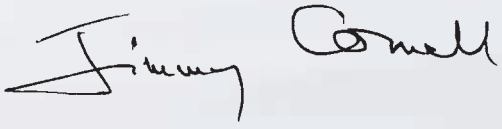
Part 3 – Small Craft

Safety has been a major concern for seafarers from the earliest days of sailing and whereas in the old days mariners were willing to put their fate in the lap of the gods, today's sailors prefer to play safe by taking additional precautions. The many thousands of miles that I spent sailing on the oceans of the world have taught me to have a profound respect for the forces of nature and not to take anything for granted but be always prepared for the worst. Safety therefore has been my first priority, both on my own yachts and as organiser of various offshore sailing rallies whose commendable safety record speaks for itself.

Over the years my concern with safety prompted me to undertake a number of surveys among my fellow sailors. Puzzled by the large number of groundings, collisions and even fatal accidents that still seem to occur in spite of the recent improvements in navigational and safety equipment my latest survey attempted to find the reasons for this apparent contradiction. By looking closely at recent accidents involving cruising yachts what is striking is that in many of the cases in which boats were lost as a result of grounding, this appears to have been caused, just as in the old days, by a navigational or human error. Looking at a number of incidents of near or total losses, I drew the inevitable conclusion that whereas in pre-GPS days boats were often lost because sailors didn't know where they were, nowadays boats are lost because skippers ***know*** where they are. Or so they think!

Indeed, one conclusion that could be drawn from these findings is that many of today's sailors seem to have a self-confidence that almost borders on arrogance and as a consequence are prepared to set off on a voyage believing that all those wonderful gadgets will make up for their lack of experience. If, as in some of the examples cited on these pages, alcohol is mixed with inexperience and a dash of ignorance, the resulting cocktail can lead to fatal consequences.

The main aim of my latest survey was to answer the question whether sailing generally, and cruising in particular, was safer. Personally I believe that cruising generally is safer, and I am relieved that the findings of my survey bear this out. Boats still get lost but certainly not as frequently as during the days of astronavigation. What I found, however, is that whereas offshore cruising is indeed safer, the situation is not so good when it comes to coastal cruising or navigating close to land. Bearing in mind the thousands of miles travelled by cruising yachts, sailing in distant waters is probably the safest way to see the world. Unfortunately, just as in the case of motoring where most accidents occur within a few miles from home, so with sailing where it is the home waters that pose the greatest risk. This is why the Marine Accident Investigation Branch is so right to focus its efforts on making safety on our very doorstep its main priority. One of the most valuable lessons I learned in my life is to learn from both my own and other people's mistakes and do my best not to repeat them. This is why even the most experienced mariner can still find something to learn from the case studies discussed in this excellent publication.



Jimmy Cornell

An accomplished sailor and successful author, Jimmy Cornell has sailed 200,000 miles in all oceans of the world including three circumnavigations as well as voyages to Antarctica, Alaska and Spitsbergen. His 43 ft Aventura III is currently based in the Eastern Mediterranean. Jimmy Cornell is a member of the Royal Ocean Racing Club.

Many of Jimmy Cornell's 14 books have been translated into various languages and his World Cruising Routes, described as the bible of offshore sailors, has sold over 100,000 copies and is one of the best-selling nautical publications in the world. Jimmy Cornell's latest book "A Passion for the Sea, Reflections on Three Circumnavigations", which is a memoir of his sailing life, was published in 2007 and can be ordered via his website: www.jimmycornell.com

As the founder of the highly successful ARC transatlantic rally, Jimmy Cornell is credited with having devised the offshore cruising rally concept. Until his retirement in 2000 Jimmy Cornell had organized 24 transatlantic and five round the world rallies. His latest project, the website www.noonsite.com, is currently the main source of practical information for cruising sailors on the internet and lists details of facilities and formalities in 183 maritime nations and over 4,000 ports worldwide. Fluent in six languages, Jimmy holds cruising seminars at various international boat shows.

