
Dinghy Cruising

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The boat in the photograph above, *Surprise*, carries The '20th Century Lugsail' developed by Roy Downes of the DCA. The dinghy is a National 18, Ian Proctor's design, which Roy had commissioned for himself many years previously and then cruised it extensively with Janet (both of them are seen here). What follows, taken from DC219, is one of the best technical articles I have published in the DCA Journal — and one of the longest!

Keith Muscott

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Bulletin № 219

Hoisting the Lugsail into the 21st Century, by Roy Downes

First, look at the photograph of Surprise on the front cover of this issue – now read on

The lugsail is a very ancient sail form. The first Chinese lugsails appeared more than 1700 years ago and these were true fore-and-aft sails, enabling their boats to sail effectively to windward more than one and a half millennia before European craft could do so. This Chinese 'junk' rig was a fully battened sail, zero twist, low mast compression balance lug. By the time of the Ming dynasty (1430 AD) this rig was in use on boats up to 500 feet long – almost twice the length of *Cutty Sark*.

In northern European waters, by the late 1700s, particularly along the Channel coasts and elsewhere around the British Isles, the less efficient but powerful dipping lug variant was in widespread use in the huge fishing fleets. The simplicity, relative ease of handling, basic spars and sail construction, minimum cordage and fittings and above all, low cost, were key factors for its utilisation.

In the early 19th century lugsail rigs drove 'gentlemen's cutter yachts' on long cruises and in early yacht races. In the western Channel very competitive and often physically combative lugger 'racing' (for much higher stakes) frequently took place between the Revenue cutters and off-duty fisherman engaged in risky but lucrative freetrading 'runs'. The lugsail is an immensely powerful sail – a report from 1838 tells of a Suffolk Beach Punt achieving 16 knots on a reach!

By the 1880s it was the rig of choice for the enthusiastic small boat sailors in the Victorian pleasure boating boom, who used both the standing lug on the Humber and Mersey yawls and (most notably on the lighter canoe yawls) the balance lug form. As a racing rig the gunter lug was hoisted across Europe until the late 1920s. The lug sail lost its popularity as sailors embraced the 'advantages' of the Bermudian rig and fishermen adopted marine engines.



Old illustrations of the lug rig working boats usually show a sagging luff on the wind and the excessively twisted leech of a boomless sail downwind. These characteristics are replicated in more recent times: just look at the photos (circa 1978) of Fabian Bush's 18ft lugger as illustrated in *Spritsails and Lugsails* by John Leather. Even DCA President Roger Barnes sports a lovely traditional twisted boomless mainsail on *Avel Dro*. (*Bulletin* 214 p56).



Viking: 1886 Humber Yawl at Fowey Classics. ©Richard Waldram

But the 1993 launching of *Roxanne*, a 30ft high-tech lugsail yawl from the board of Nigel Irens, consigned to Davy Jones's Locker all the historical baggage surrounding the lugsail as she sliced through the fleet in Falmouth Classics to take the Overall Winner trophy.

The cult of the modern lugger was born. This is the account of one of these, an 18ft centreboard dinghy, following in the wake of *Roxanne*.

☆☆☆☆☆

The old fisherman, leaning on the harbour wall at Mevagissey as we ghosted in below him one calm afternoon, summed up everybody's questions about *Surprise*:

'What sort of boat is THAT then?'

Tempted briefly to answer in the vernacular – 'She'm a simple Cornish lugger me 'ansome' – would have been both patronising and possibly less than truthful. Cornish yes, with St Piran's cross flying at the peak and the distinctive Fy (Fowey yawl) sail insignia, a lugger undoubtedly ... but simple? I'm wasn't so sure, so I replied that she was a sort of a modern version of a typical old West Country 'punt' – the traditional small boat used by watermen.

Surprise was launched in 1973 as National 18 No.303, with a conventional Bermudian sailplan,

though with a lower aspect ratio than her racing sisters, as from the outset she was intended to be a cruising boat. The GRP hull, moulded to the 1968 Ian Proctor design (identical to Roger Bamford's *Sea Fever* (Bulletin 218 and earlier issues) with a 7ft beam, a 65lb cast alloy aerofoil centreplate, large bow and stern tanks (just like Proctor's *Wayfarer*), a trapeze, three headsails, a storm trysail and a spinnaker. We went cruising from our mooring at Lee on the Solent, all over and out of the Solent to Chichester Harbour, Christchurch, Poole and beyond. We sailed down to Helford (Cornwall) and back, and the following year down to Salcombe and back. So four times round Portland Bill.

