Submission of an entry will be taken as signifying the entrant's acceptance of these rules.

Queries concerning possible entries may be made by phone or e-mail to the AYRS Honorary Secretary on tel/fax +44 (1727) 862 268; e-mail office@ayrs.org.

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

On the Horizon . . .

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