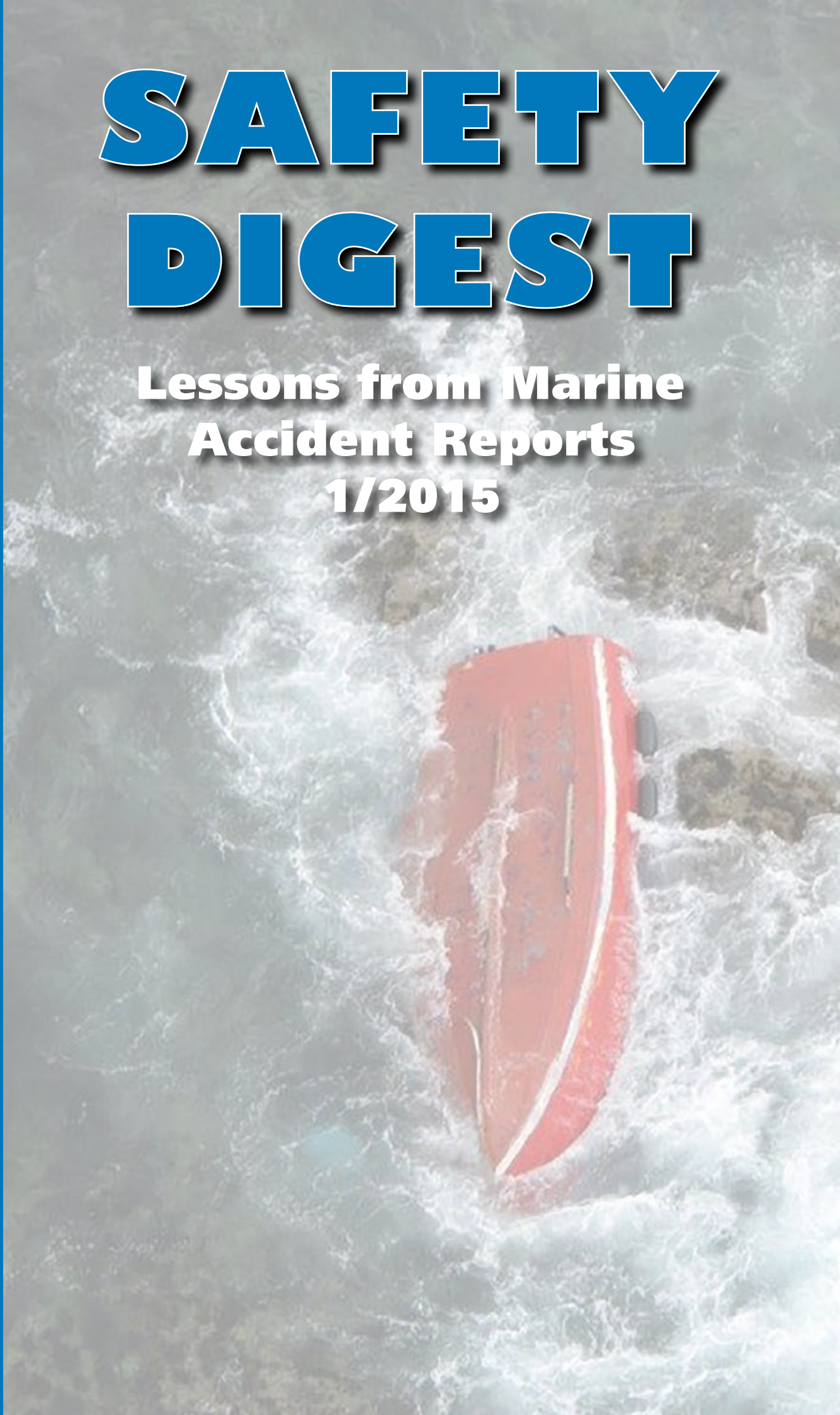
MARINE ACCIDENT INVESTIGATION BRANCH

MAIB

SAFETY DIGEST

Lessons from Marine Accident Reports 1/2015



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No 1/2015

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April 2015

MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) examines and investigates all types of marine accidents to or on board UK vessels worldwide, and other vessels in UK territorial waters.

Located in offices in Southampton, the MAIB is a separate, independent branch within the Department for Transport (DfT). The head of the MAIB, the Chief Inspector of Marine Accidents, reports directly to the Secretary of State for Transport.

This *Safety Digest* draws the attention of the marine community to some of the lessons arising from investigations into recent accidents and incidents. It contains information which has been determined up to the time of issue.

This information is published to inform the shipping and fishing industries, the pleasure craft community and the public of the general circumstances of marine accidents and to draw out the lessons to be learned. The sole purpose of the *Safety Digest* is to prevent similar accidents happening again. The content must necessarily be regarded as tentative and subject to alteration or correction if additional evidence becomes available. The articles do not assign fault or blame nor do they determine liability. The lessons often extend beyond the events of the incidents themselves to ensure the maximum value can be achieved.

Extracts can be published without specific permission providing the source is duly acknowledged.

The Editor, Jan Hawes, welcomes any comments or suggestions regarding this issue.

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The role of the MAIB is to contribute to safety at sea by determining the causes and circumstances of marine accidents and, working with others, to reduce the likelihood of such causes and circumstances recurring in the future.

Extract from
The Merchant Shipping
(Accident Reporting and Investigation)
Regulations 2012 – Regulation 5:

"The sole objective of the investigation of a safety investigation into an accident under these Regulations shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of such an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

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Glossary of Terms and Abbreviations

AB	-	Able Seaman
AIS	-	Automatic Identification System
C	-	Celsius
CCTV	-	Closed Circuit Television
CO2	-	Carbon Dioxide
COLREGS	-	International Regulations for the Prevention of Collisions at Sea 1972 (as amended)
CRT	-	Canal and River Trust
DSC	-	Digital Selective Calling
ECDIS	-	Electronic Chart Display and Information System
EPIRB	-	Emergency Position Indicating Radio Beacon
GPS	-	Global Positioning System
GRP	-	Glass Reinforced Plastic
LSA	-	Life Saving Appliances
m	-	metre
"Mayday"	-	The international distress signal (spoken)
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Note
MOB	-	Man Overboard
NIFPO	-	Northern Ireland Fish Producers' Organisation
OIC	-	Officer in Charge
OOW	-	Officer of the Watch
"Pan Pan"	-	The international urgency signal (spoken)
PLB	-	Personal Locator Beacon
RA	-	Risk Assessment
RIB	-	Rigid Inflatable Boat
RNLI	-	Royal National Lifeboat Institution
Ro-Ro	-	Roll on, Roll off
RYA	-	Royal Yachting Association
SAR	-	Search and Rescue
SOLAS	-	International Convention for the Safety of Life at Sea
VHF	-	Very High Frequency

Introduction

At first glance, this edition of the Safety Digest contains 25 diverse examples of accidents. However, on closer inspection you will see a number of familiar themes emerging from these unfortunate chronicles of mishap.