One fine day we stripped out all the cruising gear, packed our lunch and sailed non-stop around the Isle of Wight in under 12 hours. But an inescapable fact of dinghy cruising life is living with wet sails ... in our case, a lot of them (they were all used). The other downside for us was a more fundamental design problem: all our dry gear had to be stowed in the bow and stern tanks, precisely where one doesn't want weight in a small boat, and this gave us problems in heavy weather.

After 10 years it was time for a rethink: one big sail with industrial reefs, a little mizzen for balance and gear stowage under the cockpit floor towards the centre of the hull.

The inspiration for this radical re-rig and the associated rebuild of *Surprise* came primarily from the sailing canoes of the 1880s. These were the hot-shot boats of the era, allowing the inventive Victorian sailors almost unlimited scope of design and experimentation. Their preferred sailplan was a fully-battened balanced lugsail with a small (often sprit) mizzen. The efficiency of the traditional Chinese junk rig was another aspect of my thinking. Sail plan doodles and layout drawings multiplied. Ideas crystallised. But the undertaking posed risks: it was going to be costly ... and what if it didn't work?

In 1983 my crew and I got married, moved from London to Cornwall, raised a family and embarked on the restoration of a much neglected house. The entire boat project moved to the proverbial back burner.

The catalyst for action was the launching of *Roxanne*, so we dusted off the old drawings and doodles – and then came seriously unstuck. There is a world of difference between dreams, doodles and ideas and the practical mechanics of making such a radical rig transformation to a small boat. In that pre-internet age there was no ready access to reference material to explain the intricacies of converting a conventional Bermudian rig to a lugsail. How would the concept work in reality? The potential expense and the risk of getting the design details wrong loomed ominously.

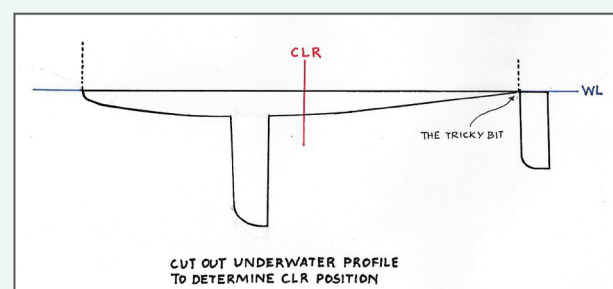
The only information to calculate the correct location for Centre of Effort (CE) vs Centre of Lateral Resistance (CLR) for a hull being converted from



Roxanne ©Nigel Irens Design

Bermudian to lug was in *Practical Junk Rig* by Haslar and McLeod. But the authors focused exclusively on yachts with long keels, not dinghies, and featured the true Chinese junk rig, rather than a Western standing or balance lug. So not as simple as you might think without access to sophisticated computer software. Which we didn't have.

So we applied a more traditional method: the model. Using very stiff but thin, cuttable cardboard, we made an absolutely accurate scale drawing of the underwater profile of *Surprise*, with centreplate AND rudder blade fully lowered (blade only, not the stock). Then very carefully we cut out this profile ... the tricky bit is cutting the cardboard right at the transom because there is only the underwater section of the rudder attached to the boat waterline by a whisker of cardboard and the rudder blade must remain in its proper (ie sailing) position. Then we stuck a pin into this profile, initially just aft of the centreplate and moved it fore and aft until the entire profile balanced perfectly horizontally. Bingo! That's the position of the CLR. Getting this right is absolutely vital if you want to sail a well-balanced boat.



We had some puzzles with the sailplan trying to determine the sheeting angle but Nigel Irens – with great generosity and a lot of his time, as we sat aboard *Romilly* (Roxanne's little sister) at Southampton Boat Show, imparted valuable insights into the optimum sheeting angles for a boomless fully-battened lugsail. This determined the precise fore and aft positioning of the thwart which carried the full width mainsheet traveller. The construction of the new *Surprise* could move ahead at last.

Technology is the key to success for the modern lugger. Most particularly in the departments of minimal deflection spars, low distortion fabric (woven please, not Kevlar) and in virtually zero-stretch cordage. For the first time it is possible to apply and maintain constant tension to the luff of the sail. One hundred and twenty years ago fishermen were using chain halliards in their efforts to minimise stretch but they were still defeated by the slack performance of flax canvas sails and hempen bolt ropes.

A sail will lose 20% of its potential drive if allowed to twist just 30° between foot and head and the traditional lugsail often operated at worse than 50% twist. Oops! Let's apply the available upgrades.

SPARS

First of all the mast shouldn't bend, because if it does the luff (and halliard) tension will slacken. Modern composites, aluminium or skilfully laminated wooden spars will minimise bend. The spars on *Surprise* are all carbon fibre: mast, yard and mizzen were custom made, but the bumkin is a section of broken windsurfer mast.

