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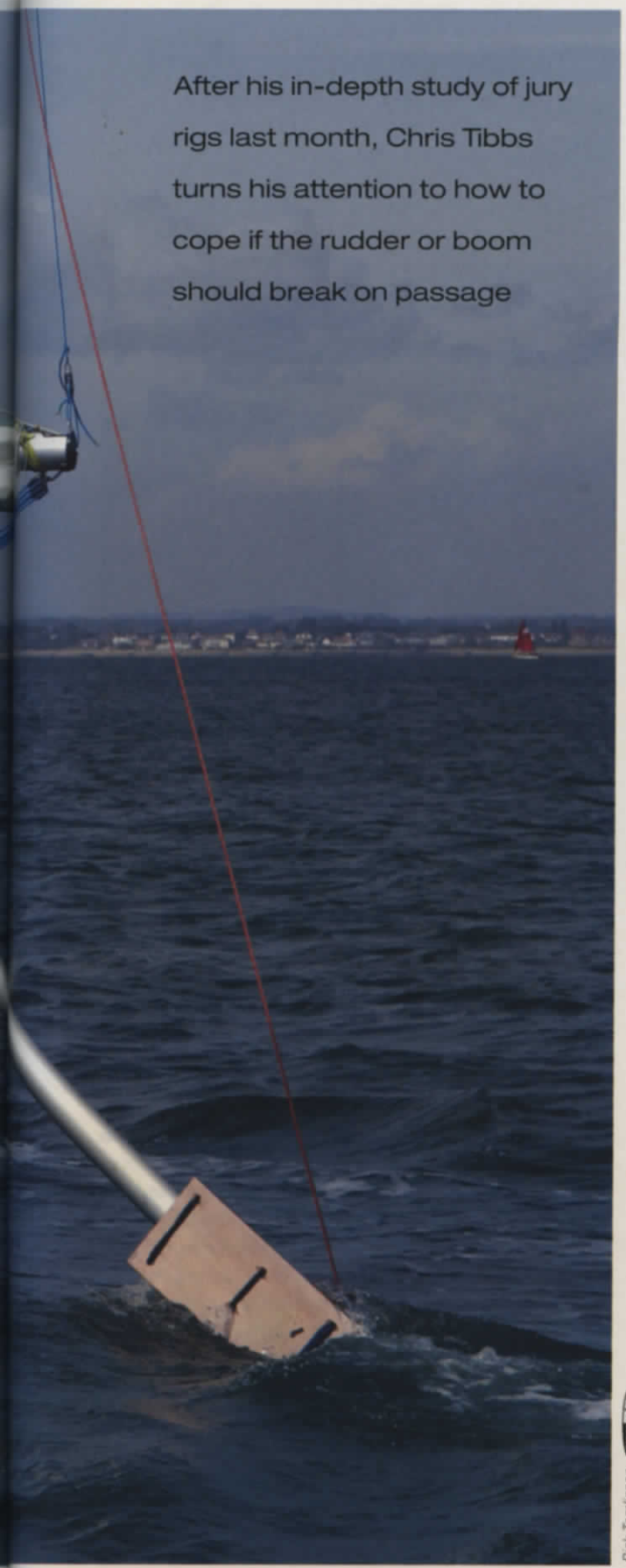
Ocean Ready

Jury rudders and booms

After his in-depth study of jury rigs last month, Chris Tibbs turns his attention to how to cope if the rudder or boom should break on passage



Rick Tomlinson

A board lashed to the spinnaker pole is often quoted as the solution to a rudder failure

Chris Tibbs has covered more than 250,000 sea miles around the world, including two Whitbreads and the BT Global Challenge as skipper of *Concert*. He now runs Sailing-Weather.com, a weather forecasting service for sailors

There is a sickening feeling if the boat will not answer the helm. The harder you turn the wheel, the less the response to it. This will be familiar to anyone who has tried to dip a starboard tacker and the mainsheet has jammed. There is a powerless conviction that something nasty is about to happen, and it usually does.

