SAILING IN THE 21ST CENTURY

Get your kicks on Route 66

'A bold experiment in bluewater cruising design,' this American 68-footer is pushing back the frontiers in more ways than one. Matthew Sheahan reports

America's first coast to coast, transcontinental highway became a national icon for the technological age. It was seen as a far sighted and ambitious project. The same could be said of its namesake, the unorthodox new design, *Route 66*.

The first time you view the yacht from the dock, you will notice that she has a freeboard high enough to rest your chin on, a rig that towers 78ft (23.77m) above her deck, and a boom long enough to make your winch-grinding arms and Spectra-ripping palms wince.

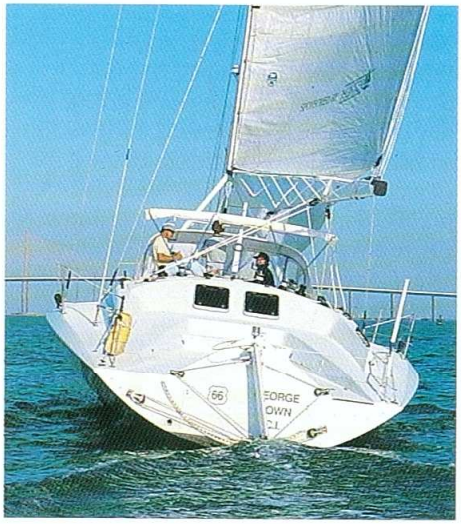
And yet *Route 66* has been conceived, built and delivered to a husband and wife team, to be handled with no additional manpower. She is no fancy, scorch-round-the-bay machine; she is their home, their transport and their ticket to a global cruise.

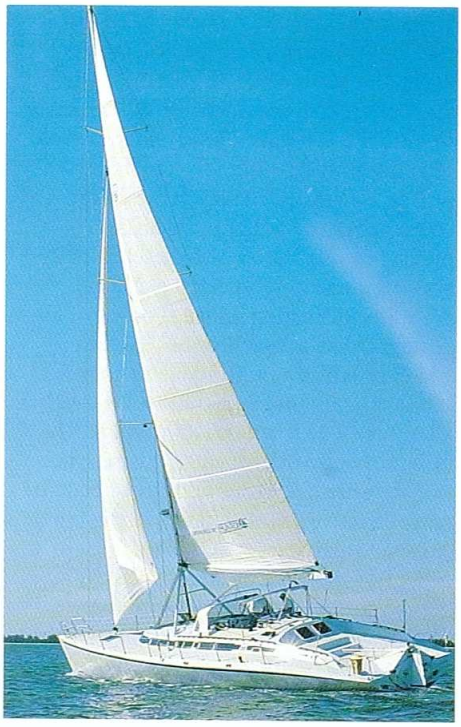
So don't be put off by her looks; *Route 66* is one of the most significant designs of her time and, even if you could never accept her appearance, the design philosophy is a rare example of unrestrained free thinking.

She was built by the Newport Rhode Island-based yard of Eric Goetz Custom Yachts, although she was sponsored by America's largest yacht builder, the Hunter Marine Corporation. Hunter describe her as: 'a bold experiment in bluewater cruising design' and she is the showcase for a new breed of cruising production boats, starting with a Finnish-built 45-footer to be launched in early 1995.

Route 66 bears no resemblance to any of Hunter's existing boats – they produce the well established Legend range. In fact, she resembles nothing else you may have seen on the water to date, with her razor-fine entry, high freeboard and a sheerline that slopes away to just above the waterline towards the stern.

The design was conceived by Sarasota-based Lars Bergstrom. The prolific design work from the Bergstrom & Ridder partnership is probably one of the best-kept secrets of the marine industry. Many will cast their minds back to the Bergstrom & Ridder (B&R) rigs of the 1970s, distinctive for their heavily swept-back spreaders and double-diagonal rigging. But how many people realise that the same team designed the Windex wind indicator, or that they quietly worked behind the scenes as main consultants to such famous designers as Sparkman & Stephens, Ron Holland, Bruce Farr, German Frers and many more? This time around, it is not just the rig, but the whole design that has come from their drawing boards.





Top, her hull sections are semi-circular to ensure that her underwater shape does not change with an increase in heel angle. Above, despite light winds, *Route 66* sailed well upwind with small fractional jib

Yachting World were invited aboard *Route 66* by the owners, Bill Whitmore and Carol Hankins, for three days of sailing trials in the cool, bright sunshine of Florida's Tampa Bay.

THE DESIGN

One of the best known of the 60ft single-handers designed for globe trotting was *Hunter's Child* and B&R Designs spent many hours in the test tank at the Royal Institute of Technology in Stockholm developing her lines. Convinced that their fair hull design worked well aboard that boat, the designers used the same hull for *Route 66*, but this time the boat was slightly longer at 68ft LOA.

Broadly speaking, the aim was to produce a hull shape that did not alter below the waterline with an increase in heel angle. In this way the fore and aft balance of the hull remains the same, which eliminates the tendency for an increase in weatherhelm and dramatically reduces the chances of a broach.

Achieving these fair hull lines means that the underwater sections need to be semi-circular with the same radius centres. As the radius of the sections becomes larger towards the stern, so does the beam and to restrict this it is necessary to reduce the height of the sheerline in the after sections. Hence the sloping deck.

In keeping with her pedigree, *Route 66* is a high performance yacht which has already clocked up speeds of over 20 knots. Subtle design details such as the neatly concealed spray rails at the hull-to-deck join in her forward sections hint at this, but a less obvious feature is the faired-in, quarter-inch deep slot, that runs round her hull at maximum beam.

This is the venturi slot. Its purpose is to smooth the transition between displacement and planing speeds by feeding in air to the underside of the hull, reducing the resistance caused by the boundary layer being dragged along. The slot is connected to vents concealed in the cockpit.

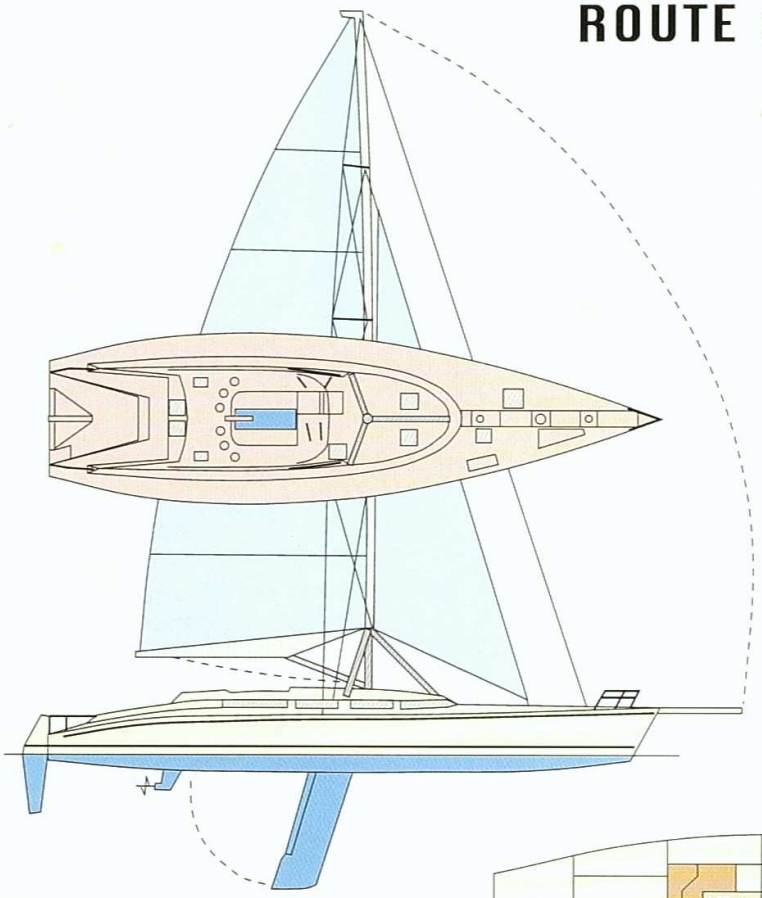
As well as acting as cockpit drains, the ▷