Even more important, the lugsail yard shouldn't bend at all. If it does (typically in banana shape: downwards at the throat through luff tension, upwards at the halliard sling point and downwards from the peak through leech tension) your sail will assume a shape altogether different to the one intended by the sailmaker (unless it has been cut to fit a bendy yard) and no amount of tweaking will put it right. I know: we initially suffered a bendy yard on *Surprise* and I began to wonder if my 'second mortgage' level of investment in carbon fibre was such a clever idea after all.

Fortunately CompoTech (a former contractor to the Soviet military and space effort based in Czechoslovakia), had just established their agent in the UK, which saved the day.

They produced a zero deflection yard, lighter and better profiled: a complex tube starting as a circular form at 55mm dia, increasing to 70mm ovoid, then parallel at this width before finally tapering over 3350mm to a circular section 35mm dia at the outboard (peak) end. And still cheaper than our home-grown but now defunct Carbospars.

The bendy Carbospars yard was adapted to make

the boom when we changed the rig from standing lug to balance lug.

Why did we do this? Well, you only have to experience once a Chinese gybe in 27 knots of wind and endure the ignominy of being dragged down by the sheer windage of the twisted sail to the inevitable capsizes* in front of the entire Falmouth Classics fleet to appreciate that a boomed sail is far less likely to provoke this degree of helplessness. A Chinese gybe prevents either luffing up into the wind or bearing away and it also prevents you from lowering the sail. In a word – you're stuffed! Add the boom.

The two other good things about a boom: a balance lug with a multiple purchase tack downhaul (in our case a winch taking the tail of a 2:1 purchase) can apply significant tension on the tack point – which of course is some way aft of the actual tack of the sail so the boom effectively acts as a kicking strap (boom vang). The other upside is the remarkable benefit it gives to camber control.

SAILS

Surprise sets a loose-footed sail secured to the boom only at the tack and clew. The area of the mainsail is 167 sq ft and the mizzen, a traditional 'leg of mutton' planform, with a single full-length diagonal batten, is really just a balancing sail at only 17 sq ft.

James Lawrence, our sailmaker, recommended for the mainsail (or more properly 'the foresail') a 5.5oz tight-woven, soft-finish cloth, heavier than usual for a dinghy of this size, to counteract the very considerable loading a lug rig places on the fabric. They were absolutely right: after 15 years the sail shape is still perfect.

Another reason why the sail is in good shape is because it has never flogged. A flogging sail will rapidly break up the stitching, coating and fibres of the fabric. In very strong winds a flogging sail creates huge windage drag and can make boat management very difficult, quite apart from upsetting the already whimpering crew!

With its four full-length battens *Surprise's* mainsail sail can be eased – unreefed – in 37-knot squalls (yes, we've been there, done that, got the White Knuckle T-shirt) and remain perfectly silent and fully under control. As accurately observed by Lord Byron in *Childe Harold*, 'This quiet sail is as a noiseless wing.' It is really responsive, delivering 'power on' or 'power off', just like the accelerator on a high-performance car.

BATTENS

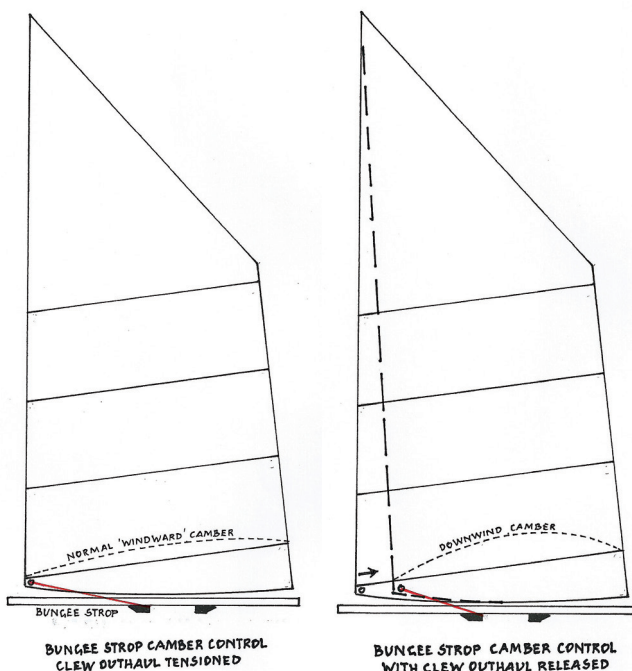
Surprise uses the widely available and tunable cruciform + section GRP batten. The horizontal (lateral) arms of the + can be planed down towards the luff to increase batten flex exactly where it is needed, whilst retaining a very stiff section towards

the leech. The battens are tensioned with a simple strap and locking buckle system. The applied tension determines the basic pre-set or default curvature for the sail since once hoisted it isn't possible to make any further adjustments to batten tension. We alter the sail with very effective control lines which allow the sailcloth to dictate the batten curvature and camber of the sail.