A Not So Lucky Escape

Narrative

An instructor and three trainees were operating a 5.3m RIB with a 60hp outboard engine during the second day of an RYA powerboat level 2 training course. The weather was fair and the sea state was calm; the wind was force 2. During the morning, the trainees practised manoverboard drills and high speed 'S' and 'U' turns. On completion, the instructor decided to let the trainees conduct 'high speed tight turns', which he demonstrated with the engine fully trimmed down at 5200rpm. He then gave the helm to one of the trainees, who was a teenage boy. The other trainees, a mother and her teenage son, who had been alarmed by the tightness of the turn and the angle of bank during the instructor's demonstration, sat on the starboard inflatable tube in the vicinity of the steering console.

The trainee's first attempt at the tight turn did not go as intended because the wheel was not turned sufficiently hard. During his second attempt, the boat turned tightly to port and heeled over. As it encountered waves created by its own wake, the RIB's hull suddenly and unexpectedly 'dug in'. This caused the RIB to jolt and abruptly change direction, throwing the trainees on the starboard tube overboard. The mother was thrown clear and inflated her lifejacket, but her son was hit by the boat's propeller.

The instructor immediately took over the helm and manoeuvred the RIB to recover the trainees from the water. He quickly realised that the teenage boy was injured and headed back to the training base at best speed, calling the emergency services en route. The injured trainee was landed and taken to hospital by ambulance where he was found to have suffered a fracture, lacerations and bruising to his right arm (Figure 1).

Figure 1

The Lessons

1. Included among the major attractions of a RIB is the ability to turn very tightly at speed. Unfortunately, although exciting, manoeuvring in this manner carries the risk of the boat's bow 'digging in' without warning, causing a sudden jolt and change in direction. Occasionally, this is sufficiently violent to eject people out of a boat; coxswains and overseeing instructors should be mindful of such potential danger when conducting very tight turns at speed, particularly in a seaway or when crossing wakes.

2. The seating arrangements in RIBs vary considerably, and the use of the inflatable side tubes for this purpose is very common. At slow speed or in calm waters, this practice is generally safe and trouble-free. However, when manoeuvring at fast speed or navigating in disturbed waters, the risk of falling off the tubes, either into the boat or over its side, is increased dramatically. The possibility of back injuries to persons sitting on tubes is also considerably greater due to the twisted position of the spine and the shock of the boat hitting the water. Therefore, when operating under such conditions, it is far safer to limit the number of persons on board a RIB to the number of dedicated seating positions fitted, rather than by the maximum number allowed on its builder's plate.

Hold On Tight, If You Can

Narrative

A rigid inflatable boat (RIB) was being employed as a support boat for an event on the water. The 6.3 metre RIB was powered by a 115 horsepower outboard engine, giving a potential top speed in excess of 30 knots. The RIB was just over a year old but had only been used for a 4-month period prior to being bought by the current owner 2 months previously.

On the day of the accident, the boat was being used to transport event personnel out to barges. At the time of the accident, there were three people on board: the helmsman was positioned at the controls, standing astride the starboard seat pod; a passenger was seated in the port seat; and a second passenger was standing behind the two seats, holding on to the seat backs. There was a settee ahead of the instrument console, but this was unoccupied.

Having dropped off his two passengers at a barge, the RIB loitered nearby. To collect them, the helmsman manoeuvred his vessel across the 3-4 knot ebb tide back alongside. With the throttle set ahead to counter the tidal stream, he removed the kill-cord from his left wrist and stepped across to the port side of the RIB to hold on to the barge while his two passengers boarded. He then returned to his seat, replaced the kill-cord and manoeuvred clear of the barge. Having asked his two passengers if they were holding on, he commenced a turn to starboard to head down stream. As the RIB turned, there was a loud crack and all three occupants were thrown into the water, along with the two seat pods.

With no one at the helm, the boat careered on out of control because the kill-cord had fallen off the helmsman's wrist, and not operated. The RIB then collided with another vessel during which the console top was broken free

Vessel's deck showing outline of consoles – note lack of deck preparation and adhesive

of its fixings and the throttle hit the deck, pushing it to full ahead. Fortunately, the crew of a nearby support boat brought the runaway RIB under control very quickly, preventing serious injuries to those in the water. The auto-inflating lifejackets worn by the three men operated successfully, and within a few minutes they were rescued by other support craft, having suffered only minor injures.

