



T10x4: A TriloBoat for the Around in Ten

by Dave Zeiger © 2008

Only a fool would challenge the ocean in a tiny boat, but it is he who sees the Wonders of the Earth. – Frederic Fenger, Alone in the Caribbean (quotation approximate)

Ok. I think we can all agree that a race around the world in ten foot boats is a certifiably Nutso Idea. No responsible person would condone, aid or abet such an irresponsible undertaking. Now that's out of the way, let's sharpen our pencils, pull out a napkin and get to work!

The Rules for a race around the world in a ten foot sail boat (www.AroundInTen.com):

- The boat shall be exactly 10ft long. Any rudders, spars, self-steering gear or other protrusions beyond 10ft must be removable.
- The race will start in the Bahamas in January 2009.
- Anyone can take part, any age-group, male or female and from any country in the world.
- is a single-handed race. Apart from the skipper (Racer), no one else is allowed on-board once the race has started.
- The boat can be self designed and self built or designed by someone else and built by someone else.
- The race is restricted to monohulls (No catamarans or trimarans).

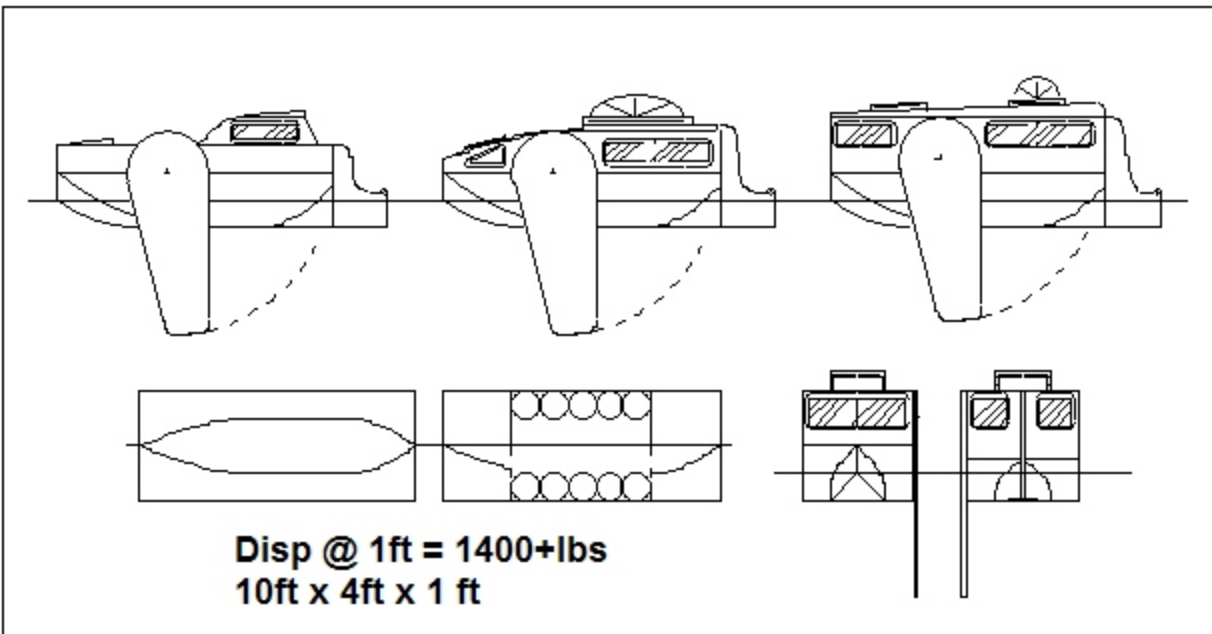
The race will be starting from the Bahamas in early 2009. The route shows the anticipated stopovers for the racers to recuperate and carry out any repairs. The final routing may be subject to changes.

The Hull

Let's start off with a survey of basic requirements:

- *Carrying capacity* – to ‘safely’ carry crew, gear and supplies, our design must tend toward high displacement.
- *Self-righting* – if you're going to round Africa, you'd be better be ready for a tumble or several. In small boats, ‘self-rescuing’ is often considered sufficient (crew can right an overturned boat, from outside the hull), but I think we should insist on full (unassisted) righting, and NOT require the crew to enter the water.
- *Speed*, so-called (I hear the snickers!) -- This *is* a race, after all.