SAIL CONTROL

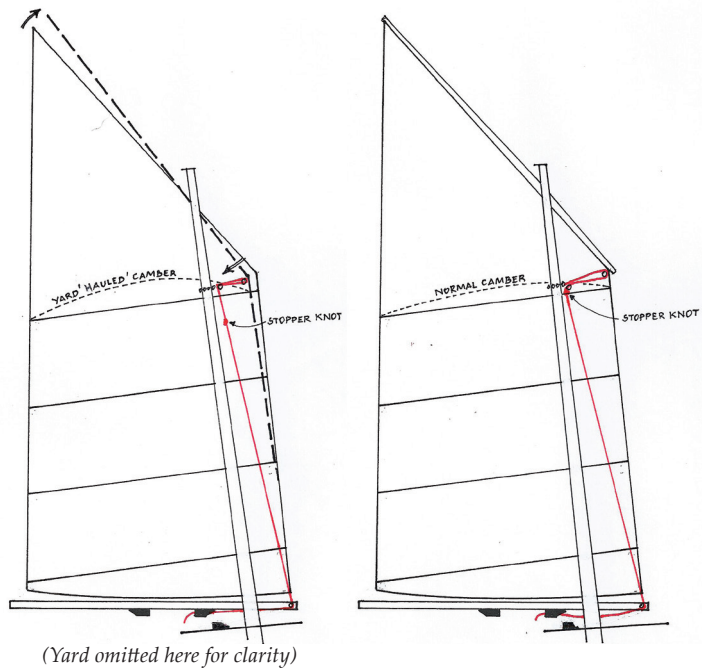
Starting at the peak, there is an 8:1 mini-block tackle to apply significant tension along the head of the sail laced to the yard. This is another very important setting to be determined before the sail is hoisted and we use a self-adhesive numbered tuning scale stuck to the outboard end of the yard to accurately replicate settings. Curiously this well-tensioned section of sail immediately below the yard acts as our key sail trim indicator: it gives us the same information as the luff of a regular Bermudian mainsail or a jib. When it flutters we're pinching or sheeting incorrectly. The real luff of the sail is completely unreliable as an indicator. So I tend to get one helluva crick in my neck peering up at the yard!

The camber (flow) of the sail is easily altered underway with two simple controls. Primary adjustment is foot tension. The clew is attached to the boom very simply: just 3 turns of Dyneema rope passing quite slackly around the boom and through the clew cringle. The outhaul control line leads forward from a two-block purchase at the clew to approximately midway along the boom, within easy reach of helmsman or crew and is jammed with a big clam cleat. Also attached to the clew is a powerful bungee strop which, when tensioned, stretches back to mid-way, on both sides, along the boom. When we come off the wind the outhaul is released and the bungee instantly pulls the

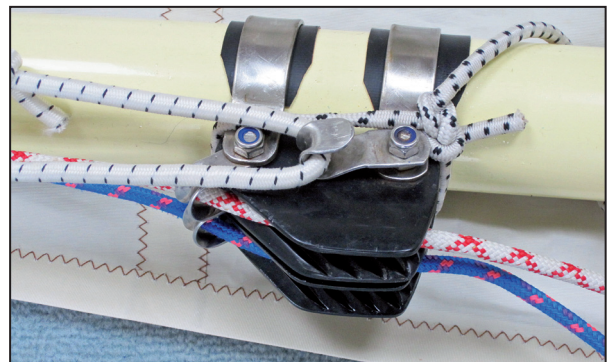


clew forward along the boom, increasing the camber (flow) of the sail from the flattest windward setting 1:16 to an obscenely obese 1:6 for downwind sailing. That's a curvature approaching 20 inches (50cm) at the point of maximum chord along the foot. (See drawings) The increase in drive is phenomenal – so simple and sooooo effective. Who needs a spinnaker?