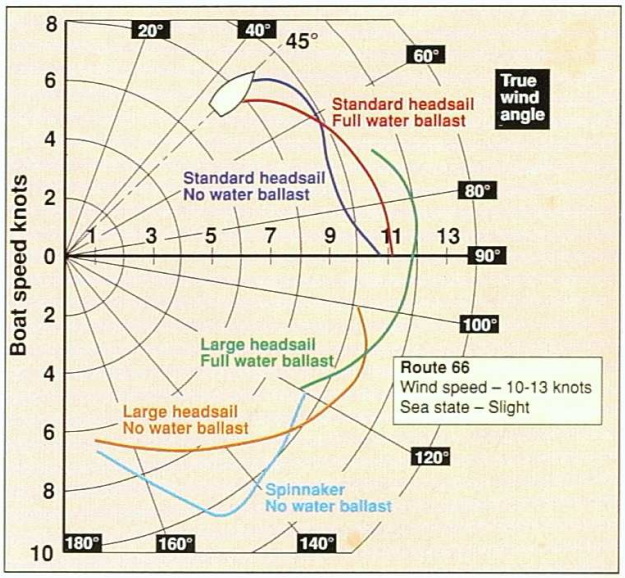
All sailing shots: Sprague Photography

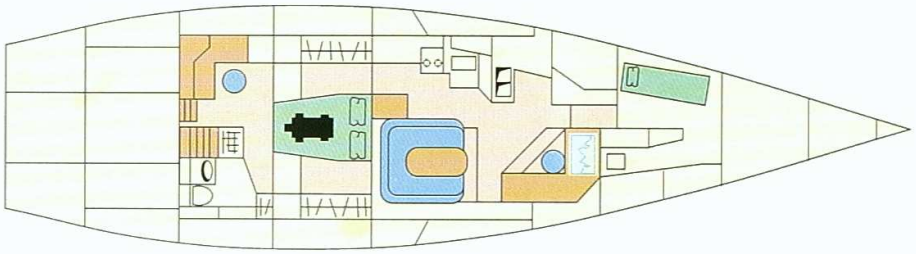
Inset photos: Matthew Sheahan

Main picture, in light airs with the asymmetric spinnaker set. Apparent wind angle was 90°, but the true wind angle was 160°. Top, with the rudder swung to port, launching a RIB which is cunningly stowed under the afterdeck, is a simple operation. Above right, a cradle system prevents the mainsail from falling onto the deck when lowered. Above, the overflow pipes from the water ballast show when the tanks are full

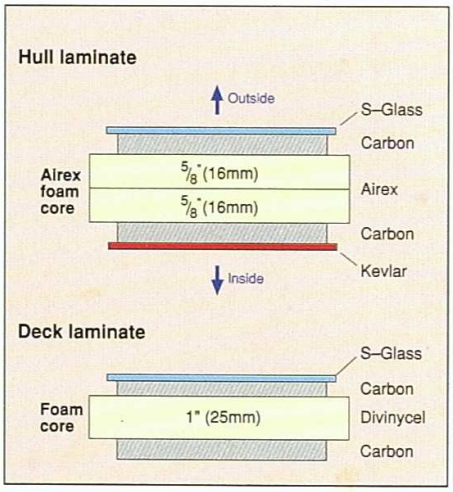
ROUTE 66

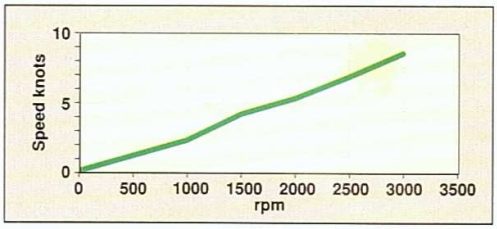


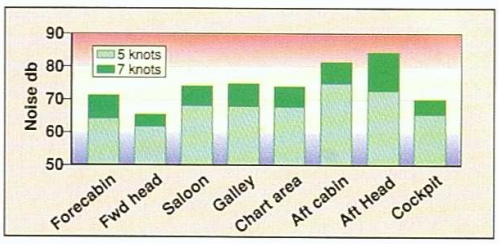




Designed by: Lars Bergstrom
Built by: Eric Goetz Custom Yachts, Newport, Rhode Island, USA.
Marketed by: Hunter Marine Corporation, PO Box 1030, Rt 441, Alachua, Florida 32615, USA. Tel: +1 (904) 462 3077. Fax: +1 (904) 462 4077.





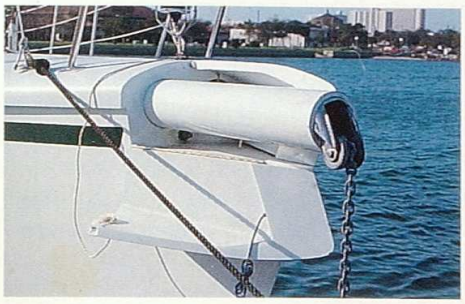


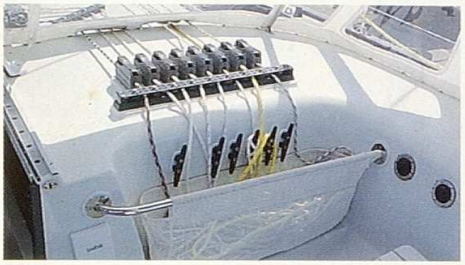
Polar diagram: Shows the optimum close-hauled angle to the true wind. Also shows speed attained on all courses. Important – consider in conjunction with the true wind speed during the test.
Sail area: displacement ratio: This ratio gives some indication of power available. Higher numbers = greater performance.

$$\frac{SA(ft^2)}{(Displacement\ (lb) \div 64)^{.666}}$$

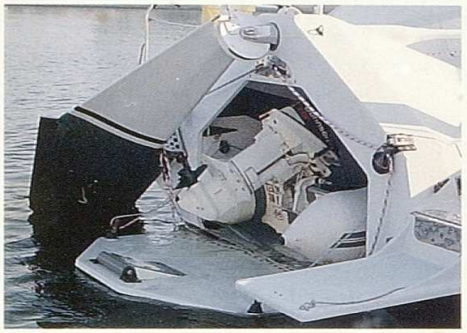
Ballast ratio: A comparison between displacement and the weight of the ballast.
Displacement:waterline length: Performance indicator. Low numbers = higher performance. (Displacement (lb) ÷ 2240) (0.01 x LWL (ft))^3

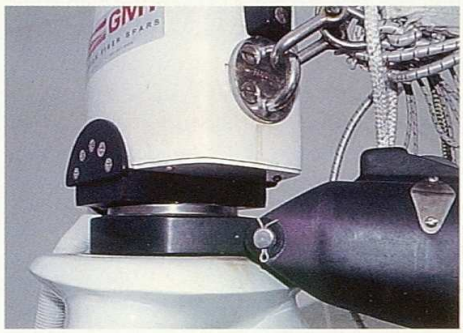
COMPARABLE BOATS	ROUTE 66		OPEN 60		WHITBREAD 60		SWAN 68	
LOA	68ft 0in	20.73m	60ft 0in	18.29m	64ft 10in	19.76m	67ft 8in	20.62m
LWL	66ft 6in	20.27m	56ft 9in	17.30m	60ft 3in	18.36m	54ft 9in	16.69m
Beam	18ft 0in	5.49m	19ft 0in	5.79m	17ft 3in	5.26m	17ft 9in	5.41m
Draught	15ft 6in	4.72m	13ft 0in	3.96m	12ft 4in	3.76m	11ft 8in	3.56m
Displacement	28,000lb	12,698kg	24,250lb	10,998kg	29,770lb	13,501kg	88,000lb	39,909kg
Sail area	1,800ft²	167.4m²	3,153ft²	293.23m²	643ft²	59.80m²	2,155ft²	20.42m²
Berths	4		1		8		12	
Sail area:disp	31.2		60.2		35.8		17.4	
Disp:LWL	42		59		60		239	





Top left, two telescopic poles are concealed by hinged bow section doors. This pole is extended to keep the anchor clear of the bow; the other is the asymmetric spinnaker pole. Above, venturi slots connected to the cockpit drains smooth the transition into higher speed ranges. Left, all rope clutches are backed up with horn cleats. Below left, the transom folds down to reveal a small RIB stowed under the after deck. Below right, the gooseneck arrangement





Photos: Matthew Sheahan

slot also provides a dumping vent for the 416gal (1892lt) of sea water ballast which can be carried on each side of the hull. Filling these tanks is achieved either by means of the engine-driven pumps, which takes four minutes, or via the forward-facing scoops under the hull.