So here's the TriloBoat approach (www.TriloBoats.com):



The hull is essentially a barge, which racks up maximum displacement and interior volume for any given dimensions. Or, from another direction, the beam can be kept slender and draft shallow and still achieve reasonable displacement. A step keel has been added to further increase displacement. Beam could be increased, if necessary, for yet more.

With the wind aft of the beam, a hull of this shape is a toboggan. Upwardly curved planes toward the bow act like skis to lift the bow when running downwind (hull upright), and clear the water when heeled. This will help counteract the forward (rotating downward) thrust of the sails, which will try to ‘drive the bow’ under. As ends of a short boat depress easily, hull form, rig and live ballast will all be working together to keep the bow high.

This means, however, that there will be times when the stern will want to ‘squat’. The fairly abrupt rocker at the stern allows a fair amount of lift at the bow before rolling back and dragging

the transom. The flat bottom, continued along the step keel and continued by the rudder plate will counter excessive aft trim. In the rigging drawings, I've drawn optional trim tabs, which can be set to limit transom drag in extreme conditions.

On the wind, the relatively narrow beam (compared to what other hull forms of the same displacement are able to achieve in 10ft and within 1ft of draft) will reduce wetted surface and drag. The hard, right-angled chines become a V when heeled, add lateral 'bite' and make for improved tracking.

The off-centerboard is long enough to adjust CLR as required. Rake aft for running or lift it clear, as conditions warrant. Down, it's like a high aspect fin keel. They're very light relative most other systems of lateral resistance, and fully compatible with low weight/drag 'chine runners' (see Matt Layden's PARADOX (he's *entering* the AiT, by the way) and other designs).

Several topside arrangements are shown, each having pros and cons:

The high sheer version makes the most of the length, allowing ample headroom for sitting or kneeling on the sole, hanging stowage under the deck and a positive 360° view from below. There is plenty of reserve buoyancy high up to ease rolling the hull to its feet from inside (self-righting). Ten footers off the Cape of Good Hope should *plan* on some ass-over-teakettle. Cons are higher weight (and Center of Gravity), windage and less stability for working on deck.

The medium sheer version addresses some of the weight and a good portion of the windage problems. But view forward from below is through steeply angled material, and the downward slope ends in the water (not as fail-safe). Some of the lost sense-of-volume below might be addressed by the elongated version of a Jester pram hood hatch (won't rotate).

The lowest sheer version (with trunk cabin) has the lowest windage and most stable deck, but gives away a vertical foot of interior volume and, probably, most view from below. It will take the most effort of the three to right.

Hatches should be strong and doggable. I'd consider a double hatch... The upper being watertight, opening to expose a Jester pram hood and mounting. I'd go further, and have an anorak with bungee sewn around the waist hem to snap around the Jester mount, to wear like a kayak spray-skirt while working from the hatch in snotty weather.

Construction in plywood or hex-core laminates (which could pay their way in positive buoyancy and insulation) should be quick, strong and simple. Late entrants could hope to complete the hull in a week or two.

The Interior

I'd make the interior rather minimal and well padded.

The hull is cut away aft and/or forward to open into the step keel, extending the dead-flat to

provide a full length sleeping platform. Consider quick-release seat-belts Xing across the chest, and straight across the hips and thighs for secure sleep in wild conditions.

I've drawn two broad benches. The forward one is a chart table and lid for a strong-box forward for heavy/dangerous gear. Aft is a seat for the con. Water tanks may be built in under the lids and outboard of the step keel.

The circles drawn p&s represent dry-bags, webbed to D-rings along the hull. They can securely stow gear while providing extra padding, and limiting 'throw room' for the crew.