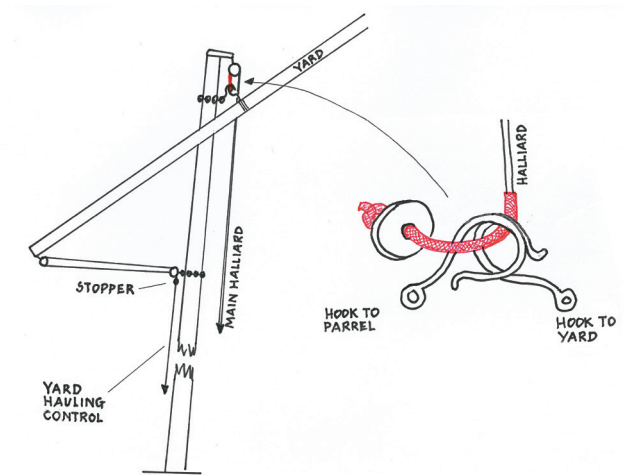
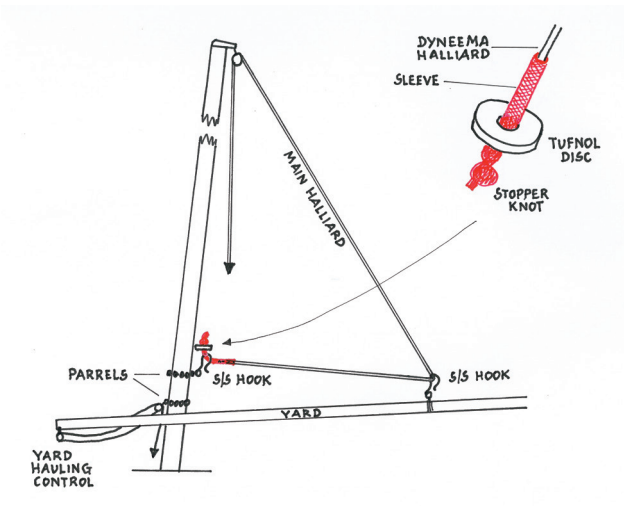
The other sail shape control is the yard heel control which is effectively a yard 'hauling' system. As Chris Waite noted in Bulletin 218, (*The String Thing*) an uncontrolled lugsail yard can, with no encouragement whatever, pierce the foredeck like a lance if inadvertently released.



We've been there too and have a perfect 55mm dia hole through our foredeck, now skilfully covered up with non-slip treadboards glued to the deck. As this unwelcome event took place in the first week after *Surprise* was re-launched (imagine the language!) it was obviously the moment to address the problem. Alongside this projectile characteristic, an unrestrained yard can also cartwheel skywards even when being carefully raised or lowered; this makes handing the sail quite a challenge.



Bungee strop sail camber control tensioned to hook



Fortunately the solution is very simple: add a second parrel band under the main halliard parrel (see above) and run a dead length rope strop from the heel of the yard to the parrel.

The parrel rises as the sail is hoisted and the length of the strop completely limits the distance the heel of the yard can rise towards horizontal: the yard cannot cartwheel or lance the deck. The length of the strop should be sufficient to allow the yard to float forward to its natural position when fully hoisted.

If you like to wring maximum performance out of your sail there is a small improvement which can be made to this simple control (above).

Ditch the strop and replace it with a line starting at the parrel, thence to a small block at the heel of the yard and then back to another small block on the parrel. Below this block on the parrel tie a stopper knot in the line and put a small hard plastic washer to take the wear as it stops against the sheave and cheeks of the block. Ensure that the scope of this two-part tackle is equal to the original dead length strop.

Now the clever bit. Take the fall of the line down the foreside of the mast, through a turning block and to a cleat or jammer. On a reach or run heave in on this line. It will pull the heel of the yard towards the mast, throw fullness into the sail and simultaneously raise the peak helping to reduce leech twist. Letting

it go returns the sail to its flattest camber as the yard heel takes the luff forward again. Simplr.

There are a number of different traditional methods to attach the yard to the halliard and to keep it close to the mast when raising or lowering the sail. Ever since re-launching *Surprise* in 1997 we have used this foolproof, simple and strong system, which, combined with the yard heel parrel, gives complete control over the sail. It's pretty similar in principle to the method outlined by Chris Waite.