Speed enhancing though it is, taking on water ballast to achieve a greater righting moment also means taking on extra weight and this can mean a lower speed potential, especially in light winds. *Route 66* can carry a maximum of 191gal (868lt) of fuel on each side of the boat (449gal in total, including the 67gal day tank) in symmetrically sized and positioned tanks. So on a passage this can be pumped to the weather side before the extra weight of sea water is taken on board (see diagram below). Filling both the water and fuel tanks achieves a maximum of 12° of heel.

In their quest to keep weight to a minimum and performance to a maximum, the designers have opted for a deep 15ft 6in (4.72m) carbon fibre, lifting fin keel with 6,900lb (3,129kg) of lead occupying the bottom 4ft (1.22m). The configuration operates much like a dinghy centreboard, but in order to avoid the extra drag of a centreboard slot, the fin is cleverly hinged about a point on the trailing edge, just inside the hull (see diagram below centre). With the keel fully raised, she draws 5ft 6in (1.68m), but still maintains adequate stability, as well as providing enough steerage under power or sail.

As anybody who has witnessed the unnerving loss of grip on a rudder at speed will confirm, efficient foils are all important. Designers of the world-girdling Open 60s have spent much time developing this area and here *Route 66* has inherited the lessons learnt.

She has a single-blade, transom-hung rudder that can be canted from side to side to ensure that the blade is always perpendicular in the water. This not only ensures maximum lift and control, but also prevents the bow from being pitched as the rudder is moved. Adjusting the angle of dangle can be achieved from the cockpit, with two control lines led onto self-tailing winches within reach of the helmsman.

Yet advanced though this is, B&R have taken the idea one stage further. By canting the rudder fully to port, the transom can be folded down to reveal a purpose-built garage for the rigid bottom inflatable tender. Rigged with its outboard engine, ready to go and resting on a set of free running rollers, the dinghy is simply pulled out by hand.

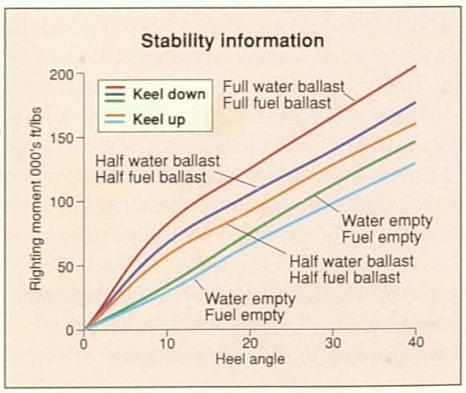
Storing the dinghy is equally simple. The painter is led round a block inside the garage and back to the step where a gentle tug eases the boat back into its housing. Even fuelling this tender has been thought of – it has a separate fuel storage tank and delivery hose.

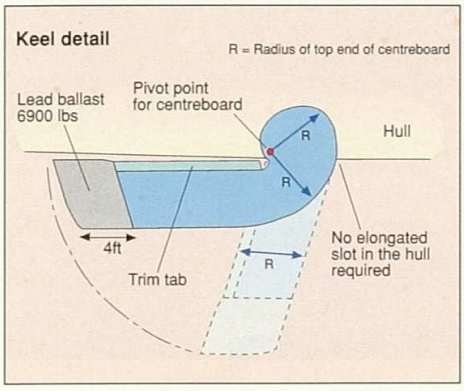
ON DECK

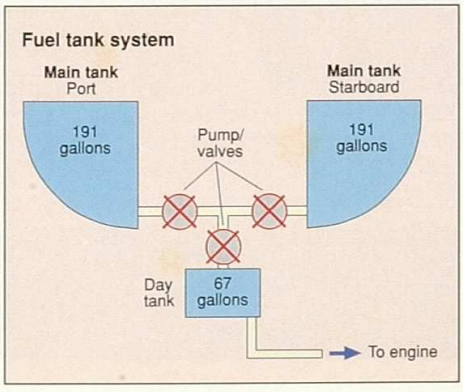
Bill Whitmore has spent the best part of his sailing career with a tiller in his hand and he could not entertain the thought of giving it up aboard his dream boat. A Kevlar belt and twin control lines connect the tiller to the helm through a tube that runs back to the rudder stock. But with just two on board the autopilot is more frequently used and here the trim tab on the rudder blade steers the boat. This system means that there is less load on the autopilot as well as providing a back-up means of steering the boat in the event of the main linkage failing.

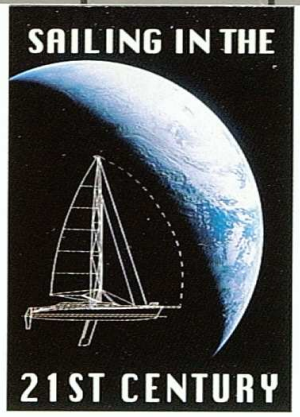
The small centre cockpit is set high in the boat giving excellent all-round visibility. Behind the helmsman, three pairs of Barient self-tailing winches control the mainsheet, genoa/spinnaker sheets and the rudder canting. All the control lines are led back to the cockpit through Lewmar Superlock clutches before reaching the dedicated horn cleats.

Once the control lines are set, the ▷









clutches are released to allow the horn cleats to take the full load – a seamanlike arrangement. Beneath these cleats, a large netting bag, suspended on a sturdy stainless steel, tubular frame, collects all the rope tails ensuring that they keep the cockpit clear.

Strolling down the wide side decks towards the bow, you will notice that the top of the triple guardwires comes to thigh height, the non-slip is excellent and this and the solid grab-handles make you feel secure.

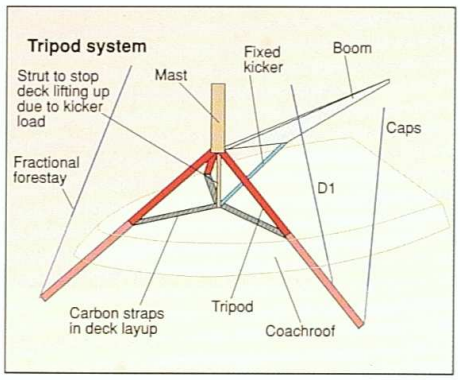
The foredeck is a wide open expanse of clear deck with flush locker lids concealing, for example, the dedicated anchor stowage or the windlass housing. Despite being open, the deck feels safe to work on.