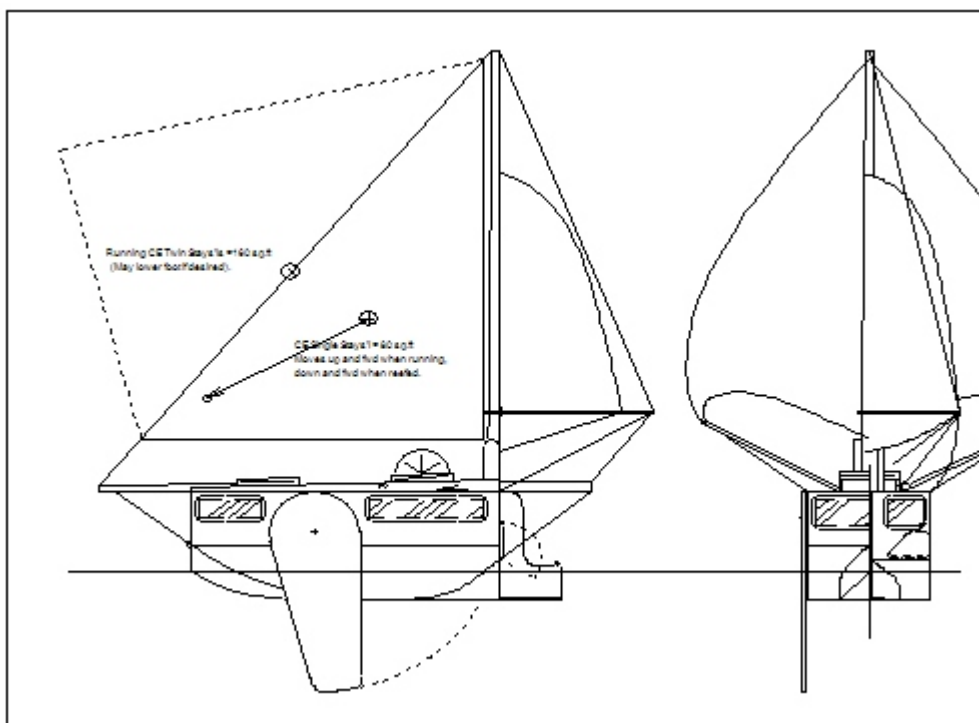
Polycarbonate windows are strong and afford a view from below-decks. Some might have curtains, bungeed along top and bottom (remember Tristram Jones' warning about swaying curtains at sea!) to shut out a view that may, on some days, seem just a little overwhelming.

Ventilation should be more than adequate (don't forget extra if cooking with combustibles!) and inversion proof (e.g., conducted below via a loop of 'dryer hose').

The Rig

I'd look for a light-weight, low windage rig that provides lift while running, requires no sails beyond her working suit, and can be completely handled from the two hatches. On the wish list would be that the mast be easily dropped, to be lashed on deck while lying to sea-anchor in a howling nasty.

So how about that aft Double, Aft Stays'l Rig? Always wanted to try it... no time like the present:



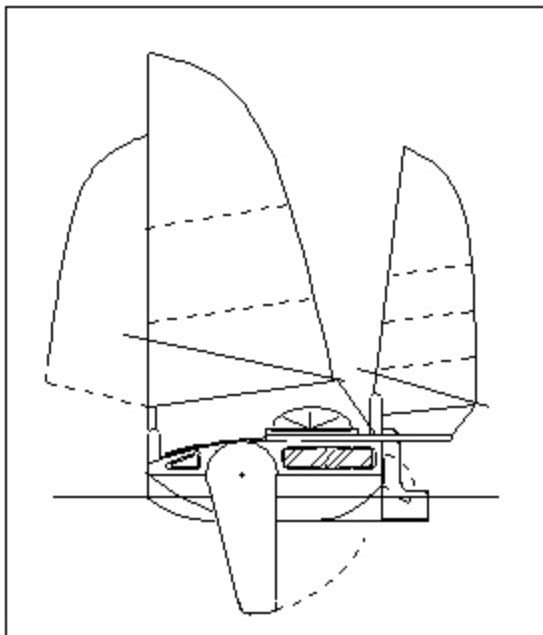
You'll probably notice some funny things in the drawing. Yes, the mast backstay *is* spread by the mizzen boom and swings along with it. The mizzen is used for beating or riding. When running (most of the time), it's to be (double)sheeted amid-ships. While the mast is on the centerline, the sprit and boomkin are not. The stay system isn't optimal, but improves on *no* stay, is easily and quickly dismantled, and keeps the number of parts low by making them wear more hats.

Bowsprit and boomkin are the ends of a spare mast, secured on deck and pressed into service to pay its passage. The tabernacle 'kneels' the mast forward for removal and lashing in case a low profile is desired.

Twin stays'ls, at 80sq.ft each provide lift and drive. Running, they may be wung out by whisker poles. When beating, one may be handed or doubled over, with the sheets handled as one. They should be slab reefed to keep their CEs moving down and forward, maintaining balance against the mizzen (which may be brail reefed along the foot). The flat-cut mizzen is to be fully battened to keep it from flogging when in use as a riding sail. When beating, over-trim to induce weather helm. All sails should be set flying for emergency release and retrieval (stopper the haulyard ends to a point within reach!).