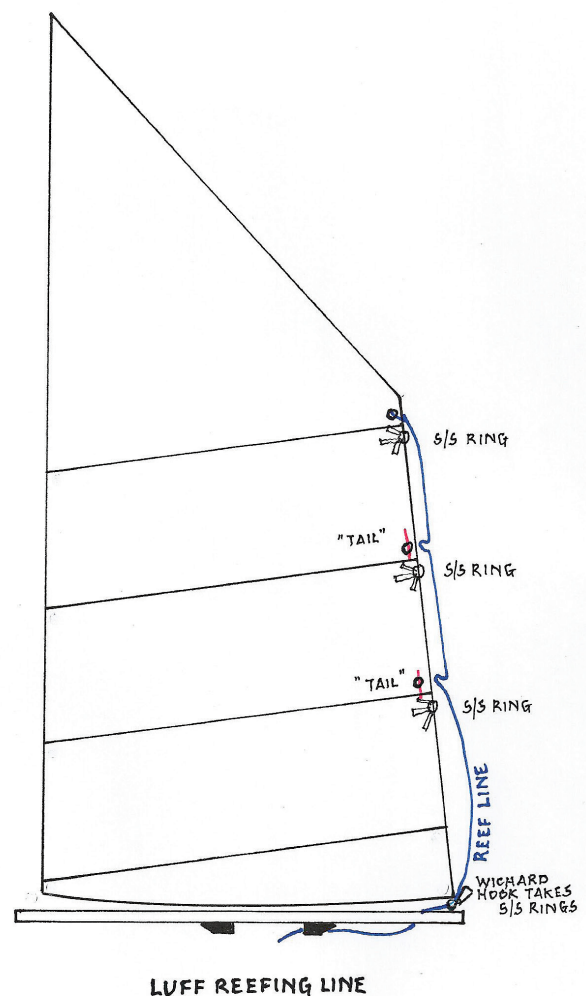
SAIL TRIMMING

Only two things to say here: don't pinch to windward and don't sheet in too hard going to windward. Lugsails (especially in these virtually cat-rigged versions) like to be sailed a little bit free. Speed through the water will usually more than compensate for the slight loss of heading angle.

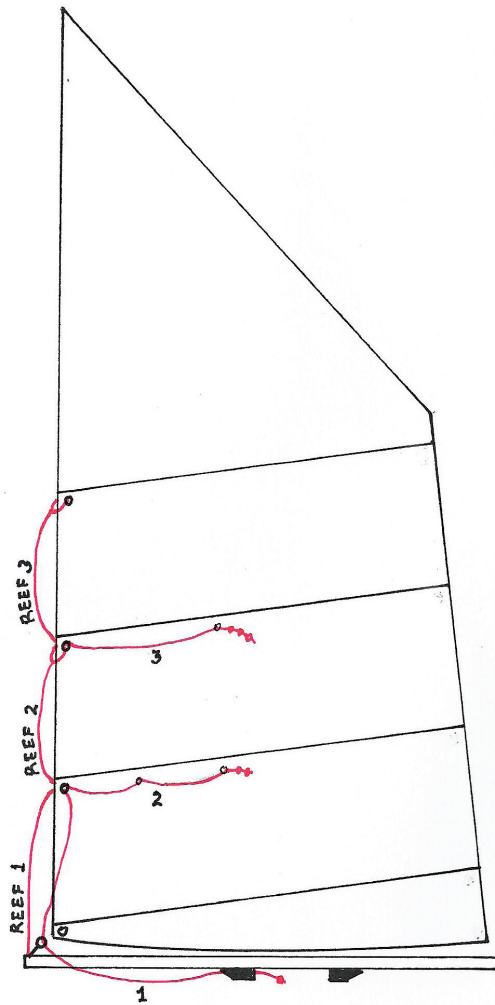
Offwind we have found that the lug rig will outperform anything else with a similar sail area and sometimes much larger boats. But offwind a boomless twisted mainsail can induce an unnerving roll. Fit the boom!

REEFING

Since all of *Surprise's* power is in one big sail, the reefing gear has received a lot of thought. We always



LUFF REEFING LINE



LEECH REEFING

reef when on starboard tack. The sail incorporates 3 large slab reefs, which average around 37 sq ft per slab. If we really get caught out suddenly the entire sail can be lowered in under 10 seconds.

Leech and luff each have separate control systems to manage reefing. To reduce the amount of rope required to take in up to 3 reefs there is just one line at the luff, attached to the uppermost reef cringle (Reef No. 3), instead of the more usual individual line for each reef.



Luff reefing line, eyelet and red tail



Each reef has a cringle at the luff end of the batten and a large stainless O-ring projecting forward of the luff. As the reef downhaul line passes down the port side of the sail, at the cringle for reef No. 2, a small bight is passed through the cringle, from port to starboard and is then prevented from pulling back out by pushing a tail of thick rope, stitched to the luff on the starboard side of the sail above the cringle, into the small bight, so this works in the fashion of a Dutch shackle.



Boom tack fitting (sail not attached). Luff reef line passing through rounded shackle, not block. Strong Wichard snap hook shown attached to ring

From cringle No.1 the luff line descends to the forward end of the boom, passes through a smooth shackle (it could be a block but a shackle can be through-bolted with the tack eye securing fitting) at the tack of the sail and then aft along the boom to a clam cleat. Once the reef is hauled down, the luff O-ring is attached to the heavy duty Wichard snap hook fixed at the tack and the little rope tail holding the bight passing through the cringle is removed, releasing the luff line to allow it to apply



Luff reefing showing stainless ring attached with webbing and one reefing pendant bobble

a direct pull on the next reef up. This system ensures that as a reef is pulled down, the tension on the reef downhaul line is from the lowest available reef, not from No 3 way up the mast. This prevents the 13 ft luff of the sail bellying away from the mast.