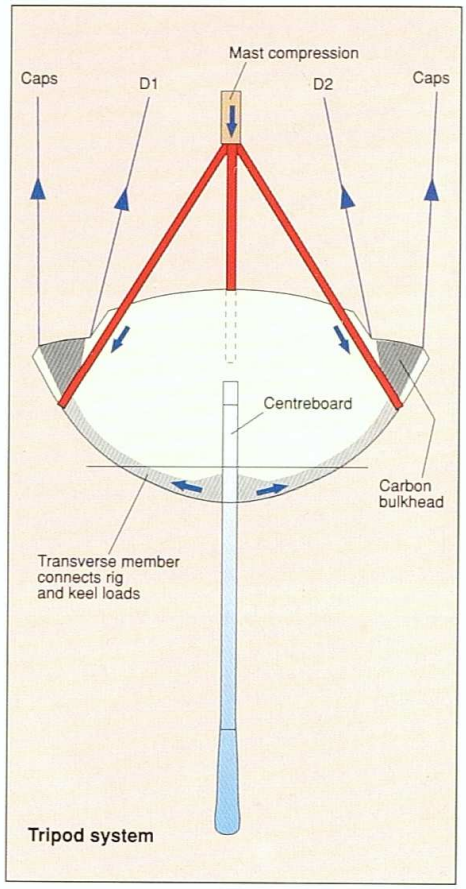
The headsail is a furling type, set roughly midway between the pulpit and the mast which means that, should you need to deal with the headsail, you are well back from the really wet bit. In fact, the only reason to go forward is to open the bow flaps concealing the retractable spinnaker pole on one side and the anchor pole on the other.

THE RIG

A large, white-painted, carbon fibre tripod spans the boat from gunwale to gunwale, supporting the base of the B&R rig some 7ft (2.13m) above the deck.

Producing a 68ft cruiser that is lighter than a Whitbread 60 owes a lot to this system – designing loads out of the boat is the key.





Diagrams above and right, show the tripod system designed to connect the rig loads to those exerted by the keel without using the hull or deck to link them. All load is taken by the robust tripod, rather than by the vulnerable mast

Conventionally rigged boats generally use the hull and deck structure to carry the high loads between rig and keel. Crudely put, the result is a hull and deck that is frequently overbuilt and overweight. The B&R rig system, with its tripod base, ensures that the rig and the keel are connected directly. The transfer of load between these two major components is best thought of as a closed loop of loads. The diagrams above best show how this is achieved, but a good analogy is a sailboard rig.

You sit on the beach, with your foot on the mast heel and sweat down the luff of your sail to get the required bend in the mast and an efficient shape to the sail. Once the downhaul is cleated, the sail is like the skin on a drum – taut and perfectly shaped. You then pick up the lightweight aerofoil section and fit it to your board. Despite the high load you have induced into the rig, the unit is easily handled.

Route 66's rig, from the tip of the mast to the top of the tripod, is the same as the sailboard sail. The mast is pre-bent by the tension in the diagonal stays and the only real difference is that it is held upright in the boat by a pair of cap shrouds and lowers. The rig is so secure that not even a permanent backstay is required, let alone runners.

On designs gone by, the tripod was mounted below decks, but *Route 66* has a boom fixed by a solid, non-adjustable kicker, and mounting the boom gooseneck on the tripod means that all the load can be taken by the robust tripod and not by the vulnerable mast. To the crew, the net result is a fully battened mainsail that always maintains its shape, with a mainsheet that simply alters its angle of attack to the wind – just like a sailboard.

ACCOMMODATION

Route 66 is home to Bill and Carol, so you would expect her to be fully fitted out. Despite her clinical colour scheme of white and dark green, she is spacious, practical and homely – perhaps it's the oak trimmings and wicker-fronted lockers that add the domestic touches. And she is designed to household proportions.

Take the galley, for instance. Running a full 14ft (4.27m) along the port side of the cabin, the galley has no less than 17.8ft² (1.65m²) of worktop space, a fridge, a freezer and extensive food stowage space.

The navigation station, too, has a vast 25.1ft² (2.3m²) of desktop space with stowage to match. Its position follows the contour of the coachroof windows, allowing a superb panoramic view and, with the autopilot

Sprague Photography

Conventionally-rigged boats are subject to high loads on the bottom section of the mast. The A-frame arrangement reduces these to a minimum

repeater to hand from the swivelling office-type chair, venturing outside is rendered virtually unnecessary. Through much of the boat, the headroom is typically 6ft 9in (2.92m).

The after cabin spans the full width of the boat, with ensuite head, as well as a desk complete with a filing cabinet and a phone, to name but two of the household essentials. Removing the double-berth mattress reveals the engine and all the yacht's main services, with plenty of space to work on every item. There are even two hatches and companionways onto the after deck for that early morning swim.

The forecabin houses a pair of hingeing pipecots, hanging space for wet oilskins as well as a workshop bench area. Again, the area surrounding these features is spacious.

UNDER SAIL

There are no bow thrusters or special techniques to get the yacht under way. Bill simply asks for the bow to be gently pushed out and, as he accelerates away from the dock, Carol steps aboard at the transom, the low point of the sheerline. A normally aspirated Yanmar 50hp diesel is all this boat needs to propel her at more than eight knots and, even with her keel up, she has surprisingly good manoeuvrability.

Once we are out of the harbour, the 3:1 main halyard is placed on the hydraulically powered primary winch. As the mainsail slowly creeps up the mast, the Harken batten cars carrying the luff of the sail are exposed. The operation may seem slow, but there is no noise from the sail as the full length battens damp the flogging motion – there are no running backstays whipping around the side decks, either.

Bearing away, the boat accelerates quickly in the light breeze. Bill cuts the engine. No sooner has the prop stopped spinning than the headsail is unfurled and, with a gentle tug at the cleated sheets, *Route 66* snaps into action. A quick glance at the log and we are reaching along at over seven knots in ten knots of true wind and yet from the cockpit I could have sworn that we were doing no more than four.

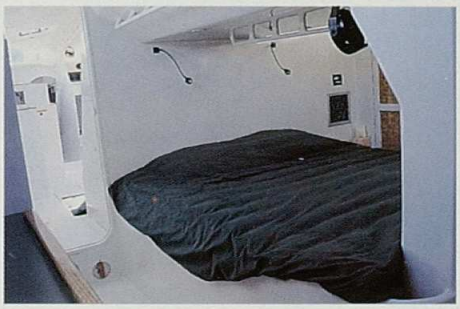
"Watch the transom," says Bill. "At the moment the keel is up, which trims the stern down; as soon as we lower the keel, the wake will turn flat and she will start to get going – then we'll put the ballast in!"

By now Bill has turned on the autopilot and Carol, having just flipped the switch to lower the keel, is showing one of their guests down below. There is a calm, confident atmosphere aboard as our speed climbs towards double figures – *Route 66* is certainly well suited to short-handed sailing.

Her normal sailplan uses a small fractional headsail, with virtually no overlap, but today we have the new masthead floater aboard, designed to be used in lighter winds. Our plan is to compare speeds and sailing angles for the two headsails as well as comparing her performance with and without water ballast.

As we vary the sailing angles and experiment with the water ballast, a pattern begins to emerge. On the polar plot, lines start to intersect each other, giving us a clearer picture of her optimum configurations. But it's not all plotting points and logging numbers.

Photos Matthew Sheahan



Above, looking aft at the galley, to port. Beyond lies the after cabin. Left, acres of space are available to the navigator in the nav station. Below, the after cabin has a split mattress and leecloths. The engine bay and ancillary equipment are beneath this berth. A lifting cover provides quick and open access to all equipment

At 80° to the true wind (11 knots), we hit 12 knots. She comes alive as the channel markers in Tampa Bay rush by. Yet as the excitement builds within the crew, the boat remains docile on the controls. The autopilot hardly moves as each gentle puff of wind has us heeling a little more, but accelerating at the same time.

On the previous day Bill and Carol demonstrated the ease with which a 3,000ft² (279m²) masthead asymmetric spinnaker can be handled by two. The wind then was only three knots less than today, but for a high performance boat, such light winds mean that you quickly exceed the speed of the wind.

With this configuration, the apparent wind was dragged so far forward that, at 160° true, the apparent wind was on the beam. Eventually, as the boat speed exceeded the wind speed, we could not sheet the sail any further and the sail collapsed until the boat slowed down. We had clocked 10.4 knots in 8-9 knots of wind!

