

Managing Emergencies – Rudder Failure

Round the world yachtsman Chris Tibbs considers how best to cope with a rudder failure at sea.

It is a horrible feeling if the boat will not answer the helm. The initial reaction is to keep turning the wheel (or pulling the tiller) and it takes a few seconds to realise something has gone wrong.

When the steering fails you are lucky if the boat slowly rounds up and turns head to wind, possibly tacking and heaving too. However if powered up when sailing down wind an accidental gibe or broach may be the result.

Rudder failures are generally rare; however most years during the ARC, there are reports of rudder or steering failure. Whilst most skippers and crews repair the damage or make a jury rudder, there have been cases where the yacht has been abandoned.

So why does such a crucial piece of the boat that is normally so reliable fail during an Atlantic crossing?

Trade wind sailing can be particularly hard on gear as big waves need large rudder movements to keep control; 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. It may also be that out of sight is out of mind and unless the yacht is out of the water it is hard to get at the rudder to do any checks.

There is a tendency to lump all rudder failures together, where really they should be split into actual rudder failures and the more common steering mechanism failure.

By steering mechanism failures I include breaking of steering cables, gearbox or quadrant failures and the occasional damage to pedestals or the blocks that cables pass through. Most of this can be avoided with regular maintenance and repairs en route may be possible. However much of the steering system is often difficult to access and gets forgotten with so many jobs to do before departure.

All yachts with steering wheels carry an emergency tiller; but when was the last time you tried yours? Does it fit and is it readily

available? Or is it rusted up in the bilges with years of accumulated cruising gear on top? Now is the time to get it out and give it a try rather than at 3 in the morning (sods law states that anything at sea will happen in the darkest part of the night).

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

Repairs to the steering mechanism may be possible and sailors on the whole are a very resourceful lot. The picture from El Syd shows lashings to hold the quadrant together. Self-steering may also act as a standby in an emergency when it is connected directly to the quadrant and some wind vane self-steering systems provides a small additional rudder.

Failures to rudders are a whole lot more serious. Failures included the rudder breaking away, the shaft bending or breaking, bearings that seize or even break away from the boat. Hitting an object in the water can bend a shaft locking the helm in a fixed position.

Steering by the sails is much easier upwind than down, however it should be a reasonably straightforward job of reducing sail and getting the boat to heave to. This quickly gets the boat under control and gives a steadier platform for working on and it also gives us time to think.

To continue to St. Lucia you are going to have to rig a jury rudder; something to help with directional stability. Whatever you come up with the sails will be the main steering force and it is important to trim these to help the steering of the boat. In dinghies we were taught to steer by sails alone. The rudder was removed and we had to sail a course before the rudder was replaced – good fun as well as teaching how important the trim of the sails are to steering.

There are two main options for jury-rigging a rudder and a few years ago I experimented on my own boat a 1978 S&S designed Swan 38; the underwater configuration is a fin and skeg.

The most often quoted method is to lash the toilet door, a floorboard or other piece of wood to a spinnaker pole and use this as a steering oar.

The second method is using a drogue of some sort. This helps with keeping both directional stability and by causing drag to turn the boat.

The Steering Oar

A board was lashed to the spinnaker pole and passed through the pushpit. The size of the board was limited by

ARC Rudder Problems in last 10 Years

1998	Harlequin	Dehler 41
2001	El Syd	Sydney 41
2001	Heya	EC37
2002	F2	Hunter Legend 450
2006	Arnolf	Bavaria 350

ARC yachts have also been involved in rescuing crews from non-ARC yachts which sank – saving the crew of Cap d'Ambre in 1993 and Sagitair in 2001, both of which had rudder failures.



◀ Using a spinnaker pole and panel to rig a steering oar is a reliable method, though the force on the oar in big seas or strong winds can be great. ▼



▲ The crew of El Syd had to lash their steering quadrant during ARC2001

Damaged rudder stock, yacht abandoned
Broke rudder quadrant, jury rigged a repair
Lost rudder, jury rigged emergency steering
Broke rudder stock, yacht abandoned
Broke rudder stock, subsequently salvaged.



◀ Using the drag from a drogue to steer is easier in strong winds than using an oar

▼ The auxiliary rudders of some windvane steering systems such as Hydrovane enable a yacht to be steered if the main rudder fails.

easy although when trying to gybe the drop in speed made the drogue inefficient and the boat wallowed.

Matching the sail area to the wind and drogue is

important, we ended up with too much sail and the loads on the drogue increased dramatically.

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 one of keeping control.

Conclusions

Different boats will behave differently and although the rudder was not used it was still there adding directional stability. Look around any boatyard and one of the biggest differences we see is in the type, size, and shape of rudders. Sailors will go to great lengths defending their particular type of rudder, and each no doubt has its merits, so no solution is going to be one that fits all boats

Creating drag was controllable and easy to set up. A variation to 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 a greater movement for the drogue and more control. However loads can get high and with all these methods there is the danger of damage. The test boat used has a modest beam compared with some modern boats; also not everyone carries a spinnaker pole. Without a pole leading the control lines to the maximum beam then to winches would be an alternative.

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

Different boats will behave differently, but with some trial and error you should be able to get control. There is nothing to stop a combination of methods – a drogue to give some directional stability and a spinnaker pole for fine adjustment. Whatever method, trimming sails is going to be very important

Losing a rudder, providing there is not a large inflow of water, is going to slow us down, but should not mean the abandoning of the crossing. It is obviously of concern to all on board, however we should still get to St. Lucia, maybe a little later than expected, but in one piece.

what could be comfortably passed through the pushpit. A topping lift to the outboard end of the pole, and an additional line to the backstay were added.

Used as a sweep the loads were high and the pole difficult to manage. 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 too tight and it is was difficult to move the pole, too loose and control was lost.

Verdict: Heavy and cumbersome and additional guys would have helped. The spinnaker pole dated from 1978 and is very heavy compared to modern poles that would probably have to have added support to avoid the risk of breakage. The crew of Heya in ARC 2001 attached the end of the spinnaker pole to the bathing platform; much of the load was taken from the pole. The steering worked in light winds but they had to remove sails or heave to when the wind strength increased.

Drag

A spinnaker pole was lashed, but not firmly enough as it happened, across the cockpit. With lines through blocks on either end a drogue was towed behind. The inboard ends of the lines were led to small winches.

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

Towed behind the boat the drogue was winched from side to side and the boat slowly turned. There was still the necessity to trim the sails so that the system was not overpowered, but with relatively little effort control was gained. The wind had dropped so against my better judgment the reefs were dropped and full sail raised.

The wind then increased to a force 4 and 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



About the Author

Chris Tibbs has been sailing since childhood and was a professional yacht skipper for more than 20 years, having logged over 250,000 miles; which included racing around the world 3 times, the last time as skipper of Concert in the BT Global Challenge. In addition he has skippered private and charter yachts in home waters and abroad, and as a delivery skipper has crossed the Atlantic some 18 times. Having obtained a Masters degree in Meteorology and worked for the Met Office, he now runs a yacht routeing and consultancy company – Sailing Weather Ltd.