When the steering fails, you are lucky if the boat slowly rounds up and turns head to wind, possibly tacking and heaving to. However, if powered up downwind, a Chinese gybe with the main pinned against a runner may be the result.

Rudder failures are rare, but not as rare as you might think. Jeremy Wyatt from World Cruising Club reports that there is usually at least one rudder or steering failure on each ARC Rally. The loss of the rudder on *F2* last year was not, therefore, an isolated incident (*Yachting World*, May 2003), although the reasons why may well be.

Losing a rudder is not a new phenomenon – even the *Cutty Sark* had a problem with her rudder when racing against the clipper ship *Thermopylae*. They both left Shanghai on the same tide and the *Cutty Sark* had opened up a lead of 400 miles by the time they reached the Atlantic. In bad weather she then lost her rudder.

It took five days and the demolition of a deckhouse to make a jury rudder for the 6,000 miles home. She lost the race and the best price for the tea, but made it home unaided.

Steering failure

There is a tendency to lump all rudder failures together when really they should be split into rudder failure and the more usual steering mechanism failure. Rudder failures include the rudder breaking away and the shaft bending or breaking, while steering mechanism failures are generally the result of broken cables, loose bearings and quadrant failure.

The steering mechanism is usually the lesser of two evils as there is a chance of repair or of using the emergency tiller. But when was the last time you tried the emergency tiller? Does it fit and is it readily available? Or is it rusted up in the bilges with years of accumulated cruising gear on top?

One delivery that turned sour for me was on a charter boat with a beautiful aft cabin. The emergency steering fitted through the centre of a king-size bed, but to use it meant steering from the aft cabin. Visibility was nil and instructions had to be shouted down from the deck. Luckily the steering failed near the end of the trip, but docking the boat was a bit stressful!

Long distance sailing puts a much greater strain on ▷

Ocean Ready

Photos: Rick Tomlinson

Every boat has different rudder fixing characteristics and the extent of damage will vary depending on what it is. For me, a spade rudder is best for performance, but security tends to favour a full skeg

the steering gear than coastal cruising. Tradewind sailing can be particularly hard on gear as big waves need large rudder movements to keep control. This is made worse by the extra weight of cruising gear and provisions – most cruising yachts are well below their design waterline when setting off on long ocean passages.

Rudder damage

Problems really begin when it is the rudder that is damaged or breaks. One of the most difficult is if the blade of the rudder is hit, bending the shaft and jamming it against the hull. The jammed rudder blade will make it hard to set any jury rig if it is over at an angle, keeping the yacht turning in circles. Occasionally the shaft breaks on a spade rudder between the lower and upper bearings. The blade does not fall out but acts as a lever, eventually breaking the hull and threatening the yacht. This has led to an increased use of watertight bulkheads on some yachts.

Stokey Woodall, a sailor with hundreds of thousands of ocean miles under his belt, makes the following points:

- Check the watertight integrity of the boat, he urges: the loss of a rudder may well leave a hole in the hull at the bottom bearing.
- By carefully balancing the sails, you should be able to steer a reasonable course. Stokey also points out that, in such cases, a mechanical-type windvane with its own rudder can come into its own as an alternative steering mechanism.

Options for jury rigging a rudder

The most often quoted example is the head door lashed to a spinnaker pole and used as a steering oar. As the term 'starboard' is derived from 'steering oar side', this should be a tried and tested method. The alternative is some form of drogue. This helps with both directional stability and by causing drag to turn the boat.

The heads door lashed to the spinnaker pole has always been my stock answer when I have been asked what I would do in the event of a rudder loss, although I had never really thought it through, let alone tried it. So I decided it was time to put the idea to the test and see if it really worked.