CONCLUSIONS

Sophisticated she may be, but she has also been well conceived in a seamanlike manner that should perhaps embarrass some of today's conventional cruisers. Only if a system makes life easier or safer is it incorporated into the layout. The pump panel for the water and fuel looks involved, because it is. And yet just three on-deck instrument repeaters are fitted to display her sailing performance, because they are all that is necessary.

You have to admire the way in which everything, from the bilges to the block and tackles, is easily accessible. Nowhere is there an item of equipment that is hidden or awkward to get at.

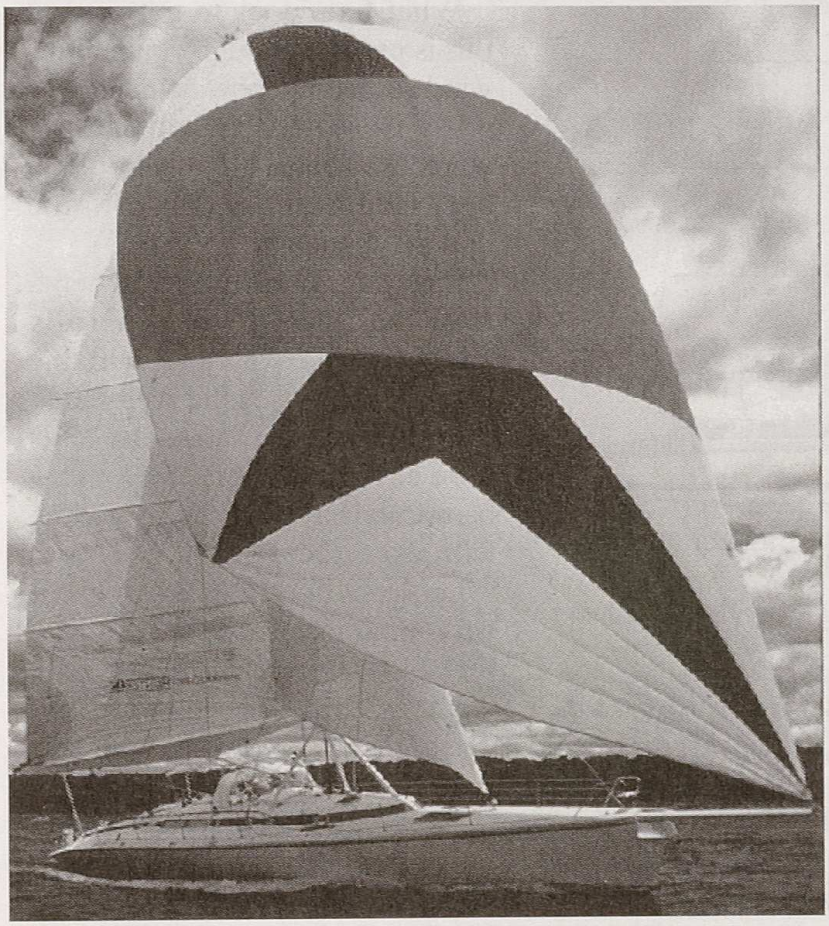
Perhaps most important is that she is a fully integrated modern design. The use of asymmetric sails, water and fuel ballast, a simple-to-handle rig, a centre cockpit, a transom-hung rudder, are all factors that complement each other to produce a yacht that is easy and exhilarating to sail – and comfortable as well.

Love her or loathe her, she may not be the final word in cruising designs of the future, but she's providing plenty of answers. ❑

OTHER VIEWPOINTS

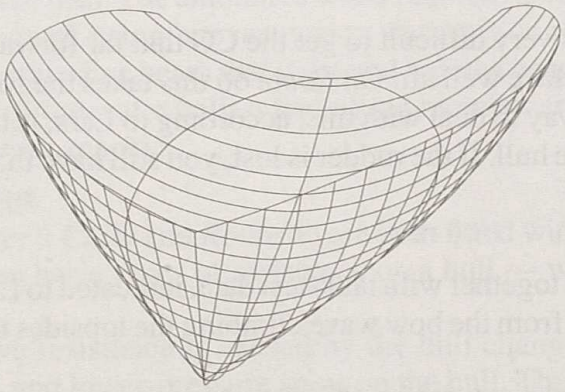
So far we've been hogging the stage with our own view of what makes an ideal cruising boat. That there are other opinions on the subject goes without saying. There are, in fact, about as many views on any given design subject as there are designers, boatbuilders, and owners.

Figuring that you might benefit from viewpoints other than those of ours, we've asked several designers whose work we respect to submit one of their seminal designs for your perusal, and then let them tell you in their own words what they feel about what goes into a good cruising yacht.



The 68-foot (20.9m) *Route 66* at speed on Narragansett Bay. The asymmetrical spinnaker is a real powerhouse downwind. With 3,000 square feet (284 square meters) of area, projected well forward on the bowsprit, you know you are going to be moving right along.

The small, high-clewed staysail is actually the normal working headsail. The outer headstay is used for a light reacher. (Billy Black photo)



Even though *Route 66* is very beamy on deck, she has a narrow waterline. The hull sections are totally circular, reducing wetted surface to the minimum.

LARS BERGSTROM

Lars Bergstrom is one of the most innovative yacht designers we've known. Over the years he has developed all sorts of interesting things, from his B&R rigs to pivoting rudders controlled aircraft-style with small trim tabs. Lars has also done a series of extremely interesting racing and cruising designs.

I first became aware of his racing designs with *Tuesday's Child*, which he did for Warren Luhrs. Next came *Thursday's Child*. Both boats were innovative in the extreme and pointed the way toward *Hunter's Child* in which Warren Luhrs, Lars, and Steve Pettengil broke the New York–to–San Francisco clippership record via Cape Horn. *Hunter's Child* was recently raced by Steve Pettengil to a second overall in the BOC.

Subsequently Lars did an Ultimate 30, *Benz Express*, for Bill Whitmore. Bill and Lars got to figuring that a blown-up version of *Benz Express* might make a really interesting cruising boat.

The result: *Route 66*.

Hull Design Criteria

Lars works toward the same criteria as the rest of the designers in this section: the hull needs to be balanced with heel so that it is easily steered, and to be comfortable at sea.

The shape of *Route 66* is what I would call a modified BOC hull.

It is quite narrow on the waterline, with a broad beam (19 feet/5.84 m) at the deck carried well aft.

Cruising displacement is a very light 34,000 pounds (15,420 kg).