I'll bet this is a fast rig with great lift (the boats I've seen rigged like this look smokin' hot!). The downside is that it's a lot of sail for a puny boat (a reduced version would help), and will require lots of time and attention from the crew. Dropping it will be quick, but messy (and you *know* that the kind of conditions that will make you drop it won't encourage a cuppa something warm while you sort things out).

Here's a little more standard Cat-Yawl:



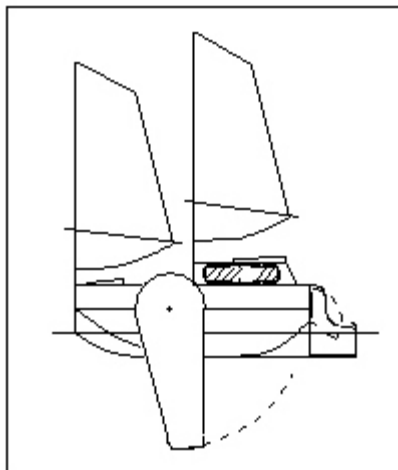
This is a much simpler rig, with minimal control lines. The entire foot of the main can be reached from the hatches for control or reefing.

Lift is transferred forward by the sprit booms (might consider a standard boom aft), which are self-vanging as a bonus (handy for all that running down the trades). The aft sail may be brought forward, for running, to balance the main.

If the area still seems intimidating, triangular sails would reduce total area and lower the Centers of Effort.

The mizzen is a little larger than optimal, allowing it to be moved forward as a running balance to the main (probably set without its sprit-boom). It will balance better with the main when flying aft if it's sailed with a reef in. Reefing the main in this configuration won't change the overall balance.

Last but not least, here's a diminutive Cat-Schooner:



This would be my choice. It follows Sven Yrvind (formerly Lundin)'s preference for very small, easily handled rigs and spars. He's got more experience in this sort of cruising than anyone (at least who's writing about it). The approach is KISS and fail-safe. The ratio of a human's physical strength to the weight of and forces affecting rig components is larger. The rig will tolerate changing conditions over a wider range than most rigs. My guess is that this humble rig, though not as powerful, will keep sailing longer with less wear and tear on the crew than the others I've drawn. Of course, the masts could be lengthened in proportion to one's temerity.

The two equal sails are spread entirely inboard and balance each other from forward when running. Each may be entirely handled from a single hatch. Combined CE is low.

In tight situations, you can sheet the fores'l close and leave the main slack, trimming by hand – close on the wind, broad off of it (fores'l blanketed). Sailing this way lets you sail on any point (with some loss of efficiency, off wind) without a frenzy of line handling.

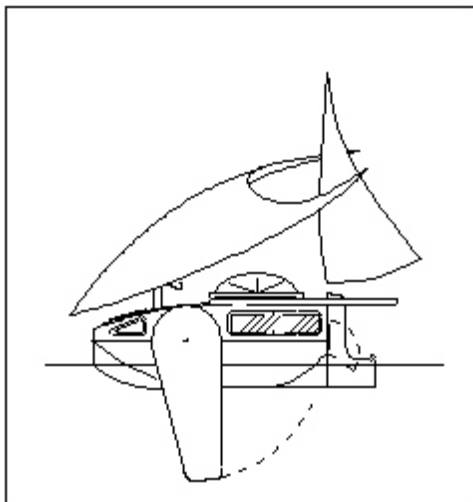
An additional advantage is that you could put these sails anywhere there was a socket to hold them; along the mid-line, or at each of the four corners. For example, running, you might want to post them port and starboard, with a rectangular sail slung between them. Or both to windward, doubling resistance to heeling. It would be easy to carry one spare or even two.

Other sail types could be substituted; full triangular, sprits'ls, Wharram wings'ls, Holopuni quick-rig, or Ljungstroms for starters.

A Note on the Junk Rig:

My usual favorite rig, the Chinese lug, a.k.a. junk rig, is also a contender, but is relatively heavy – utilizing weight to drop sail. I'd certainly consider it for an AiT Racer, but do everything I could to hold weight down, and test it on a completed hull before committing to it. Don't forget a mast-drop test; the batten parrels have to either allow the bundle and yards to fold up close to the mast or be released (not a process for a sharp squall).