I spent time in making up a board to lash to the spinnaker pole, as sacrificing the head door seemed a bit drastic. The object of the exercise was to prove that in the event of a rudder failure the boat could be sailed to a port of refuge safely, and in a seamanlike manner. It was therefore important to be able to sail in a straight line, tack and manoeuvre, with the minimum of effort. The Solent is not the Atlantic, but sailing in moderate conditions should give us an idea about the practicality of sailing in more extreme conditions. In winds of around Force 4, I used a 1978 S&S Swan 38. Not wanting to remove the rudder, this was lashed amidships.

As an alternative to the steering oar principle, I also decided to investigate the idea of drag but more as a comparison than as a viable alternative. (See results opposite)

The experiment

Steering oar

I topk two sizes of board for the trial, although the configuration at the back of the boat dictated the maximum size that could be fitted through the pushpit. I added a topping lift to the outboard end of the pole and an additional line to the backstay.

When the steering oar was used as a sweep the loads were high and the pole difficult to manage, but by adding guys to the inboard end led to winches it became a little more manageable. Additional lines to the outboard end would probably have helped.

There was a tendency for the blade to twist as the pole was moved from side to side; this problem could be overcome by lashing a bar across the inboard end. The lashing at the base of the backstay needed fine tuning as it was too tight and it became very difficult to move the pole, although too loose and control was lost. **Verdict:** Heavy and cumbersome; additional guys would have helped. The spinnaker pole used, dating from 1978, was heavy compared to modern poles and more recent poles would probably need added support to avoid the risk of breakage.

Drag principle

To test the principle of drag, we lashed a spinnaker pole across the cockpit – not firmly enough as it happened. With lines through blocks on either end, a drogue was towed behind the boat, the inboard ends of the lines leading to small winches.

Initially, we used a small bucket as a drogue but as the wind had died the effectiveness was limited. We changed this bucket for a small kitbag with a 5kg weight, although as the bag filled with water this weight greatly increased.

The drogue was towed behind the boat and winched from side to side, slowly turning the boat. It was still necessary to trim the sails so the system was not overpowered, but with relatively little effort control was gained. The wind had dropped, so against my better judgement we shook out the reefs and raised full sail.

When the wind increased to Force 4, loads shot up dramatically. Larger winches had to be used and it became apparent that the pole was not securely lashed across the cockpit and slid from side to side. However, the yacht was manoeuvrable and tacking proved relatively easy, although when we tried to gybe, the drop in speed made the drogue inefficient and the boat wallowed.

Matching sail area to wind and drogue is important. We ended up with too much sail and load on the drogue rocketed. **Verdict:** Remarkably efficient. Drogue movements combined with sail trim made steering the boat reasonably easy. Not only was the boat controllable but it felt controlled. Even with too much sail for the system it was more a concern with the increased loads rather than of keeping control.

Conclusions

To my surprise, the idea of a steering oar proved to be difficult and not the method of choice for this particular boat. Using a drogue was easier, definitely safer for the crew and the yacht felt more in control. Whereas the big rollers of an open ocean would seem very daunting trying to steer with a form of oar, a drogue seems practical and safe. The stronger the wind, the greater the drag and the further the drogue can be let out, and I feel it has ocean crossing capabilities.

Different boats will behave differently and although the rudder was not used, it was still there, presumably adding directional stability.

Creating drag was controllable and easy to set up. A variation on the theme would be to have a spinnaker pole from the mast on the leeward side with a drogue from the end and a line to the opposite quarter. This would give the drogue greater movement and make it more controllable. However, loads can get high and with all these methods there is the danger of damage.

A storm drogue is too big and one from a Danbuoy too small. One solution would be short lengths of anchor chain. This could be added to, or removed, depending on wind strength. There would have to be some trial and error and some time spent hove to sorting out a system. Whatever system is used, sail trim and balance is all-important and worth working on.