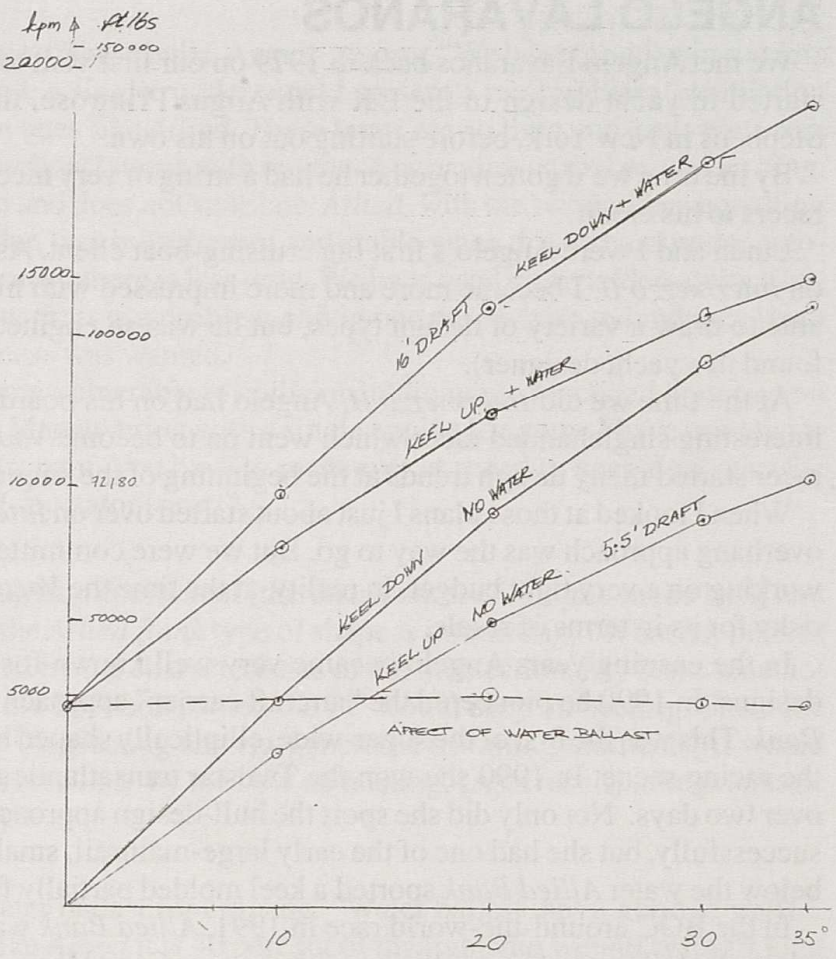
The heeled hull sections are elliptical in shape in plan view, and maintain a constant curve-of-area as heel increases.

Deciding how much water ballast to use is a trade-off between comfort and speed. Overballasting, sailing more upright, is typically faster than letting the boat heel a bit more. But sailing upright is much more comfortable than heeling.

Bill says that "off the wind we rarely allow the boat to heel more than 10 degrees. Upwind and reaching heel angle will vary between 15 and 20 degrees. At night we increase ballast or reduce sail to ease up on heel angle."

Bill loves the fixed-vang effect on the boom. This means that the mainsheet only adjusts angle of attack on the sail, the uploads being taken by the fixed vang. This reduces trimming loads and allows a faster gear ratio between winch and sheet. They adjust draft with luff tension and the outhaul, very much like you would with a headsail.

Downwind in the trades they have a large reacher that they attach to the outer headstay. "The spinnaker gets a lot more use than I thought it would," Bill continues. We've carried it up to 28 knots true-wind speed with just the two of us aboard. But we usually just carry it to 18 knots true, and then switch to the big jib."



Lars sent us this very interesting stability curve for *Route 66*. The righting moments are found along the left side, while heel angle is at the bottom.

The lowest figures are for the keel up, shallow-draft configuration with no water ballast. Notice how little diffrence there is between this configuration and when the keel is lowered.

Where the stability really starts to jump is when the water ballast is added.

The impact on *Route 66* of the water ballast is far more than any other cruising yacht we've seen, an increase in stability of almost 40 percent!

I asked Bill what he thought about the pivoting rudder. "Short tacking we just leave it on the centerline. Offshore it is very easy to adjust it to vertical. We unload the steering and crank it over. The in-transom storage that this allows for the dinghy is great. We never leave our dink in the water as a result."

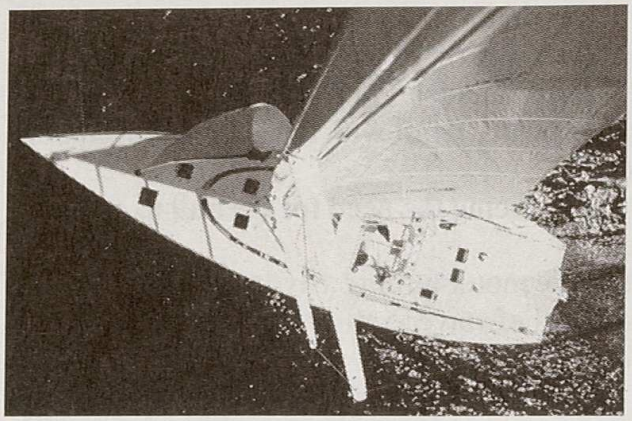
Under power Bill reports that they do 7.5 to 8 knots with the 50-horsepower Yanmar in smooth water. Motorsailing they can get up to 12 knots very quickly with just the main up and a fair breeze. They tend not to power upwind, finding they can sail faster and more comfortably. Offshore, Bill says they typically reach between weather systems, avoiding beating as much as possible.

Bill says that they tack through 80 degrees and the boat typically does not slam when going uphill, unless they are in very short seas.

When I asked Bill what he would change if he were doing the boat again, there was a long pause. "I think I'd go with a 75-horsepower engine so we had better speed upwind. We'd add a washer/dryer and a small genset."

That's a pretty short list!

(We are saddened to report that as were going to press we learned that Lars had lost his life while testing a prototype for a motorized glider he was producing. The glider was a radically new design with exciting performance potential. Right to the end, he was pushing the edge of the design envelope. Everyone in the marine industry will miss his creative drive.)



A bird's-eye view of *Route 66* and her swept-spreader rig. With a 30-degree sweep angle on the spreaders, there is enough force in the side stays to react to the headstay loads, eliminating the need for a standing backstay or runners. This in turn reduces rig load. Most important, however, is that it allows you to have a highly efficient mainsail profile. Lots of sail area, with a low center of effort, and low induced drag. The ultimate formula for speed and comfort. (Lars Bergstrom photo)

The tripod support for the main mast is clearly visible here. It takes some getting used to visually, but it makes a lot of engineering sense. (Lars Bergstrom photo)

"Surface friction is a resistance caused by accelerating the water that is close to the hull (boundary layer). Next to the hull, the water has the same speed as the hull and a little farther out it has the speed of the surrounding water. The area with a change in speed is the boundary layer. It takes energy to accelerate the water in the boundary layer. In the rear part of the boats just in front of where the water is pulled up to make a wave, a suction forms. It is this area that we fit a slot with tubes usually going up to the cockpit area so that air can be ventilated, by the suction, down to the underside of the hull. Water is about 840 times heavier than air, and therefore it takes more energy to accelerate water than air. At the same time we think it changes the wave resistance, and in the near future we hope to be able to study and test the air slot so we will better understand and be able to optimize the size and position of air slots."

Owner's Comments

When you have a design this new, it is always a good idea to talk to the folks who sail it. If they've done some miles, so much the better. It gives you a real-world look at how well the boat achieves its design objectives. Bill and Carol Whitmore live aboard *Route 66* full time and have put 22,000 miles under her keel since she was launched, including two trips back and forth across the Atlantic.

So when Bill returned my call from a phone booth in Norfolk, Virginia, I was really interested in his comments on how the design has stood up to cruising.

My first question was about the average passage times at sea. Obviously this design has extremely high speed potential, but just what can Bill and his wife get out of the boat when they are cruising?

"Two hundred miles a day is a really bad day for us" was Bill's comment. "We mostly average 230 to 240 miles per day. Our best day's run is 341 miles in 24 hours. We did this along the coast of Portugal. The wind was 110 to 115 degrees apparent and blowing about 30 true. When my wife and I are sailing alone, we don't push it. At night, we slow down. If we're hitting 15 or 16, at night my wife gets nervous, so we ease off."

When I asked about the autopilot control at these speeds, Bill indicated there were some problems with the way the Alpha pilot steered the boat at higher speeds. "Sailing along at 14, 15, 16 knots, everything is fine. Then, if we get a strong gust and we start sailing at 21, 22, or 23, the boat starts to slalom back and forth. It's very uncomfortable. So when we're sailing fast, we steer by hand."

Bill continues, "The problem is really more the Alpha pilot than the speed. We set it for a certain speed, fast or slow, and everything is fine. But when the boat accelerates, it starts to oversteer."

Since *Route 66* has a very aggressive liquid-ballast system, I was interested to hear how Bill used this feature.