The consequences of failing to properly plan a voyage on a large merchant ship are graphically described in Case 2 but Case 20 describes a similar outcome, this time on a leisure vessel. Preparing a passage plan is vital if voyages are to be conducted safely, irrespective of the size/ type of the vessel. However, once the plan is in place, don't blindly follow the track line – look ahead and anticipate what is going to happen during your watch. Make sure that the plan is not placing the vessel in danger and keep a good look using all available means (don't just rely on what your electronic navaids are telling you, look out of the window and make sure that what you can see makes sense!).

Case 8 describes another type of planning failure; the failure to properly adhere to the planned maintenance schedules of machinery can have catastrophic consequences. Ships' engine rooms are inherently dangerous places and it is important that engineering staff are properly trained and follow sound engineering procedures if avoidable accidents are to be prevented. Cases 10 and 11 are good examples of what can happen when tasks are not properly planned and /or short cuts are taken which fall outside customary good practice.

Previous Safety Digests have regularly highlighted the importance of wearing lifejackets when working on the open decks of fishing vessels and leisure craft (Case 15 and 19). Fitting spray hoods to lifejackets and investing in Personal Locator Beacons (PLBs) and an EPIRB can also save lives. Fitting a liferaft, even though one may not be required by regulation, is also a smart move – should the worst happen, why get wet when you can remain relatively dry and warm until help arrives? (Case 13)

Any accident can be life changing – not only for those directly involved but also for their colleagues and loved ones. Therefore, before commencing any potentially hazardous task, whether on deck, in the engine room, on a large ship or small, get into the habit of asking yourself "what's the worst that could happen?" then check that the necessary barriers are in place to protect yourself, the ship and everyone on board.

In closing, I would like to thank Commodore David Squire, Tony Delahunty and Paul Bishop for their insightful introductions to the relevant sections of this Safety Digest.

Until next time, keep safe.

Steve Clinch
Chief Inspector of Marine Accidents

April 2015

Part 1 - Merchant Vessels

The selection of case studies in the Merchant Vessel section of this MAIB Safety Digest indicates an all-too-familiar trend of accidents that should never have happened. Many have human or operator error as causal factors and all reflect a failure to properly comply with the Safety Management System (SMS), in accordance with the provisions of the ISM Code.

In our daily lives, we all take risks and we all make mistakes – it is human nature; in some cases these mistakes can have disastrous consequences, but in the vast majority we are able to quickly rectify the situation without causing any harm to ourselves or to other people or property. In the maritime context, this is where accident investigations, such as those undertaken by the MAIB, are of great value. They do not seek to apportion blame or determine liability; they are conducted solely with the objective of preventing marine casualties and marine incidents in the future.

Safety recommendations from accident investigation reports can trigger actions ranging from the development of more regulations, to increased training or simply to review a company's/ship's safety management systems. But, what is important is that we should learn from our mistakes, and from the mistakes of others.

Assessing the risks associated with carrying out an operation or task should not be simply a tick-in-the-box exercise. Generic risk assessment templates and checklists are all well and good, but they do not cover all eventualities. Carrying out a risk assessment before undertaking an operation or task should not be a 'one person' function; tool box talks encourage collective thinking and should involve both experienced and lesser-experienced personnel, for it is sometimes the lesser experienced (and the most junior) who will identify a hazard that has not been previously thought of.

Navigational planning is a form of risk assessment, because on each passage the hazards will differ even if the ship is on a regular route. ECDIS makes the planning process easier, but only if the operator of the system is properly trained in its use and is fully aware of its capabilities. It is ultimately the master's responsibility to cross-check the plan before departure, but each OOW also has a responsibility to 'look ahead' when taking over the watch, to ensure that the planned route does not stand the ship into any danger. But, most important is the need to maintain a proper visual and radar lookout not just to monitor other vessels but also to positively identify aids to navigation that are positioned to direct the ship away from a hazard.

Procedures outline the steps to be followed to accomplish specific tasks. Operational, maintenance and emergency procedures are crucial elements of the safety equation. They can be in a variety of forms, ranging from the COLREGS – specifically Part B, the *Steering and Sailing Rules* – which set out the actions to be taken to prevent collisions at sea; to procedures for the operation and maintenance of machinery and systems and for the maintenance and launching of lifeboats and liferafts; or for the action to be taken in the event of a fire or man-overboard.

Some procedures need to be committed to memory, especially the COLREGs, and those procedures related to emergency situations, but there is no reason why the latter should

not be supported by an aide memoire, provided it does not become just another 'tick list'. Others will have to be followed to the letter, especially in the case of the operation and maintenance of complex systems.

I commend the reading of this publication to all who are involved in the design, management and operation of seagoing vessels.

Commodore David Squire, CBE, MNM, FNI, FCMI

Commodore David Squire retired from the Royal Fleet Auxiliary Service (RFA) in March 1999 after a career spanning over 35 years which included a wide range of appointments at sea and ashore, culminating in a 5 year appointment as Commodore and Chief Executive of the RFA.

He is editor of **Alert!** the Nautical Institute's award-winning *International Maritime Human Element Bulletin*, which is sponsored by the Lloyd's Register Foundation.

He is a well-known authority on human element and safety of navigation issues, and has written and lectured widely on these subjects. He was a consultant editor to the Lloyd's Register publication *The Human Element- an introduction* and was a consultant to Lloyd's Register in the formulation of their Human Element Gap Analysis project.

He is Chairman of the Merchant Navy Training Board, the UK shipping industry's central body for promoting and developing seafarer education, training and skills.

He is a member of the Council and Deputy Chairman of the Operations Advisory Committee of the RNLI; an Elder Brother of the Corporation of Trinity House; editor of the Journal of the Honourable Company of Master Mariners; and a Maritime Training Ambassador for the UKSA.

