Dimensions

LOA:	42.6m (140ft) (along deck)
LWL:	40.2m (132ft)
Beam max:	9.6m (31ft 6in)
Draft:	6.5m (21ft 3in)
Sail areas:	Mainsail/mizzen: 310m²
	Code 0: 550m²
	MS1 (biggest mizzen staysail):
Genoa staysail	110m²
Mast heights:	45m above the water
Displacement:	50 tonnes
Water ballast:	10 tonnes
Keel bulb weight:	10 tonnes

Built by: JMV, Cherbourg, France

Design team: Yannick Abgraal, Philippe Briand, Greg Elliott, Clay Oliver

All photos: Thierry Martinez

Twenty knots in 11 knots true

Mari Cha III was no slouch, but after the west-east transatlantic record was snatched from her in 2001, owner Robert Miller declared war and gave a top-flight design team *carte blanche* to create the world's fastest monohull – *Mari Cha IV*. James Boyd reports from on board

Super-maxi development reached a new peak in August with the launch of Robert Miller's all-carbon fibre schooner *Mari Cha IV*. She is 140ft of uncompromised speed machine and the world's fastest offshore racing monohull, a title she is likely to hold for some time. As well as fun events such as Antigua Race Week and the Voiles de St Tropez, she'll demonstrate her credentials in serious offshore races such as the Pacific Cup. Her crew also want to enter her for the Rolex Sydney-Hobart and Fastnet races as a line honours breaker, although she's too large and powerful under current rating rules.

However, *Mari Cha IV*'s *raison d'être* is to break passage records. In 2001 Bernard Stamm's Open 60 *Armor Lux* snatched the monohull west-east transatlantic record from *Mari Cha III*. Now Miller wants it back.

While the 146ft ketch *Mari Cha III* is competitive – she unofficially broke the Sydney-Hobart record by 19 hours in 1999 – she remains a cruiser-racer. Racing skipper Mike Sanderson explains: "Crew were having to spend a month to get the interior out, change the sail inventory, put pedestals on etc and a month to put it all back. If you did two or three races a year it meant the family was out of the boat for nearly half the year." She will be kept for family cruising.

For the new pure-bred racer, Miller recruited the design team himself alongside Sanderson and *Mari Cha*'s permanent skipper and project manager Jef d'Etiveaud. The MCDT, as it became known, comprised Philippe Briand, designer of *Mari Cha III*, Team New Zealand's Clay Oliver and Greg Elliott, the Kiwi designer of the highly successful 16m *Primo* racing schooner. It was Elliott who inspired them to go down the schooner route.

Fastest racing monohull

The brief was simple – to create the world's fastest offshore racing monohull – but this created its own problems: "The design team spent a massive amount of time working out

Opposite page: *Mari Cha IV*'s two 146ft masts carrying some 4,500ft² of sail. Day-runs of 600 miles may be achievable. And if you're wondering about beam (top), she is a whopping 31ft 6in!


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what that was," admits Sanderson. With a *carte blanche* and no rule to design to, the first task was to establish configuration and size. The velocity prediction programmes showed that the longer the boat and greater the sail plan, the faster she went. But where would they stop?

The limiting factor proved to be the size of gear, in particular the sails the crew could handle without powered winches, which are prohibited under the rules for most intended races and record attempts. Similarly, the power-to-weight ratio came down to the available equipment. Raceboat kit strips weight to a minimum, unlike that of superyachts, aboard which it isn't such an issue. This defined the optimum length for a sloop at around 93-94ft.

"*Bols* and *Shockwave* have the same winches and runner blocks [as *Mari Cha IV*] and that's no coincidence – we've got two rigs the same size as theirs," says Sanderson. In effect, the LOA of *Mari Cha IV* was established by taking two 93ft monohull rigs and working out the optimum size of boat needed to fit beneath them.

Scaled-up Volvo boat

While *Mari Cha IV* may be of a similar size and rig to *Mari Cha III*, the concept is totally different; for example, she has a stripped-out raceboat interior. As a result, the new boat – just a few feet shorter, but with a bigger sail plan and a deeper draught (6.5m compared to 4.3m) – hits the scales at 50 tonnes compared with *Mari Cha III*'s 109 tonnes. Sanderson explains: "*Mari Cha III* is a mega-yacht. This is probably closest to a scaled-up Volvo boat." The design was honed further by tank-testing the hull and wind tunnel-testing the rig to assess the merits of a sloop, ketch or schooner and look at issues such as rig separation and bowsprit length.