"The water ballast takes 30 to 40 seconds to transfer from side to side. There are two 4-inch (100mm) diameter pipes for this task. It takes about three minutes to fill the tanks using a 200-gallon (760 liters) per minute Pacer pump that is belted to the engine. We also carry up to 550 gallons (2,081 liters) of diesel fuel in two side tanks and a day tank. What I usually do is keep the day tank filled and keep another 200 gallons (757 liters) of fuel to windward. This is pumped electrically at 12 gallons (45 liters) per hour. If we are short tacking, we do not transfer the fuel, just sea water."

Keel Design

As you have seen in the photos of Lars' keels in the keel section, he is no stranger to bulbed fins. But for a cruising boat, a deep, fixed bulb has a lot of disadvantages. For *Route 66,* Lars developed a pivoting keel. In effect, this works like a giant centerboard. Draft with the keel deployed is 16 feet (4.9 m). With the keel rotated up it is 5.5 feet (1.7 m).

The fin has a small trim tab that helps to create lift, reducing the need for the hull to assume a leeway angle.

The keel is operated hydraulically, with a small electric motor turning a hydraulic pump (which also powers the primary winches). There is a pressure-relief valve to allow the keel to kick up if it takes the ground.

Steering Control

Lars has long been an advocate of a *tilting* rudder. Using a transom-hung rudder blade, with a pivot at the top and track at the bottom of the transom, the rudder blade can be angled from side to side to keep it vertical as the boat heels. This has two advantages: First, with the rudder kept vertical when the boat is heeled, it is far more efficient than it would otherwise be with the boat at high heel angles. Second, because of this higher efficiency, the rudder can be smaller than would otherwise be the case.

The rudder is fitted with a small trim tab, to which is attached the autopilot drive. The trim tab forces are very light, so a small pilot does the job. The trim tab in turn develops huge amounts of force to control the rudder.

B&R Rigs

Lars, together with his partner, Sven Ridder, developed the B&R rig many years ago. With *Route 66* they took the process one step farther, mounting the mast on a tripod, efficiently distributing the compression load to the hull.

Lars explains the rig logic: "In addition to the safety factor, the B&R rig on *Route 66* is completely self-tending and trouble-free once properly set up. There is little risk of metal fatigue, except in the forestays, because none of the wires ever go slack. Having no backstay allows for a large, full-roached, fully battened, long-life mainsail for extra horsepower and ease of handling. The only price to pay is some increased mainsail chafe from the 30-degree swept spreaders, and some loss of upper-end headstay tension, which is of little, if any, consequence if jibes are properly designed. Also, changes in mainsail shape must be done with outhaul, vang, and luff tension rather than changing mast bend, which should be fixed with this rig. The fixed vang-sheeting arrangement for the mainsail greatly reduced mainsheet loads and makes for a much safer cockpit area with the boom at a fixed height overhead."

Sail proportions are modest for a vessel of this size. Note the very large mainsail and small headsail. This keeps most of the drive in the main, where it is most efficient, especially downwind. Mainsails are also much longer-lived than jibs, which means that over time this rig configuration will cost a lot less to own than one that is headsail-dependent.

Water Ballast

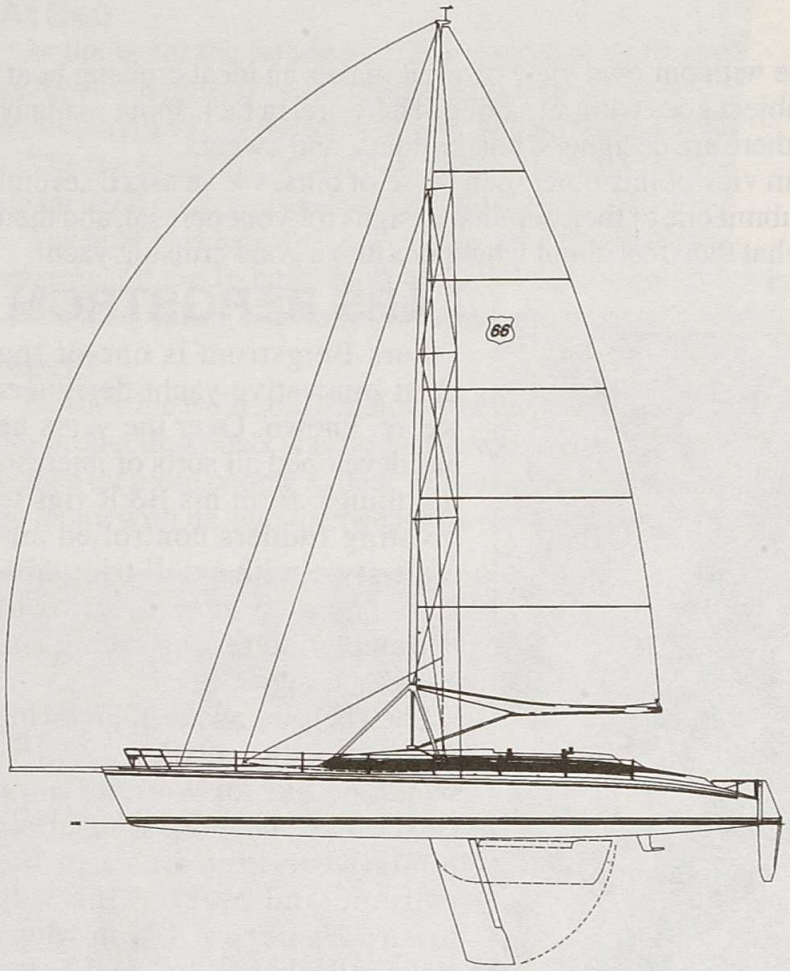
Lars is a strong proponent of water ballast for cruising. As he puts it, "I very strongly believe that water ballast is the simplest, easiest, and least costly way to achieve stability for the first 20 degrees of heel. The amount of water required is very easy to control. An empty tank has the added advantage of being buoyancy area should it be required. As the hull shapes that we use have a narrow waterline beam that is around half the beam of the boat, using water ballast means that the weight of the water ballast has a long moment arm." Each side has 420 gallons (1,892 liters) of salt-water capacity.

Air Slot

Hunter's Child and *Route 66* are both fitted with air slots aft of the keel. Lars explains, "There are three basic types of resistance on a hull — wave resistance, surface friction, induced resistance.

"Wave resistance is caused by the hull changing the water surface — it induces waves, by higher- and lower-pressure areas on the hull. These areas deform the water surface (wave). This increases rapidly with speed.

"Induced resistance is caused by side forces from keel and rudder to counteract the side force from the wind on the sails.



The profile view gives you a good idea of the compact yet efficient rig proportions of this cruising rig. The main is 1,250 square feet (118 square meters), while the jib is 550 square feet (52 square meters).

This can, however, get you into difficulty if those heeled sections keep the bow in the water and angle the hull and keel relative to the water flow. When this occurs, it is like a huge leeway angle being placed on the boat and tends to be very slow.

What Lars does to get around this is provide enough volume forward so that the bow actually lifts out of the water a bit with heel. In effect the heeled alignment of the boat is almost parallel with the upright alignment.

Lars puts it this way: "When a B&R hull heels, the bow rolls around the line (parallel with the center) and out of the water, and the stern stays the same. Our hulls have circular sections only, like a barrel, and have the same waterline with any degree of heel."

Lars adds that, "We have found it very important not to have a deep foreship (forward hull section) on the hulls, as the foreship has a tendency to steer the boat, which in turn requires more rudder surface."

The half-entry angle of the hull is 11 degrees, the narrowest of all the boats in this section, and comparable to what we draw. When you couple this with a fore-and-aft prismatic of 0.60, you start to see the potential for some serious boatspeed, with reasonable comfort with a bit of sea running.