The seat pods and boat were examined after the accident. The glass reinforced plastic (GRP) seat pods had each been attached using 6 × 25mm stainless steel self-tapping screws with penny washers and a bead of a sealant-like substance. The deck was constructed from 18mm plywood, with a 2-3mm GRP skin which was impregnated with small plastic granules to create a non slip surface. Analysis of the sealant was unable to positively identify it as any particular product, but it was established that it was polyurethane-based. Polyurethane adhesive sealants normally provide good adhesion, but in this case poor surface preparation had resulted in ineffective adhesion to the deck, leaving the self-tapping screws as the only means of securing the seats. Over time, water had seeped into the six screw holes and softened the plywood, resulting in the screws pulling out as the RIB turned to starboard, and the weight of the occupants was forced laterally against the seats.

Vessel's seat
note: wide spacing of securing screws and poor coverage of sealant

The Lessons

1. The RIB's three occupants were very fortunate not to have been more seriously injured during this accident. The potential consequences of RIB seat pods or consoles coming adrift, especially at speed, can be very serious indeed. Owners and operators should regularly check that their RIB seats and consoles remain secure, particularly if adhesive sealant and screws are the method of attachment. Do not take your seat fixings for granted.

2. The kill-cord must be attached properly if it is to be effective. Either secure it around your leg, or clip it to a hard point on your lifejacket. As demonstrated in this accident, simply looping it around your wrist can result in it pulling free. It was only the skill of another boat's crew that prevented this runaway boat from causing serious harm.

3. Do not force yourself into unsafe practices by being undermanned and for the sake of expediency. The helmsman was leaving his throttle ahead to counter the tide and then removing the kill-cord from his wrist in order to hold on to the barge. A proper assessment of the task would have identified the need, in these conditions, to carry an additional crewman to secure the RIB, leaving the helmsman free to remain at the helm and in control.

4. Where possible, ensure that all passengers on board are seated before increasing speed. Ideally, there should be sufficient seating without employing the RIB side tubes. Having passengers standing up can all too easily lead to injury.

Can't See Him? Then Alter Course

Narrative

A privately owned motor yacht was heading north east in thick fog at night. Heading south west along the same stretch of coast was a small tug towing a dumb barge. On board the yacht were the owner and a friend, and they were sharing the watches "hour about" through the night. The radar was operating, navigation lights were on, and they were occasionally sounding the appropriate fog signal. On board the tug, the skipper was on watch alone. Both the tug and the barge were showing appropriate navigation lights, the radar was operating, and from time to time the fog signal for a vessel engaged in towing was being sounded.

At almost the same time, each watchkeeper noted the presence of the other vessel on radar right ahead. The tug skipper monitored the approach of the yacht, noted that they were on a collision course, and decided to take action once the yacht closed to 1-mile range. The owner of the yacht was on watch. He noted the target ahead, and monitored its movements. However, he became confused because the target appeared to occasionally divide into two separate targets, and he was uncertain whether they would pass to port or to starboard. He decided to maintain course and speed and to trust that he would be able to see whatever it was in time to take avoiding action as necessary.

When the radar target ahead closed to 1-mile range, the tug skipper started to alter course and then to slow down. Both actions were carried out in steps to avoid the tug being overrun by the barge. Continuing to observe the target on radar, he watched as it approached, merged with and moved away from the radar target of the barge.

Concerned that he had not been able to see the approaching craft, the owner on the yacht called his friend to the wheelhouse and asked him to go forward and act as lookout. Shortly after this they saw the lights of the tug to port. However, the radar was still showing a target ahead and, seconds later, the friend shouted a warning that he could see the barge. The owner put the wheel hard to starboard and the engine controls astern, but it was too late; the yacht collided with the barge. The impact threw the owner against the wheel, breaking two of his ribs.