An acute problem with the creation of an 'unlimited' raceboat is the weight spiral. Larger heavier sails demand a stronger mast, heavier rigging and a beefed-up hull structure. The spiral can be infinite. Jef d'Etiveaud, controlled this with a full weight audit, right down to tubes of silicon and bags of washers. Engineered by SP Technologies, *Mari Cha IV* was built by Jean-Marie Vaur's JMV Industries in Cherbourg, France, birthplace of boats such as Christophe Auguin's Vendée Globe and BOC Challenge winner *Geodis*, Mike Golding's *Ecover* and Cam Lewis' maxi-cat *Team Adventure*. The boat was built in carbon fibre/Nomex from the outside in using a female mould; *Mari Cha IV* is believed to be the world's largest yacht built in carbon/Nomex.

Radically different

In the water *Mari Cha IV* is overwhelming – we could see her masts towering above the superstructure of a cross-channel ferry as we arrived in Cherbourg. The hull shape is radically different from *Mari Cha III*, with a slight reverse sheer, a stern akin to Peter Blake's Whitbread ketch *Steinlager II* and a curved knuckle bow reminiscent of *Geodis*. "We were keen on the boat getting its bow out [of the water] when reaching," says Sanderson. "We wanted her to be well behaved because an angry 140-footer isn't much fun."

Compared with *Mari Cha III*, she is substantially longer on the waterline, wider in the beam, but narrower on the waterline. Her deck is so long and wide an unfit journalist could get out of breath walking its length and the cockpit is so big you could fit an America's Cup boat into its outline.

The old boat had a distinct influence on the layout of the cockpit. "One of the big problems was communication," explains Sanderson. "The boat was incredibly noisy if there was any breeze at all and from where I was steering it was very hard to communicate with the guys. So the wheels are a long way forward and the pitmen are right there; the main and genoa trimmer are as close as if you were on a maxi."

While the rigs and scale of the boat are innovative, so is the concept of the movable ballast arrangement on board.

Mari Cha IV has a swing keel and water ballast, but her water ballast tanks are on the gunwale. "The idea is that downwind we are fully canted and upwind we are fully ▷

Above: the world's largest carbon/Nomex monohull is very carefully lowered onto her swing keel. Below: *Mari Cha IV*'s giant cockpit, with a forest of trimming pedestals. Opposite: the hull emerges from JMV Industries

Forget the crew weight, *Mari Cha IV* depends on a 10-ton swing keel and water ballast to keep her upright

ballasted and we have portions everywhere in between," says Sanderson. The keel can cant to 40° and is moved by one giant ram mounted to starboard and capable of delivering roughly 200 tons of thrust. The keel is also positioned further aft than normal because of the schooner rig, which is set up primarily for reaching and running.

Mari Cha IV can load almost 10 tons of water ballast. She has two tanks on each side, which are well forward for upwind sailing. This is to remove the need for daggerboards, which would be heavy and complex. *Mari Cha IV*'s keel tends not to be canted when sailing upwind so that all the lift benefit from the fin can be used. As the yacht bears away and the lift benefit is less critical "we can start dumping water and start canting the keel," explains Sanderson.

However, full keel cant and maximum water ballast cannot be used simultaneously. "The boat is set up to achieve maximum righting moment with one or the other," says Sanderson. "If you fill them both up you're going to blow the rigs out of it, so you can have a combination – say three-quarters cant and half a tank of water."

Despite all the superlatives, *Mari Cha IV* is relatively conservative with no fibre rigging, daggerboards or trim tabs.

Sanderson says: "There is nothing radical. We didn't want to have problems with trim tabs flapping around when we're halfway across the Atlantic. We didn't want to have wings. All these tricks are heavy."

Reaching and running machine

She is primarily a reaching and running machine. "A lot of it comes back to how fast can you go upwind offshore even in a 140-footer," says Sanderson. "In 30 knots [of wind] upwind you have to slow your Whitbread 60 down to 8-9 knots, *Sayonara* you have to slow to 9 knots and *Mari Cha III* we have to slow to 9 knots. So what is the point of building a schooner that can go upwind at 13 knots when you'll have to back off as soon as it gets heinous offshore anyway? So, yes, some boats are going to beat us upwind in St Tropez."