Lars is an aeronautical engineer by training, so it is natural that he would look at how to create a stable aircraft, and then apply the same principles to sailboat design. In an airplane, you always design the center of gravity so it is forward of the center of lift in the wings. This way, if you have your elevator (horizontal tail assembly) trimmed for a certain speed, the airplane will maintain that altitude, even when you let go of the controls.

Lars uses the same approach in hull and fin design. If the center of gravity can be brought forward of the center of lift for the hull and keel, the boat hull will track (assuming the sails are balanced) without input from a rudder.

Of course, in a cruising boat, it is sometimes very difficult to get the CG that far forward. The alternative is to have a small, fixed, vertical surface well aft. On *Route 66* this takes the form of a skeg from which the prop protrudes. Another way to deal with this, according to Lars, is to make the top 15 percent or so of the rudder fixed to the hull. If the rudder is lost, you still have that small fixed section to help with tracking.

Spray Deflectors

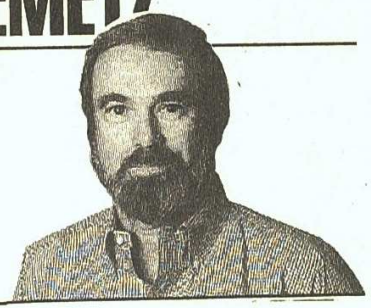
Some heavy-weather, real-world experience, together with tank-test data, indicated to Lars that at very high speeds, above 24 knots, the energy from the bow wave climbing the topsides tends to pull the bow down, causing it to submarine.

To get around this potential problem, he fits spray deflectors from the bow aft about a third the length of the hull. These deflectors are perpendicular to the hull and 2 inches (50 mm) wide. When the spray climbs the topsides and encounters these deflectors, there is a reaction, forcing the water back down and creating a lifting force for the bow in the process.

SPORTS EXTRA

Whitmore's 'Route 66' proves to be an eye-opener

MORGAN
STINEMETZ
Sailing



Back in 1990, Bill Whitmore, a veteran racing sailor from Sarasota, got onto an ungainly craft called an Ultimate 30 at the Sarasota Sailing Squadron. The new boat belonged to Pat Benz. Designed by Lars Bergstrom and incorporating some unusual features, Benz's boat never reached its potential. The project eventually foundered for various reasons, but the boat mightily impressed Whitmore.

"I've sailed a lot of boats in my life, but that was by far the most exciting boat I've ever sailed,' said Whitmore. "It went like a scalded dog in every direction."

Now Whitmore has his own version of an Ultimate 30. It's more than twice as big, luxurious, thoughtfully laid out and splendidly built. Maybe you've seen it featured in sailing magazines. The boat's name is Route 66, and feature stories on it have appeared in SAIL, Sailing, Sailing World, Cruising World, and Soundings.

To truly appreciate the breakthrough that Route 66 represents, you need to see it up close, inside and out. Whitmore himself gave me a look earlier this week. It proved to be an eye-opener. I felt like I'd seen the future of quick cruising right here and now.

A word of caution. Since Bill and his wife Carol have sold their house and moved on board, Route 66 is also their home, so general public tours are out of the question.

Route 66 is probably the fastest cruising monohull ever built. It's 66.6 feet at the water line, 68 feet on deck, 18 feet across, and draws 15.5 feet with the swing keel down, 5.5 feet with the keel up. The top of the mast is 92 feet above the water. The main is 1,200 square feet. The roller furling jib is 600 square feet. And the asymmetrical spinnaker, when set, totals 3,000 square feet. The boat displaces 28,000 pounds.

Those numbers are impressive, to be sure, just because of the pure size of them. But they are just numbers. A major part of the story of Route 66 is that it can be sailed — indeed, *will* be sailed — by just a couple of people.

"It has very high-speed potential, and it is safe and easy to sail," said Bergstrom, who, along with partner Sven Ridder, designed the boat. Bergstrom and Ridder regularly explore the nether regions of sailing engineering.

Route 66 carries a carbon fiber mast (with the patentened B&R rig and obligatory swept back spreaders) which is stepped on a tripod that absorbs all the rigging loads.

"With this rig, everything is totally straightforward. The wires come down and attach to the end of the compression post. The post goes straight up to the mast. The mast goes straight up. You could take the rig out of the boat fully tensioned and it would be unchanged. None of the rigging loads go into the hull, so we built the hull (strong enough) just to take the wave forces," Whitmore explained.

The cored hull is built of carbon fiber and S-glass laminates with a Kevlar outer skin. In most places, the hull is 2 inches thick, which makes the boat very quiet.

Because the mast isn't keel-stepped, it does not interfere with cabin space. The boom has tubular racks on it. Combined with lazy jacks, the racks catch the huge fully-battened mainsail when it is lowered.

The sail, which Whitmore says is enormously heavy, squats on the racks without flaking. "You don't even need to put sail ties around the sail at night when you are at anchor," he said.

At the stern is inside storage for a hard-bottomed inflatable dinghy, complete with motor. The dinghy can be launched or retrieved in only two minutes. This idea first appeared on the Hunter 54s back in early 1980s and has been picked up by Bergstrom, Ridder and Whitmore.

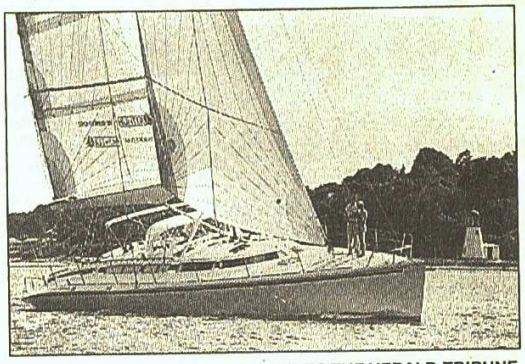
Route 66's auxiliary power is a 50-horse inboard diesel that powers a sail drive lower unit. The engine itself is under the amidships bed in the owner's stateroom. Heat from the engine can be used to warm the bed itself on cold nights. In warmer climes, the heat is exhausted outside.

Whitmore says Route 66's top speed is unknown. The fastest he has had the boat going is 22 knots, which he averaged over a two-hour period last summer, after he and Carol had taken delivery on the boat in Rhode Island. "There is water everywhere when you're going much over 18 knots," he said.

One of the design features which helps Route 66 get moving faster is a ¼-inch venturi slot on the hull. The slot runs athwartships aft of the max beam. The slot introduces air underneath the hull, and that air destroys speed-robbing suction of what is called a boundary layer of water. The venturi slot is normally not visible, except from about 45 degrees abaft of the beam.

Below decks, Route 66 is vast. Whitmore said the view is 270 degrees. "We made it multilevel inside, so no matter where you are standing or sitting, you can see out." Clear plexiglass in the hatches in the main cabin roof allow a view of the mainsail from down below while sitting at the navigation station or working in the galley area.

Route 66 is so full of nice touches that it's impossible to do justice to them all. I'll list a few. The inside of the built-in clothing drawers are finished with mesh instead of wood or fiberglass for better air circulation and less weight. The boat's lone inside shower (in the owner's stateroom) is accessible from the cabin and also from the rear deck behind the cockpit, and that's just perfect for washing off salt or grime without bringing it below.



SPECIAL TO THE HERALD-TRIBUNE

Route 66 may be the fastest cruising monohull ever built.

The seating angle of bench seats in the cockpit can be changed to fit different heeling conditions. The nav station is state-of-the-art and features a 486 computer that gives a display of the vessel and its heading on a real NOAA chart; it's one of those things you have to see to believe. And the finish work throughout the entire boat is absolutely top-notch.

To be sure, Route 66 is in a class by itself. It was built by Eric Goetz in Bristol, R.I. Goetz has a platinum reputation in the boat-building business. He builds America's Cup boats, too.

"Those guys don't like to do things twice. They don't like to have things break. They want to do it the best possible way the first time. They use the best materials," said Whitmore. "Eric was the right guy to have do it. He doesn't settle for less than perfection."