Testing the drag principle

Steering oar

Photos: Rick Tomlinson

A small board was used for the steering oar as it fitted through the pushpit; however, the loads were considerable

Rick Tomlinson

With a reef in the main and a line aft, reasonable sail shape was achieved in our simulated broken boom experiment

When the boom breaks

A broken boom is a nuisance and slows a passage but it is seldom a danger. Booms tend to break on long downwind voyages near the vang fitting. There are a number of reasons for this. The most likely is when the boom is dipped in the sea when power reaching.

In tradewind conditions, this happens more often than you might expect and to avoid damage to the boom the vang should be released before the boom hits the water. This is fine when fully crewed, but if you are sailing short-handed, you may just have to reef earlier than usual.

Once the wind has eased, a sloppy sea also causes the boom to be dipped more than usual with a resulting crack or break appearing near the vang fitting. This happened to us on *Liverpool Enterprise* in the Southern Ocean during the 89/90 Whitbread; the subsequent repair is shown in the photographs (above right).

A favourite trick to protect the boom is to use a short preventer from the toerail to the vang fitting. Some older boats with low booms had moveable kickers to do this and, although it gives a good sail shape, great care must be taken to keep the boom in one piece. This set-up when racing often has a piece of lighter line in the system to act as a fuse, which breaks before the load gets too great.

Repair or sail without one?

Repairing means splinting or sleeving the boom. It was popular at one time for Whitbread yachts to carry sleeves for booms, but that has largely gone out of fashion.

It is possible to splint a boom by supporting it with a spinnaker or jockey pole and tightly binding rope or, as in the picture (right), wire around it. This must have been the last race when any of the yachts used wire sheets and guys; a passing that is regretted by no one!

Jockey poles, spinnaker poles, even supports from pipe cots have all been used to splint booms. Getting the lashings tight enough is a problem that can be solved by using a Spanish windlass – in practical terms, this entails using a screwdriver pushed between the lashings, and at 90° to them, then rotating. This takes a bight of the rope and tightens the whole lashing, but it does require the screwdriver to be left in place and also lashed.

Not all repairs are going to be practical for a short-handed crew and most boats can be sailed without a boom. Downwind the options are easy, as you can set twin

A repaired boom on *Liverpool Enterprise* in the Southern Ocean after a gale had blown through

Photos: Chris Tibbs

headsails and maintain a good average speed. Some crews swear by twin headsails for downwind sailing, although I have always found it a rolly experience.

With the wind on or forward of the beam, a tried and tested method is to roll up the first reef then attach the mainsheet to the first reef cringle. The problem is outhaul tension and a block and tackle to the runners, if fitted, or any fitting of sufficient strength as far aft as possible can solve this. This method has been used very successfully on a number of racing and cruising yachts, although once the wind moves aft the sail shape is lost.

Double whammy

El Syd, a Sydney 41, got a double whammy while sailing in the ARC. Owner/skipper Ian McKinney explained that, while screaming along in 30–35 knots of wind, the yacht suffered a full-on broach when a steering cable broke. The rig stayed up, although the spinnaker was lost. The broken cable was repaired using Vectran and soon they were sailing again.

Possibly caused by over-tight steering cables, there was also noticeable movement in the rudder bearings. Ian's biggest fear was that the bearings would fail and the rudder fall out. This would have left a hole difficult to plug and possibly the loss of the boat. The situation was monitored and, where possible, the bearings tightened, but this continued to be a worry for the rest of the race.

Then, after the weather had calmed down, the boom broke. It seemed strange that after such a fast sail, it broke in only 18-20 knots of wind. Ian described how, in apparent slow motion, it just folded up, failing near the vang fitting. Under a poled-out No 3 and a second headsail, they subsequently hit a top speed of 16.9 knots. His recommendation is to have the boom dye-tested for cracks or if possible X rayed before a long passage. ❑

Repairs to *El Syd*'s steering mechanism, damaged during the Atlantic Rally for Cruisers

Next month

Keeping food fresh on a long passage, and fishing for your supper

Coming up

Training for safety and survival; tenders and outboards; whether to join a rally or go it alone