The Lessons

1. **The COLREGS require that risk of collision should be assessed, and that early action be taken to avoid collision. There is no doubt that the yacht owner was aware of the risk of collision; it is also clear that he took no action to avoid one until it was too late. Had he altered course when it first became clear that a risk of collision existed, a close-quarters situation could have been avoided.**

2. **The tug's action, although ultimately resulting in a substantial alteration of course to starboard, was not carried out "in ample time" as required by Rule 19 of the COLREGS. Early action, which is readily apparent to the other vessel, ensures that the vessels involved will pass safely, and avoids any confusion as to actions taken.**

3. **In restricted visibility, every vessel which detects by radar alone the presence of another vessel, and that a close-quarters situation is developing and/or a risk of collision exists, is required to take avoiding action. There is no stand-on vessel in restricted visibility.**

4. **Neither watchkeeper had undertaken any formal training in the use of radar. Such training might have highlighted the fact that, at a range of 5 miles and with the vessels approaching at a combined speed of 15 knots, there are only 20 minutes in which to notice the other radar target, monitor its movement and take action to avoid collision. Every minute's delay brings the target ¼ mile closer, and will require a larger alteration of course and/or speed to avoid collision.**

"It Can Happen to the Best of Us"

Narrative

The crew of an inshore, rigid inflatable lifeboat were conducting a routine training exercise in coastal waters, close to their base. It was a fine summer's day and the sea was very calm.

The boat was fitted with three seats: for the coxswain, navigator and radio operator. It also had hand-holds intended for passengers seated on the inflatable sponsons around the edge of the boat. In addition to the usual three crew, a trainee crewman was on board. He had been out on the boat many times before and had completed the boat-handling elements of his training.

The crew had been working hard practising manoeuvres to rescue casualties from rocky outcrops, and were intending to move to an open sandy bay to practise anchoring techniques. The boat was stopped in the water and the crew had gathered round, discussing the exercise. Two crew members had sat on the port and starboard inflatable sponsons in the forward part of the boat, facing inwards to the control console. Another member of the crew took the wheel, and the coxswain sat on the starboard inflatable tube, next to the engine throttles, to take control if necessary. They expected to make the short transit to the sandy area and then gather in the forward part of the boat to discuss the next part of the exercise.

The crewman on the helm increased speed to between 20 and 25 knots and, to satisfy himself that the boat was manoeuvring as expected, began to make a series of fast turns to port and starboard. Despite holding on and appearing to be comfortable, the crew member seated on the port sponson near the centre console fell overboard during a turn to starboard. He was struck on the head at least three times by the

propellers, piercing his protective helmet in two places. The boat was quickly turned round and the casualty was recovered back on board.

It was clear that the injuries were very serious, so the crew reported the accident to the coastguard, requesting an ambulance to meet the boat as it returned to the beach. The location was not described precisely, and this led to some confusion between the coastguard and ambulance controllers as to where the ambulance should be sent. When the ambulance arrived, it was unable to cross the beach to meet the boat, and there was some delay while the casualty was transferred using a coastguard vehicle.

The casualty suffered severe head injuries.

The Lessons

1. **Fast turns in rigid inflatable boats generate large forces which can throw personnel overboard, despite their best attempts to hold on. Before commencing such manoeuvres, coxswains should ensure that all occupants are aware of the impending manoeuvre and the need to be *securely seated* and "hold on tight".**

2. **The arrangement of the boat and angle of heel in the turn meant that once the crewman had fallen from the boat, it was almost inevitable that he would be struck by the propellers. *It is therefore imperative that all persons are secure within the boat, such that they cannot fall overboard.***

3. **Although the crewman's protective helmet was substantial, it could not protect his head against the rotating metal propeller blades; the boat had not been fitted with propeller guards as it was considered this would compromise its performance and ability to respond to an emergency. Recognising the need for performance in any rescue situation, serious consideration should be given to the use of propeller guards on any boat likely to be used for the recovery of persons from the water, in view of the extreme dangers created by open bladed propellers.**

4. **When reporting casualties, to minimise delay take care to report your position as accurately as possible and seek advice on the best place to rendezvous with the emergency services.**

Excess of Alcohol Contributes to Four Accidents

Narrative

Several accidents to persons on small craft have been reported recently to the MAIB in which the consumption of alcohol has been a contributory factor.