And just because Weird Little Boats deserve Weird Little Rigs – a Crab-Yawl?:



A few thoughts for minimal open-ocean cruisers:

- They are only going to make any progress at sea OFF the wind. Beating, aptly named, is nothing that any ocean sailor takes lightly. It's hard on the crew, the boat and progress is painfully slow. I'm guessing that an AiT racer CANNOT beat reliably to windward with any sea running. *This implies that lee shores are to be avoided like plague!* Unless the sea is flat and wind light, I don't see AiTs sailing to windward for any distance or length of time. Consider rigs optimized for off-wind sailing.
- I'd consider a sea-anchor to be essential gear. Lying a-hull will be a hellish, exhausting experience. The hulls will be easy to roll and pitch-pole, so proactive measures should be

taken early to avoid that. The cone system looks like a good candidate, being adjustable for a wide range of conditions, and may also be used as a drogue.

- Longitudinal stability (resistance to depression of the bow or stern) will be slight. Rigs should be chosen with lift in mind, easy reefing (which should be done early), and robust redundancy, with possibilities for improvisation (jury rigging). All maintenance should be manageable from deck level, and preferably from waist-deep in the hatches.
- There are likely to be extended periods when the interiors resemble nothing so much as the ‘tumble dry on cold’ setting, minus the ‘dry’. They should be padded, gear securely stored, and afford the crew a way to ‘strap in’, possibly for days to weeks at a time. While strapped, the crew must be able to manage food/drink in, food/drink out, preferably without saturating the interior from either direction. All surfaces should be easy to wipe-down.
- Cooking facilities must be economical of fuel and weight. Consider a ‘solar oven’, pressure cooker and thermos cooking to conserve fuel. Any fuel which produces vapors (combustibles) must be adequately vented, and supplied with oxygen OVER AND ABOVE crew requirements. Ventilation should be ‘inversion proof’ (shouldn’t allow water flow from any angle).
- Navigation is likely to rely heavily on GPS, as celestial observations are going to be difficult in any kind of sea. Masthead tricolor nav lights will be much more visible than those mounted at or near the decks. Some form of communications equipment is likely to be recommended, if not required. Cabin lighting will be a powerful comfort. Power generation and/or storage will be a consideration.
- Reliable ability to produce fresh water should be considered (reverse osmotic hand-pump or solar still).
- I’m betting that a gumby suit won’t pay its way. Consider ensuring that your vessel has positive buoyancy, the means to patch and bail the hull and a drysuit to see you through exposure situations. Stay with the vessel unless you’re on the rocks.

Philosophy Section (skip if allergic to opinionated BS, assuming you made it this far):

Well, this has been an interesting exercise in design. Tight constraints force one to make the most of every detail, and look for synergies. Discoveries made in the process *may* be useful in wider circles. It is (as if one were required) a rationale for competition.

Do I recommend an attempted circumnavigation in this or any other ten foot boat? No. These are boats that are small for reasons which I find, frankly, frivolous. They lack the redundant resources that a larger boat can bring to bear, along with safety margins of which larger vessels are capable. But neither would I forbid the whole shebang (in Coastguard terms) as a ‘manifestly unsafe voyage’.

Whatever fanfare and festivity sees the racers off, this is no light-hearted adventure. The undertaking is a solemn one. There's a very good chance that lives will be lost in the course of this race. Any attempt to gloss this fact over will only increase that likelihood. Each of those who enter – and those they leave behind them – must look that hard chance squarely in the eye.

As engineless sailors in SE Alaska (which can get brutal), we've often been accused of terminal stupidity. We occasionally meet those who feel "there oughta be a *law*". Well... there *are* laws; too many, in my opinion. Ironically, for a land of 'freedom lovers', the passage of laws prohibiting persons from engaging in consensual activities seems to be a national pass-time.

We each have our one, precious life to spend as we please. Sailors face the Sea – a *gestalt* of forces which dwarf the human scale – with every ounce of resource, skill and courage we can muster. Whether our boat be ten feet or a thousand, the ratio of boat to the sea is vanishingly small.

And we are all in the 'same boat'. Sooner or later, *one* of those situations we face is going to overwhelm us, whether lying abed, crossing a street or at sea.

Give me the sea.