Where There's Smoke .....

Narrative

It was just another routine day. The cargo had been discharged from the ro-ro ferry and loading was going according to plan. As usual, the crew complained about the general condition of some of the vehicles as a number of them had to be pushed or towed into position because of mechanical problems. However, that was the nature of the second-hand and scrap vehicle export market.

A total of 170 units was loaded and lashed down, which included 10 vehicles accompanied by their drivers. Despite the crew's concerns there were no risk assessments available or material checks made to confirm the suitability of the vehicles for carriage. Loading was completed at 2100 and, at 2110, the ferry departed. As the second officer took the watch, he settled down for what he thought would be another routine and uneventful passage – but not on this occasion!

At 0215 the fire detection system sounded, indicating a fire on the starboard side of the main deck. The on-watch rating was sent to investigate the cause as the second officer requested the master to come to the bridge. He also looked at the main deck CCTV monitor, but saw nothing untoward. In the meantime, the rating opened the main deck door. He did not detect anything unusual from his position, and was reluctant to proceed any further because of the tightly packed cargo. As the rating returned to the bridge, the master looked at the CCTV monitor and noticed heavy smoke and then flames rapidly develop on the starboard side of the main deck, before the camera lens became obscured.

Muster stations were announced and the nominated ventilation team immediately started to shut the 36 main deck ventilation jalousies positioned on the upper and weather decks. At 0225, the chief officer reported that the vents were closed. However, thick smoke continued to pour from many of the louvres because they had not been correctly closed against their locking cams (Figure 1).

In the meantime, the master alerted the shore authorities to the situation as the chief engineer reported that he was ready to inject the required 19.8 tonnes (t) of CO_2 into the main deck from the 21.3t capacity storage tank. However, it was a further 5 minutes before the chief officer was able to account for one of the crew, who had not reported at the muster station.

At 0230, the CO_2 system was operated for 15 minutes in accordance with the system instructions. At the same time, the chief officer opened fire hydrants on the upper deck to boundary cool the area above the fire. At 0245, the chief engineer reported to the master that the CO_2 tank contents gauge was showing 12t, suggesting that insufficient gas had been injected. The system was operated for a further 15 minutes, but the contents gauge still indicated 10t of gas remaining. Unsure of the true situation, the master instructed that the CO_2 system be manually operated instead of using the automatic timing arrangement. The chief officer had by now set up the drencher system to replace the hydrants for boundary cooling purposes.

As the ferry made its way towards the agreed port of refuge, the 10 vehicle drivers, who had been drinking heavily, started to become disruptive and distracted the chief officer from his primary incident management role. It was agreed to relocate them inside the superstructure where they could be readily evacuated if necessary. In the meantime, the deck temperature above the fire was being

constantly monitored. As the temperature had not increased and no other fire/smoke detectors had alarmed, it was determined that the fire was under control.

The ferry berthed alongside at 0640 where it was met by the local Fire and Rescue Service. After evacuating surplus crew, some of the cargo was discharged in order that access to the fire could be gained. The firefighters dampened the scene down and declared the fire to be extinguished at 1325.

The vessel suffered distorted deck plates and longitudinals, and damage to minor electrical circuits. A truck carrying a van was completely destroyed and a cab unit and six trailers suffered severe damage (Figures 2 and 3). Other vehicles suffered from radiated heat damage.

Figure 1: Ventilation jalousie and louvres arrangement

Figure 2: Burnt out truck and van it was carrying

Figure 3: Damaged vehicles

The Lessons

Many of the vehicles on this particular trading route had been de-registered and not used for many months, and were often in poor mechanical condition.

Systems will inevitably deteriorate, including electrical insulation and components. In this case, it was found that the engine pre-heating control solenoid had seized, preventing the air charge from being heated to ease starting. It was also found that the engine starter motor solenoid had suffered catastrophic internal electrical arcing caused by the moving contact becoming detached from its supporting post. This caused the main battery supply cable to overheat, which was live even though the ignition key was in the 'off' position, and the insulation to burn and ignite other components. The fire travelled into the cab and then to the cargo compartment, igniting the tyres, and then to the adjacent vehicles.

1. Section 1.1 of the MCA's Code of Practice Roll On/Roll Off Ships – Stowage and Securing of Vehicles, identifies that the principal source of danger to ships and persons is the unsatisfactory condition or design of vehicles presented for shipment. This observation was particularly relevant in this case. It is important that procedures should be in place and checks made to confirm that vehicles, especially those of unknown condition, are safe to load.

2. Despite the obvious concern of the crew about the carriage of these vehicles, no risk assessments were undertaken. An electrical defect was identified as the most likely ignition source. A control measure of isolating the battery would have significantly reduced the risk, and the fire would not have occurred.

3. Crew should report to their muster station, or report in by radio as quickly as possible so that they can be accounted for. The master understandably delayed using the CO_2 system in case the missing crewman was on the main deck. While the delay would have allowed the fire to develop it was still containable - in other circumstances the impact could have been far more significant.

4. While the crew were well trained overall, they were less well versed in operating the ventilation louvres. The gaps between each louvre totalled the equivalent of a $5m^2$ hole, which can severely impact on the effectiveness of the CO_2 system. Do ensure that crews are fully aware of how to operate these types of systems by including them in the vessel familiarisation documentation.

5. Dealing with disruptive passengers who have consumed alcohol can be a difficult problem. The chief officer acted appropriately in removing them from the control position and so defused the situation. Do consider how to deal with this type of issue. It may be possible to develop guidelines with stakeholders to achieve a common policy.

6. The apparent inaccurate CO_2 storage tank level indicator caused confusion about how much gas had been discharged. It is important that confidence is maintained in the use of critical safety systems by ensuring all associated instrumentation remains accurate and reliable.

Lucky it was Sand

Narrative

On a calm and clear night a modern, well equipped tanker was heading through a busy coastal traffic separation scheme. To the OOW and lookout, everything on the bridge seemed normal. The OOW was sitting in the bridge chair, where he could see the radar display and the ship's ECDIS. He was following the route shown on the ECDIS display and he adjusted the ship's heading whenever necessary to keep on track. Unexpectedly, the ship's speed reduced to zero and soon afterwards an engineering alarm sounded. Assessing that there was a problem with propulsion, the OOW phoned the second engineer and asked him to check the engines.