Case 1:
In one, a small boat collided with a police boat as it approached a slipway while travelling at night, at excessive speed and with no navigation lights. Although the police boat took evasive action, a collision occurred, which resulted in injuries to the two occupants of the boat as well as causing it considerable damage. The occupants of the small boat were not wearing lifejackets.

While helping the occupants of the first boat, the two policemen on board the police boat established that the driver had consumed an excessive amount of alcohol, which had affected his judgment and ability to navigate the boat in a safe manner.

Case 2:
In another tragic case, two lives were lost when sailors were returning, in a tender, to their yacht which was on a mooring in the middle of an east coast river. The men were friends, had spent the evening together in local hostelries and were last seen heading back to the tender in the late evening of an autumn day. The two men were experienced yachtsmen who were accustomed to using a tender in similar weather conditions to those prevailing at the time of the accident.

Their bodies were discovered the following morning, close together, on the edge of the river. The tender was recovered nearby and found to be intact and dry. The men had not been wearing lifejackets.

There is no doubt that alcohol affected their judgment and ability to make a safe passage back to their yacht that evening, and this tragic case demonstrates that alcohol and boating simply don't mix.

Recovered damaged RIB

Damage to steering wheel following impact of the skipper

Case 3:
Yachting regattas are a popular and intrinsic part of the summer season for the majority of recreational sailors. However, a number of accident reports received last year indicate that, for a minority of sailors, attending a regatta is synonymous with consuming an excessive amount of alcohol.

Two accidents occurred during the week of a popular south coast regatta, in which the consumption of alcohol was a contributory factor. In the first, several people were injured, +ly, when a RIB (see photographs), with six persons on board, struck a breakwater at night. The boat was proceeding outside the main channel, without navigation lights, and had ignored police advice not to head out to sea.

Witnesses report that several of those on board were drunk and no one was wearing lifejackets.

Case 4:
In the second, a speedboat sank after apparently colliding, at night, with a lit navigation buoy when returning home from the regatta. The seven occupants of the boat included three children, only one of whom was wearing a buoyancy aid; none of the adults was wearing a lifejacket. As the boat sank, one of the adults was able to use a mobile telephone to make a distress call to the coastguard, which organised a search.

Through extreme good fortune, everyone was rescued from the water and transferred, via a lifeboat, to a local hospital where they were treated for the effects of hypothermia. Witnesses remarked on the fact that the adults appeared intoxicated, smelling heavily of alcohol.

The Lessons

1. **Alcohol and boats don't mix. In all the above cases alcohol was a contributory factor to the accident.**

2. **The effects of alcohol on perception and judgment are well known, and mariners should be aware that their ability to perform routine and familiar tasks will be adversely affected if they consume excessive amounts of alcohol.**

3. **Always wear a lifejacket; in all of these cases only the police officers were doing so.**

The Importance of Electrical Isolations

Narrative

A small, wooden, angling charter boat was tied up alongside having completed its last angling trip 3 days earlier. The skipper had been on board during the morning to replace the worn main engine fan belt. Having completed the work the skipper successfully tested the engine. He then checked the boat over, including the bilge levels and mooring ropes before locking the wheelhouse and making his way home.

Significantly, the skipper did not open the main electrical supply switch that isolated the batteries from the rest of the boat. The reason was because the switch was seized and the square headed key, required to operate the switch, was damaged, and had been for some time, so power remained connected to the boat's electrical circuits.

About 30 minutes after leaving the boat the skipper received a call from the harbourmaster telling him the boat's wheelhouse was on fire. The skipper immediately returned to the boat and was astounded to find the main engine running but the wheelhouse still locked. The attending fire and emergency services were at this time cutting through the wheelhouse door lock. They made an entry to the small wheelhouse and found that the fire had self-extinguished through lack of oxygen.