On board *Mari Cha IV*

When we sailed *Mari Cha IV*, it was it was like attending a convention for America's Cup and round the world sailors. Former Team New Zealanders Jared Henderson and Richard Meacham, offshore racers like Brad Jackson, Robbie Naismith, Stu Bannatyne and Jan Dekker and French multihull legends such as Herve Jan and Jacques Caraes were all there. Among the crew, there are at least 50 round the world sailors and as many America's Cup crew. The project has even tempted former Peter Blake/Grant Dalton navigator Mike Quilter out of 'retirement'.

Experience is vital on a boat where if things go ▷

Top: rally car-style bucket seats keep the navigator in place. Middle: racing skipper Mike Sanderson takes the helm for early trials. Above: crew are divided into two teams to tend both masts and their sails

This picture of *Mari Cha IV* close-reaching shows the 10-ton canting keel cranked to weather. Here she's flying a Code 0 off the bowsprit

wrong, they do so big-time. "It's about technique – sailing the boat and us being good at it and knowing what it wants," says Sanderson. The crew split into two teams to run the two rigs and join forces for headsail or mizzen staysail changes.

Powering along on a five-sail reach, schooner-style, is one of the ultimate sailing experiences. It was only the third day out testing and the crew were still treating the boat gingerly as they tried out her sail wardrobe, but we still hit 20 knots in 11-12 knots of true wind. In lighter winds earlier, we were often sailing at more than twice the true wind speed, performance that is familiar on racing multihulls but rare on monohulls. The schooner rig allows more sail area to be crammed on, but with a much lower centre of effort.

The two 45m (147ft 7in) carbon fibre masts, built by Southern Spars, are slightly different – the mizzen is engineered to take only half the boat's righting moment while the main mast can take it all.

Goodbye to the spinnaker pole

The 15-strong sail wardrobe was developed by Sanderson and David Duff with the help of North Sails NZ's Burns Fallow and Micky Ickert, who worked with Team New Zealand and Oracle respectively in the last America's Cup. The sails are predominantly carbon 3DL, with lightweight, waterproof Cuben fibre in the headsails. Like racing multihulls, *Mari Cha IV*'s speed is such that the apparent wind will never be far aft of a beam reach. As a result spinnaker poles are not needed, although a short one may be fitted for running conditions demanded by sea state. "The intention is the boat isn't going to want to square aft," says Sanderson.

An added benefit of having a twin rig is that it improves the balance of the boat. "We learned with the Whitbread ketches that you have to keep the sail plan balanced, so you have got keep something up at the back," says Sanderson. Hence, the mainsail has two reefs, while the mizzen has three. "Also they are very hard to get back up once you pull them down!" he adds.

Balance was another key design requirement – Sanderson says he wanted to steer *Mari Char IV* like a small boat and avoid the sluggish feel some boats this size suffer from due to the position, size and shape of their rudder and appendages and the use of hydraulics.

There's nothing open-plan below. Instead it's like a warren, with athwartships and longitudinal bulkheads. The chart table is a carbon fibre bench with two built-in PCs flanked by the normal electronics. In front of it are two rally car-style bucket seats, which will be needed to keep navigators and strategists comfortable when the going gets tough.

Where is she now?

By the time you read this *Mari Cha IV* should be in the US waiting for a weather window to make her first attempt on the west-east transatlantic record, although this is more of a trial run than the real thing. "This year we are trying to have a good attempt to get the record back then next year we'll own it," says Sanderson. "We don't need a 50-knot storm to break the record. There are lot of things we'd like to develop more before we head out in 40 knots"

The exact programme has still to be decided by Miller, but it could include the 2004 Pacific Cup, Antigua Race Week and Voiles de St Tropez, as well as the serious business of reclaiming the Atlantic record and monohull 24-hour run record. However, there is another goal: "We'd love to be the first monohull to go around the world in 80 days," says Sanderson, adding that although the boat wasn't conceived for this, she's fully equipped to do it. It's an ambition the crew share with Gordon Kay and the new *Bols*.

As with the G-class maxi multihulls, *Mari Cha IV* will come into her own in the ocean, where she should be able to reel off 400-500 mile days as a matter of course. Sanderson won't be drawn on how far they could sail in 24 hours, but over 500 miles should be easy and 600 miles may be achievable. And with figures like that on the log, the west-east transatlantic should soon be back with Robert Miller. ❑

Wind instruments tower above the foremast. Note the heavily battened and roached head to the sails