The second engineer called the bridge back and confirmed that power was available on the starboard engine, so the OOW applied power using the starboard control lever. But the ship still did not move. The OOW also called the captain to explain that propulsion had failed in the traffic separation scheme.

Ashore in the local coastguard station, a watchkeeper noticed that the ship's position was directly over a well charted sandbank, and called the ship on VHF radio to ask about the situation. Only when prompted by the coastguard did the OOW realise that the ship was hard aground on the sandbank.

The Lessons

1. **Checking the passage plan is vital. ECDIS was the ship's primary means of navigation and the deck officers had all been trained and certified in its use. However, the passage plan, which passed directly over the sandbank, had not been properly checked using the ECDIS 'check route' function. The master was also unable to use the ECDIS system and had not properly checked the plan before departure.**

2. **Avoid over-reliance on ECDIS for monitoring the route. Correlation of visual, radar, echo sounder and electronic navigation information is critical to maintaining good situational awareness, especially on a coastal passage in a traffic separation scheme.**

3. **Good bridge team management means making sure the lookout is encouraged to contribute to the safe navigation of the ship. In this case, despite the lookout seeing flashing lights from the buoys marking the sandbank ahead of the ship, this information was not reported to the OOW or acted upon.**

4. **There was no ECDIS alarm because the safety settings in the system were inappropriate; the safety contour value was wrong and the audible alarm was not working. If ECDIS is the primary method of navigating the ship, it is crucial that the system is properly set up for the passage. Alarm management is also important to ensure the bridge team are warned of navigational hazards or system failures.**

5. **If navigational equipment is defective, don't ignore or try to live with the problem. Get it fixed!**

Out of Sight, Out of Mind

Narrative

Containers were being discharged from inside the main vehicle deck of a ro-ro cargo ship. A crewman and a fork-lift truck driver were working together to move the containers from their storage positions onto trailers for transfer ashore. The crewman's job was twofold: to remove the twistlocks from the underside of containers before they were loaded onto trailers and also to remove twistlocks left behind on the deck to prevent them obstructing vehicles' tyres.

Having lifted a 40 foot container from the top of another (Figure 1), the fork-lift driver moved his vehicle backwards and lowered the container. This improved the vehicle's stability but severely limited his visibility ahead. At the same time, the crewman moved forward to remove an underslung twistlock from the suspended container (Figure 2).

Expecting the vehicle to continue its movement away from him, the crewman then turned round, facing away from the vehicle, and started removing redundant twistlocks from the deck. However, the fork-lift truck driver, who could not see the crewman, started to steer his vehicle to avoid the potential snagging hazard from other stacked containers. This manoeuvre caused the end of the suspended container nearest the crewman to change direction and collide with a static container, fatally crushing him in between (Figure 3).

The Lessons

1. **The movement, storage, securing or removal or vehicles, or in this case containers, from inside a ro-ro ship's internal deck requires great care and proper supervision by a suitably trained person.**

2. **The crewman should not have moved towards the suspended container without a recognised safety signal. Equally, where the operator of lifting equipment cannot see the full path of the load, then a dedicated, safety signaller should guide the operation.**

3. **Industry guidance states that 40 foot containers should not be handled using fork-lift trucks as, unlike 20 foot units, they are not fitted with 'pockets' to accommodate the vehicle's forks (Figure 4).**

4. **Watch out for complacency, which creeps in when crew are routinely exposed to danger without consequence. Those involved in operations where risks have been identified must ensure that everyone involved stays alert and continuously assesses the hazards and the effectiveness of safety measures.**

Figure 1: Initial lift of the upper container - crewman standing clear

Figure 2: The crewman moves forward to remove an underslung twistlock

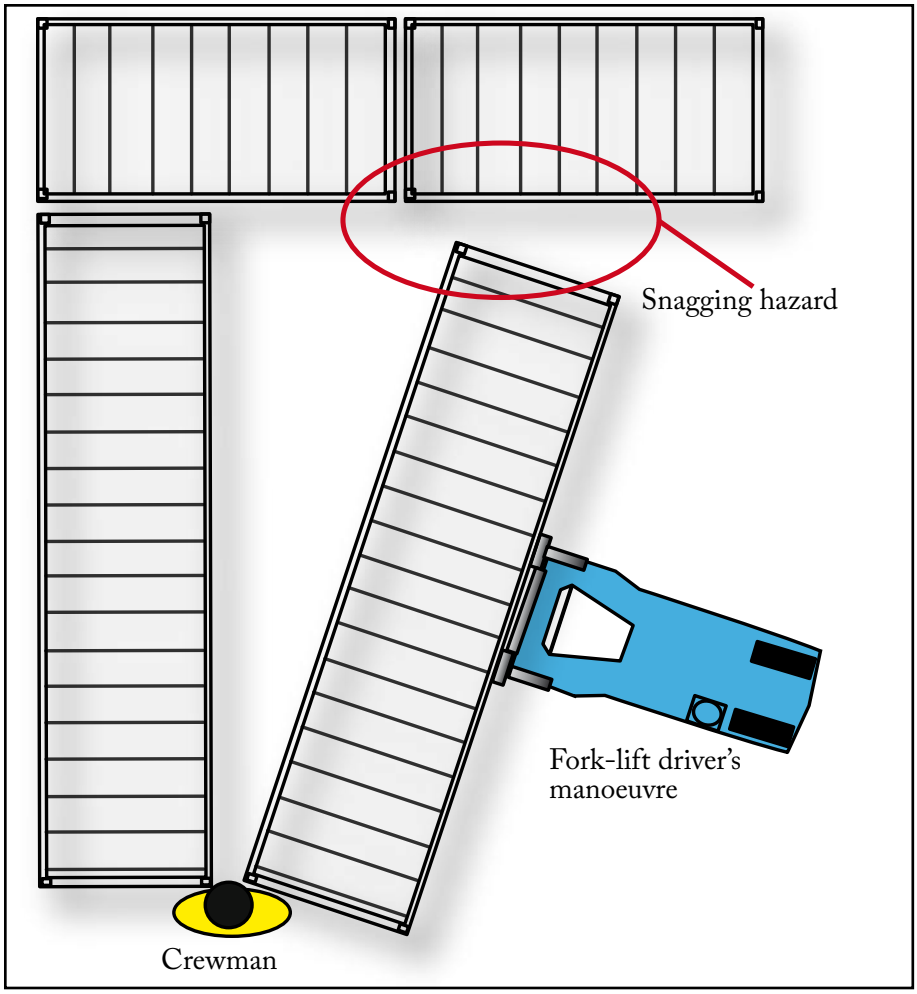


Figure 3: Fatal manoeuvre

Figure 4: Fork pockets fitted to 20 foot containers which are not present on 40 foot units

Badly Timed Tackle Results in Another Lifeboat Accident

Narrative

The master of a cargo vessel had instructed the chief officer to complete the 3-monthly routines on the ship's lifeboats and fast rescue craft. The routines included lowering the boats to the water and releasing them from the davit falls.