There was smoke damage throughout the wheelhouse (Figure 1). A small plastic cased television had been completely destroyed, and the plastic engine monitoring panel containing the engine key start switch, which was situated directly above the television, was badly burnt.

On investigation, it appeared that the television was left in the stand-by condition because power had not been isolated to the boat's electrical circuits. It is likely that the television's capacitor broke down, igniting the television's plastic casing. The flames from the television then damaged the engine monitoring plastic panel, burning the cable insulation outside the panel (Figure 2). This, in turn, shorted out the engine start circuit, causing the engine to start. Fortunately the wheelhouse was reasonably airtight, and the fire was short-lived.

Figure 1

Figure 2

The Lessons

Battery isolating switches can be troublesome. Switches designed for use in caravans are often fitted to small boats, and these are invariably of the sealed type, making maintenance virtually impossible. These types of switches are not designed for use in the harsh marine environment. Verdigris often builds up on the contacts and the operating mechanisms, causing interruptions to power supplies and making them difficult, and sometimes impossible, to operate.

1. Be cautious about taking the cheap option when fitting electrical components. Select those designed for use in the marine environment and seek professional advice if in doubt.
2. When fitting battery isolating switches, consider the supplies needed to run an automatic electric bilge pump when the isolating switch is in the open position. Normally a separate fused supply is run directly from the battery to the bilge pump, avoiding the need for the isolating switch to be closed.
3. There have been a number of occasions when fires have been caused by electrical circuits remaining powered up on unattended boats. It is always good fire prevention practice to switch off electrical equipment when not in use, and to isolate batteries from electrical circuits when no one is on board.
4. Do not delay rectifying defective electrical components. Short circuits can easily occur, causing excess currents to be drawn, leading to overheating and a risk of fires developing.

Two Wrongs Don't Make a Right of Way

Narrative

It was twilight in the western approaches; the sea was rough and there was a force 5 wind.

A 24m, 250 tonnes displacement steel beam trawler powered by a 500HP engine was working her home grounds. Her beams were down, she was fishing – displaying both day signals and lights – and was making about 4 knots. The mate, who was on watch, saw a blip on the radar and realised that it was a small yacht that he could see about 0.5 mile away. He anticipated that the yacht would pass under his vessel's stern.

The 6.5m carbon fibre yacht displaced about 800kg. A high performance design, it was making over 10 knots upwind on port tack and under autopilot. The mast head tricolour navigation light was on, and a "rain-catcher" radar reflector was hoisted.

On board the yacht the racing skipper was trying to get some sleep. He was training for a major single-handed transatlantic race and, as a result, had been sleeping for variable periods of around 20 minutes per hour during the hours of darkness for the last 4 days. The yacht was fitted with a timing device specifically developed to allow single-handed sailors to

Figure 1: Beam trawler

take short naps. The skipper saw the fishing vessel, and having assessed the situation as safe he went below, set the timer and deliberately went to sleep.

The trawler's mate saw the yacht closing, but decided to act too late; hampered by his gear he was unable to avoid a collision. The trawler's derrick struck the yacht as it passed very close by, destroying the mast, boom and sails, and causing serious damage to the deck and hull mouldings. Fortunately, the trawler's derrick passed over the head of the sleeping yachtsman. The undamaged trawler stopped to provide assistance, and the lifeboat was called. The RNLI towed the yacht in to port; her race was over. Fortunately there were no injuries.

Figure 2: A similar Mini-Transat yacht

The Lessons

1. **The race for which the yacht was training has been described as "A *legendary ocean race…spectacular, adventurous, extreme and dangerous*". The dangers to be faced in training, more than equalled anything that might be encountered during a single-handed ocean crossing.**
2. **Sailing alone, under autopilot in this busy area, in challenging weather conditions and at night was at best foolhardy, and the decision to sleep when a trawler was known to be fishing close-by could perhaps be considered somewhat reckless. When embarking on any single-handed voyage, consider *all* the risks, including the risks to those you encounter and those who may have to rescue you.**