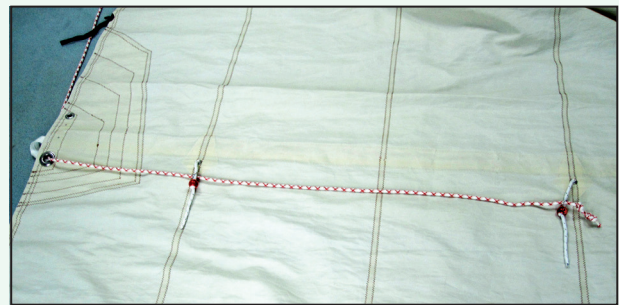


Battery of boom clam cleats showing (left) reef 2 leech line and clew outhaul control line in blue. (Right) luff reef line. All untensioned

In extremis, or if the time to be spent reefed is very short, this luff line and its clam cleat are strong enough to hold the reef without engaging the O-ring in the snap hook.

At the leech there is a rather different arrangement, also devised to reduce the amount of rope, weight aloft and windage of conventional slab reefing, which usually features a separate line for each reef, starting on the boom, rising to each reef cringle before dropping to the boom and being turned through a block and ultimately some form of cleat.

On *Surprise* only reef No. 1, the first reef, is set up this way. When in use this reef line is secured by one of a battery of four large clam cleats fastened to the boom and is tensioned with a 4:1 mini-tackle incorporating a small clam cleat to grab the fall of the reefing line. The other three clam cleats take, respectively, the



Leech reef line for Reef 2, coming down leech, through cringle and forward via small stainless rings on pendants



Reef 2 leech line hauling end, with 2 knots



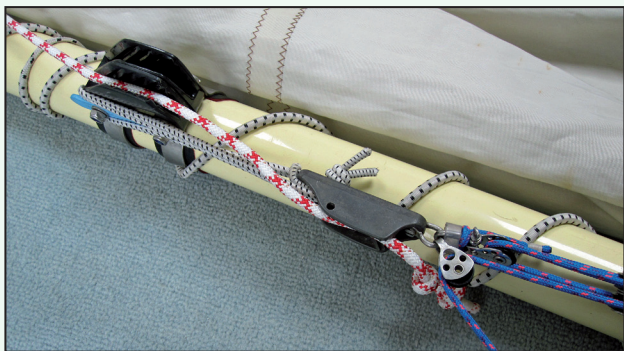
Leech line for Reef 2 now at boom level when Reef 1 is taken in



The upper (fixed) end of Reef 2 showing the line for reef 3 coming down sail leech and passing through cringle and passing forward across sail



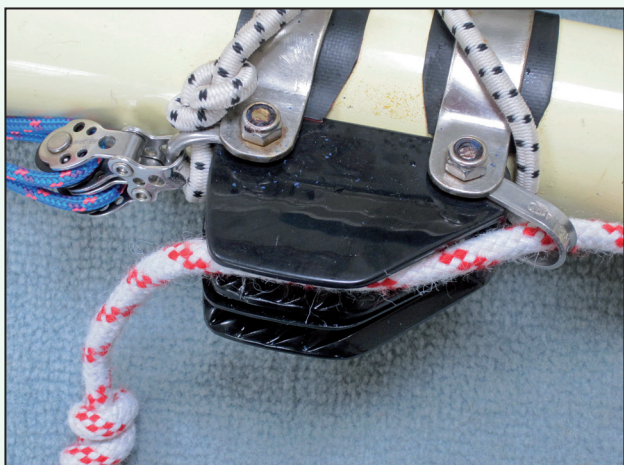
The business end of the boom mini-tackle, bungee tensioner unhooked for clarity



Mini-tackle hauling in Reef 2 leech line



Reef line hauled and stowed in bungee spiral on boom



Luff reefing line in clam cleat, fixed end of mini-tackle



Strip shackles used to make fairleads for clam cleats, and hook

permanently-rove normal clew outhaul control line and reefs 2 and 3 when in use. A little further forward on the boom is another large clam cleat for the luff reefing line. The mini-tackle lies along the boom between these two sets of cleats and is aligned to tension lines originating at the aft end of the boom since each reef creates a new 'clew' and a new 'foot' for the sail, requiring good tension.

The reefing line for reef No.2 is secured to the cringle of reef No. 2. It drops down the port side of the leech before emerging (to starboard) through the cringle for reef No. 1, thence forward along the sail, following the line of the batten, through a couple of tiny stainless O-rings to prevent it drooping too much when not in use, to a point where it terminates vertically above but just ahead of the battery of cleats. When full sail is hoisted this reef line for No. 2 reef is of course way out of reach, some 10 ft above the deck. Taking in reef No. 1 brings reefing line No. 2 to the level of the boom. The pull to operate this reef line is directly forward, via the cringle of reef No. 1. No. 2 reef is hauled down handtight, led into the clam cleat and finally tensioned by attaching the mini-tackle. Exactly the same set-up and procedure is used for the uppermost reef No. 3. Not as complicated as it sounds – look at the drawing.