A team of two officers and two seamen was assigned the task of launching the boats. The lifeboats were of the fully enclosed type and required a minimum of three people on the boat: the officer in charge (OIC) and the two seamen to conduct the drill.

To launch the boat, the bowsing tackle needed to be released, which allowed the boat to hang free in the davit prior to being lowered. This particular boat had band type bowsing tackles; it was important that these were released simultaneously in order that the boat swung smoothly into the lowering position. The OIC confirmed that both seamen were confident in operating the bowsing tackles before ordering the tackles to be eased off. The after tackle began to pay out correctly, but the forward one did not release. The OIC instructed both seamen to stop releasing the bowsing tackles; this command was repeated several times but the seaman at the front of the boat continued his attempts to release the forward tackle. The OIC moved forward to attract the seaman's attention. At this point the forward bowsing tackle released suddenly, causing the boat to swing violently and the OIC to be thrown head first into the lifeboat cabin. The boat came to rest in the falls, and the OIC suffered a cut to his forehead, which was subsequently treated on board.

A ship's investigation found that the bowsing tackle brake tension spring tail was broken, allowing the bowsing tackle to pay out in an uncontrolled manner. The spring was replaced and the bowsing tackle was then successfully tested (Figures 1 and 2).

Visual inspection of the spring has now been included in the maintenance system and the equipment manufacturer notified of the problem.

It was recognised that lifeboat launching involved some hazards, so the operation was subject to an operational risk assessment (RA). However, while the risk assessment identified hazards associated with the launching operation, it did not link directly to the operating procedure. Furthermore, it is unclear if the OIC had viewed the RA prior to commencing the launching operation. Notwithstanding this, it was reported that the OIC had extensive experience with the lifeboat and systems. The seaman operating the forward bowsing tackle was less experienced and English was not his first language, but he was deemed to be proficient in its use as a working language. Both the OIC and the other attending officer on the ship had shouted for the seaman to stop operating the bowsing tackle, but he had not heard the command to stop. Subsequent trials showed that commands issued from the lifeboat conning hatch were inaudible at the forward bowsing position.

Figure 1: Broken spring tail

Figure 2: New spring

The Lessons

Accidents involving launching of lifeboats for routine and exercise purposes continue to occur on an all too frequent basis. Training of ships' crews must be thorough and regularly carried out, with safe systems of work in place to support these operations. Crews must 'get it right' during maintenance and training to ensure that they are prepared should an emergency arise.

1. To be effective, risk assessments must cover all aspects of an operation and, where appropriate, should be supported by a 'standard operating procedure'. These must be utilised for each operation to which they pertain.

2. Launching routines should form part of the maintenance schedule and include a thorough inspection of all associated equipment.

3. Launching instructions should be reviewed to ensure that communications between the OIC and bowsing tackle operators are effective.

Gone With the Wind

Narrative

Vessel 1

A large high sided ro-ro vessel was berthed alongside in strong winds at a busy European port. The master had decided to use four headlines, four stern lines, two forward spring lines and two aft spring lines to keep the vessel secure alongside during cargo operations, a decision he based on the weather forecast available at the time of arrival.

The strong offshore winds were beam on to the vessel, causing significant loading on the vessel's mooring lines. As cargo operations progressed the wind began to increase, and gust to 42 knots, which caused all four stern lines, the two aft spring lines and one forward spring line to part, and the stern to veer quickly off the berth. This caused damage to the stern ramp, and the vessel to swing across the river and ground on the opposite bank.

The crew were able to close the stern ramp to prevent any further damage, and the main engine was started. Eventually, the vessel was re-secured alongside with the assistance of three tugs and, once secure, cargo operations were resumed.

Vessel 2

Another large, high sided ro-ro vessel in the same port, but at a different time, suffered a similar fate. This time the master had expected (as per the forecast) winds gusting up to 35 knots. Prudently, he had decided to deploy an additional breastline forward and stern line aft to counter the forecast strong wind conditions.

However, as with Vessel 1, mid-way during cargo operations the vessel encountered winds that gusted up to 45 knots. In this case four of the forward lines parted and the bow drifted some 80 metres off the berth. Luckily the stern moved just 10 metres off.

Again, the crew responded quickly, and cargo operations were stopped, engine and bow thrusters started and, with the assistance of tugs, the vessel was brought back alongside and re-secured with additional mooring lines. Fortunately, the vessel did not suffer any damage.

The Lessons

Keeping a high sided vessel alongside in strong winds was always going to be a challenge. Having decided to do so, it was important to take appropriate precautions, and to consider contingency options should the actual conditions experienced differ.

1. It is easy to allow yourself to be lulled into a false sense of security when the wind increases and the vessel stays alongside. This is confirmation bias, which can cause a person to begin to hope that with each wind increase it has reached its peak, rather than take action in response to the increase. An important precaution is to prepare a contingency plan which sets limits that trigger a response. For example, if the wind reaches X knots: start the main engine(s) and thruster(s) to hold the vessel alongside; call a tug to push-up alongside; or suspend cargo operations and leave the berth.
2. It is important to be aware of the limitations of the mooring equipment fitted to the vessel, including its mooring lines. Some thought needs to be given to the number and position of lines appropriate for the expected conditions. This, along with contingency options, should form part of a pre arrival briefing to all involved.
3. In strong wind conditions it is seldom a good idea to operate winches in 'self-tensioning mode'; in such conditions the load exerted may cause the winches to pay out unexpectedly. It is far better to ensure that moorings are regularly checked and adjusted by suitably qualified crew members throughout the vessel's time alongside, and that the weather conditions are continually monitored throughout.

100 Tonne Flood

Narrative

Poor planning and lack of procedures led to approximately 100 cubic metres of fresh water flooding accommodation and machinery compartments on board a large cargo ship.

Due to the scheduled programme at the ship's next port, a routine inspection of a fresh water storage tank was conducted on passage. The chief officer was responsible for the management of the fresh water and he delegated the task to the AB 'waterman'. The 'waterman' was told which tank to inspect and that the tank had been emptied. The 'waterman', who was familiar with the tank inspections on other ships, arranged for another crewman to assist. Neither crewman had inspected the water tanks on board.

The two crewmen went to a compartment in the accommodation block where they thought that the tank lid was located. They then removed the lid's securing nuts and one of the crewmen levered it out of position. As he did so, the tank lid was projected across the compartment by the force of water coming from the tank below, narrowly missing one of the crew members as it did so. Wrong tank!

Water quickly flooded into the compartment and one of the crewmen quickly escaped through the open door. However, the door was soon forced shut by the flood water, trapping the second crewman inside. As the water depth increased to about 2m, he was forced to climb onto a bench sink. The trapped crewman was subsequently rescued by the ship's emergency response team.

The water spread rapidly into all compartments on two decks (Figures 1 and 2), including the high voltage converter space (Figure 3). Quick action by the ship's crew to isolate the power supplies to the high voltage equipment prevented serious damage to the propulsion system. Nonetheless, the ship drifted not under command for several hours until temporary repairs were completed.

Figure 1: Flooding on the deck

Figure 2: Top of stairway

Figure 3: High voltage converter space

The Lessons

1. Any tank, regardless of its contents, is a dangerous enclosed space. The safety of crew engaged in tank work, including fresh water tank inspections, relies on a proper risk assessment being undertaken and access controlled by a permit to work system. Anything less has the potential to be very costly.

2. Assuming that a crewman is familiar with a task due to his or her routine duties during their previous contracts on other vessels, is a frequently repeated mistake. Remember that all ships vary and people are different. It pays to double check that any person assigned to do a safety-critical job has been properly briefed, fully understands how to complete the job in a safe manner and is supervised appropriately.

3. The clear, consistent and unambiguous marking of all tank lids, sounding tubes, vent pipes etc is such a simple and inexpensive way of identifying what a tank is and what it contains. It is such a shame that it is not always done.

No Buoy – Oh No!

Narrative

It was the end of an uneventful day transferring technicians between wind turbines under construction in a coastal wind farm. The skipper of a 20 metre transfer vessel began the routine trip back into port for the night, a passage he had completed many times previously.

The weather was fine and clear, with good visibility. As the vessel entered the river channel, the skipper followed his usual navigation practice of 'buoy hopping' along the edge of the channel – a practice that he would soon regret.

As the vessel continued its approach, the skipper was not aware that one of the navigation buoys marking the channel's edge had recently been damaged during stormy weather conditions, and had been removed some days prior to the accident. He was also not aware that the area in which the buoy had been positioned was well-known for shoaling – something he was about to find out the hard way.

The skipper therefore aimed for what he thought was the next charted buoy, causing him to cut the corner and find the silted-up area that had encroached the edge of the channel. This caused the vessel to rapidly slow down and stop as it grounded on what was, fortunately, a soft mud bottom.

The vessel remained aground for a short while before it refloated on the rising tide, and continued its inward passage. Fortunately, there were no injuries as a result of the rapid deceleration and, after a thorough inspection, the vessel was found to be undamaged and returned to service.

The Lessons

Time and time again, the MAIB is informed of similar accidents caused through a failure to follow basic, safe navigation practices and to effectively plan passages.

1. In this case, the skipper had allowed himself to rely entirely on the presence of navigation buoys to verify the vessel's position, rather than to monitor its progress within the channel by regularly plotting its position, or using parallel indexing, range rings or clearing bearings, which could have alerted him to the vessel's close proximity to danger.

2. No passage plan had been completed. While appreciating that the passages of small vessels may not warrant the same degree of planning as that of larger merchant vessels, the basic four stages of passage planning should be applied, and remain relevant. Had the passage been 'appraised and planned' and then 'executed and monitored' in accordance with best practice, it is likely that the skipper would have had a far greater level of situational awareness and have identified that the vessel was standing into danger due to the missing buoy.

3. The port had promulgated local notices to mariners regarding the missing buoy and the likelihood of silting in that area. Unfortunately, these were transmitted via VHF radio at times when this particular vessel was shut down with nobody on board. However, all such notices were available on the port's website. If you are a regular caller to a port, make sure you consult such resources to ensure you are current with navigational matters in your area of operation. After all, the safe navigation of a vessel is up to you as skipper.

Over-Speed Damage

Narrative

Following a main engine overhaul on board a dredger, the engine was started for a trial run. After the initial start, the engine's speed gradually increased over its normal operating limit. None of the over-speed protection devices, or the operation of the mechanical emergency stop, stopped the engine, which was eventually shut down by covering its air intakes and starving the engine of air. No secondary damage was apparent but two defects, which could have contributed to the over speeding of the engine and the failure to shut down the engine, were rectified. The engine was then tested but the test run did not include the operation of the engine's protection devices.

A few weeks later, the dredger was stopped while on passage to enable a fractured high pressure fuel line on its main engine to be repaired. Once the repair had been completed, the engine was re-started, but its speed again quickly increased beyond normal operating limits. All of the methods intended to stop the engine in the event of an over-speed, including the manually operated stop lever, failed and the engine suffered a catastrophic failure.

Subsequent investigation identified:

- Routine testing of the over-speed trip mechanism had not been carried out in accordance with the planned maintenance system because the engine tachometer was faulty and did not provide an accurate measurement of the engine's speed.
- The over-speed trip assembly bracket had broken away from its mountings, which prevented the trip from operating as designed.
- The engine's governor contained insufficient oil to enable it to operate correctly. The governor oil had leaked over a period of time from a loose pipe fitting.

Condition of engine immediately after over-speed

The Lessons

1. Thorough and regular rounds should be carried out for all running machinery, including checks on the security of fixtures and fittings. Without such checks the opportunity to identify equipment failure or malfunction at an early stage could be missed. A few loose bolts can easily result in a catastrophic failure.