KEEPING THE YARD CLOSE TO THE MAST

The main halliard is the last bit of string – but it's important (One string to rule them all?)

The halliard and the tack downhaul are both led through clutches and are tensioned with a winch. The halliard is Dyneema so it doesn't stretch. This ensures the luff stays tight and this is fundamental to the performance of the sail.

Where the halliard passes through the clutch at normal full sail position it is sleeved with the casing of a plaited rope, to improve grip in the clutch and reduce chafe. The functioning end of the halliard is inserted into another sleeve of plaited line taken off a larger diameter rope and this – locally along its length – just about doubles the diameter of the Dyneema rope. Onto this sleeve a large Tufnol washer, made from ¼ inch thick sheet, is fitted and retained by a figure-of-eight stopper knot (See sketches above, page 40).

On the main parrel which carries the yard up the mast there is a strong stainless hook shaped like a shepherd's crook, with the opening facing downwards. The opening has been squeezed to permit only the Dyneema rope to pass through it, so when the Tufnol stopper reaches the hook the diameter of the sleeved rope is too great to allow it to drop out.

An identical stainless hook – also squeezed to accept only the Dyneema halliard – is lashed to the yard to provide the sling point. It is positioned as far aft along the yard as possible to help minimise

sail twist. The received wisdom for this positioning is between one third and two fifths aft of the throat of the sail. However, moving the sling aft also reduces the gap between the tack of the sail and the deck, so unless your mast is overlong – or your luff rather short – there is a practical limit. But as far aft as possible is best.

Prior to hoisting, the yard rests on the deck by the mast, lying as far forward as the heel control strop (*see above*) will permit and then aft into the cockpit. This locates the sling point hook approximately 4 or 5ft aft of the mast parrel. To hoist the sail, the Dyneema halliard, coming from the masthead sheave, is slipped into the yard hook, from starboard to port in direction, then forward into the main parrel hook. The halliard is tensioned so that the Tufnol stopper bears against this hook. No shackles to undo, no pins to lose, no knots for cold hands. When hoisting the sail it is helpful to have the crew lift the aft end of the yard to shoulder height to take some of the weight, but it can be done single-handed. The crew can also check that no leech reefing lines are fouled around the batten ends.

The initial few feet of hoist bring the yard hook face-to-face with the parrel hook – two stainless hooks united (but not hooked together) by the large diameter sleeved end of the halliard and the stopper. With the halliard now rising vertically from the parrel, the yard is constrained from going anywhere except up – the scope for any drift being limited to the length of the two stainless hooks. The weight of the yard and sail and the tension on the halliard ensure it goes up (and comes down) close to the mast, completely under control. The heel control adds the final management touch to the operation.

So here we have a seemingly incredibly

complicated interpretation of what should be a simple traditional rig. But just a minute! ... *Surprise* has:

1 halliard to hoist the sail

1 tack downhaul to tension it

1 clew outhaul

1 peak outhaul

1 yard heel control

4 full-length battens (nothing new here: the Chinese had them 1700 years ago and the Victorians also thought they were quite a good idea)

Reefing controls for three reefs and 1 length of bungee to add flow to the sail (ah-ha – that's it ... that's the unnecessary complication!)

☆☆☆☆☆

'What sort of boat is THAT then?'

'She'm just a simple Cornish lugger me' ansome – and the Overall Winner of Falmouth Classics, 1999.

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★ I can hear Bulletin readers tut-tutting about that capsize, so let's put the event into perspective. It was the first and so far only capsize in 40 years of owning *Surprise*. We were racing. It was blowing 25 - 27 knots against a half-ebb tide on big Springs, by the Black Rock buoy at the entrance to Falmouth Harbour. The waves were quite large, *Surprise* was broad-reaching up the harbour on starboard, almost running, with two reefs in, at, I suppose, around 12 knots. Our closing speed with an approaching port tack Falmouth working boat was in the order of 18 knots. Despite stentorian bellows of 'Starboard!' it rapidly became clear he wasn't going to give way.

Our rather stark choice was a crash gybe off a full plane or – quite literally – be cut in half.

When we got ashore we were told about the notorious reputation that the working boats have when racing. Except amongst themselves, the Colreg Right of Way rules don't apply when they meet other sailing boats, most especially if the other vessel is smaller than them. As they replied to one dinghy sailor (now a quite well-known international helmsman) who had the temerity to call 'Starboard' as I did: 'It's your boat, Sonny.'

You have been warned! *RD*