2. During test runs following maintenance or fault rectification on control systems, a comprehensive testing and trials programme should be followed to verify the correct operation of the safety devices. Failure to do so is only asking for trouble.

3. Planned maintenance schedules on critical equipment must be followed at all times. Planned maintenance tasks for critical equipment should not be "closed" if they are unable to be completed. Such tasks should remain "open" or "deferred" but they must be completed as soon as is practicable and not just left until the maintenance becomes due again. In this case, the continual deferral of the testing of the over-speed trip proved to be very costly.

A Lifeboat Out of Control

Narrative

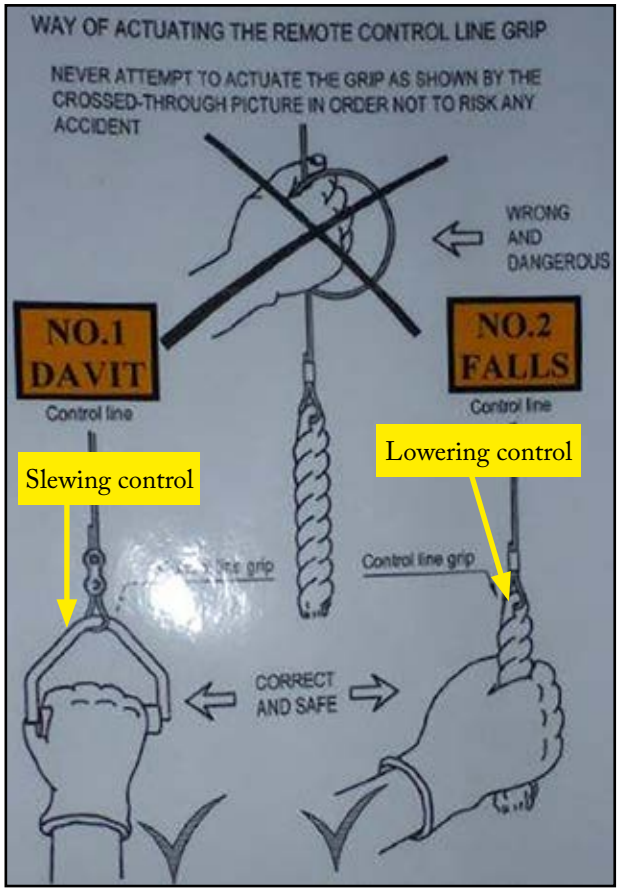


Figure 1: Operations/instructions poster

Another day and yet another inspection.

This time, the crew of a multi-role survey vessel was preparing for the annual lifeboat and davit system inspection while alongside its berth. The master had sanctioned the plan for the lifeboat to be lowered and recovered to enable the inspection technicians to observe the operation and to check the functionality of the equipment. Launching the fully-enclosed lifeboat involved pulling two control wires. One wire, fitted with a triangular handle, was used to slew out the lifeboat davit arms and the second wire, with a cylindrical hand pull, was used to release the brake and lower the falls (Figure 1).

There didn't seem to be a need to carry out a "Tool Box Talk" or run through the routine because the second officer, a foreign national who had a good grasp of English, had carried out the drill a number of times previously and knew what he was doing.

With the pre-launching preparations completed, the lifeboat was boarded by the second officer, second engineer and two ABs. The second officer completed a VHF radio check with the master, who was at the launching station and who gave the second officer permission to launch the lifeboat.

As the master closely observed the operation with the inspection technicians, the second officer pulled the cylindrical handle (Figure 2) instead of the triangular handle (Figure 3). The brake released and the lifeboat immediately started to lower. One of the technicians saw what was happening and shouted; at the same time, the master used his VHF radio to order the second officer to stop. The second officer released the control wire handle and the lifeboat stopped lowering. The second officer then pulled the same control wire again and the lifeboat dropped heavily onto the davit arms. The master once again ordered the second officer to stop and who once again released the control wire.

The falls by now had become slack and the lifeboat was leaning precariously outboard. The crew made their escape through the lifeboat

access hatch, and the falls were then wound back onto the winch drum using the hand-operated winch, and the lifeboat re-secured in its fully stowed position.

On inspection it was found that the lifeboat's forefoot and propeller Kort nozzle shroud had suffered impact damage and the nozzle's lower pintle was bent and had become detached from its mating socket (Figure 4).

Documentation checks found that no formal lifeboat training had been recorded and that the operating procedure was passed on by word-of-mouth. There were no risk assessments associated with the lifeboat launching operation and there were no instructional posters either in the lifeboat or adjacent to the launching control position.

Figure 2:
Brake release and falls lowering control wire cylindrical handle

Figure 3:
Slewing control wire triangular handle

The Lessons

A number of risk control measures were not implemented; any one of them could have helped to prevent this potentially fatal accident. There was an assumption that the second officer was fully versed with the lifeboat launching operation. All the evidence suggests that he had become confused over the purpose of each of the control wires despite their handles being distinctively different. Had a "Tool Box Talk" been conducted, it is possible that he would not have made the error. Equally, had instructions been posted, he could have referred to them to avoid any confusion.

1. The importance of training and the conduct of drills in the use of LSA, particularly lifeboat operations, cannot be over-emphasised. This is one area that calls for instinctive actions in the case of an emergency.
2. "Tool Box Talks" have become part and parcel of every day practices. They provide the opportunity to question procedures and ensure those involved understand the requirement and their individual roles.
3. Lifeboat launching instructions should be posted next to the launching position and/or on the craft itself and must be unambiguous – are yours? SOLAS Chapter III, Regulation 9 provides requirements in this matter.
4. Instructions given to crew where English is not their first language can be misleading or confusing. This can be exacerbated if those persons are under scrutiny - as was the case here. Do ensure your crew fully understand what is required of them.

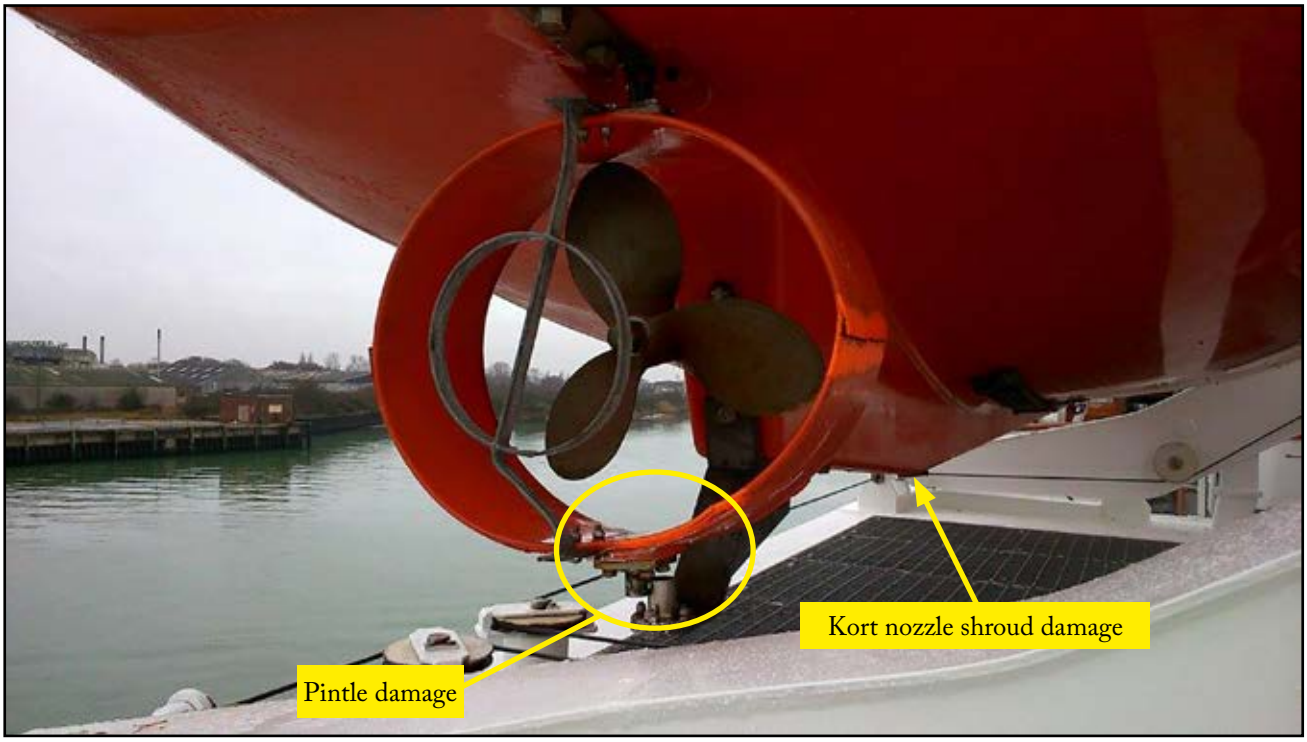


Figure 4: Kort nozzle damage

Too Hot to Handle

Narrative

The fourth engineer nearing the end of his first contract on board a container ship was nominated to work on the auxiliary boiler. The task required him to check the water level inside the boiler (the sight glass was broken) and to see if the water was contaminated with oil. The fourth engineer had not completed the task previously. He wore a pair of cotton gloves, a long sleeved boiler suit and safety boots.

To complete the job, the access cover on the boiler top had to be removed. The cover was heavy so the fourth engineer connected a block and chain arrangement to lift it. He then loosened the cover's securing bolts while standing on a step ladder. As he did so, hot steam rose through the cover's seal. The fourth engineer donned a pair of leather gloves over the cotton gloves to protect him from the heat and then continued to loosen the bolts.

Once the bolts were loosened, the fourth engineer raised the cover clear of the boiler top by pulling on the chain block. However, due to the angle of the chain block and the cover's size and shape, he had to guide and lift it manually. During this process, one of the securing bolts snagged on the underside of the boiler opening. This took the engineer by surprise and he let go of the cover's handle. Unfortunately, the hook securing the chain block to the cover's handle was also dislodged and the cover fell back towards the boiler opening. As the fourth engineer tried to grab the cover, his left hand went through the boiler opening into the boiling water. The cover also dropped into the boiler.

The fourth engineer suffered second degree burns (see figure). After receiving first-aid treatment on board, he was landed to a hospital ashore and was later repatriated home.

An onboard investigation into the accident discovered that no assessment or permit to work had been completed. The investigation concluded that the water inside the boiler was still hot because the steam valves had not been isolated.

The Lessons

Any work on a pressure vessel needs to be properly considered and planned. As a minimum, inexperienced personnel must be briefed and properly supervised. Time served on board does not always equate to relevant experience.

1. Many tasks on board a ship require permits to work. If these are not issued, the risk assessment and precautionary measures identified, such as system isolations, are likely to be overlooked. Permits to work are lifesavers – they are not just a paperwork exercise. The time invested is time well spent.

2. This job was clearly too much for one individual alone - it involved a heavy lift and working at height. Do make a proper appraisal of the resources and equipment needed before commencing any task.

Second degree burns sustained to the fourth engineer's hand

The Correct Tool is Key to Safe Maintenance

Narrative

A ship's engineer tested a spare fuel injector prior to use and found that the atomisation pressure regulating screw had been incorrectly set. The manufacturer had provided a clamping device to hold the injector, and a key to adjust the pressure regulating screw. To access the screw, it was necessary to remove a counter nut. The manufacturer's tool for removing the counter nut was not held on board, therefore an ad hoc tool had been fabricated by ship's staff.

Despite his best efforts, the engineer was unable to loosen the counter nut with the ad hoc tool using the manufacturer's clamping device. He then took the injector to the engine room workshop where he continued his efforts to release the counter nut with the injector secured in a vice. Again these efforts were unsuccessful as the tool constantly slipped out of the counter nut slot. After some consideration, the engineer thought he might be able to drill out the counter nut using the ship's lathe. However, a senior colleague recommended against this idea as there would be a risk of causing damage to the injector.

Instead, he suggested clamping the injector in the lathe chuck and using the lathe tailstock to apply pressure to the tool to prevent it slipping from the counter nut slot as the tool was turned. The lathe would be used purely as a vice to support the injector and would not be operated under power at any point (see figure).

The engineer isolated the lathe from its power source, clamped the injector in the chuck and set the tool in place. To prevent the lathe from rotating when the tool was turned, he set the lathe to its lowest speed which would give the most resistance to turning. To confirm that the gear was engaged, he attempted to rock the chuck using the chuck key as a lever. The gear had not properly engaged and the chuck rotated freely with more momentum than he expected.

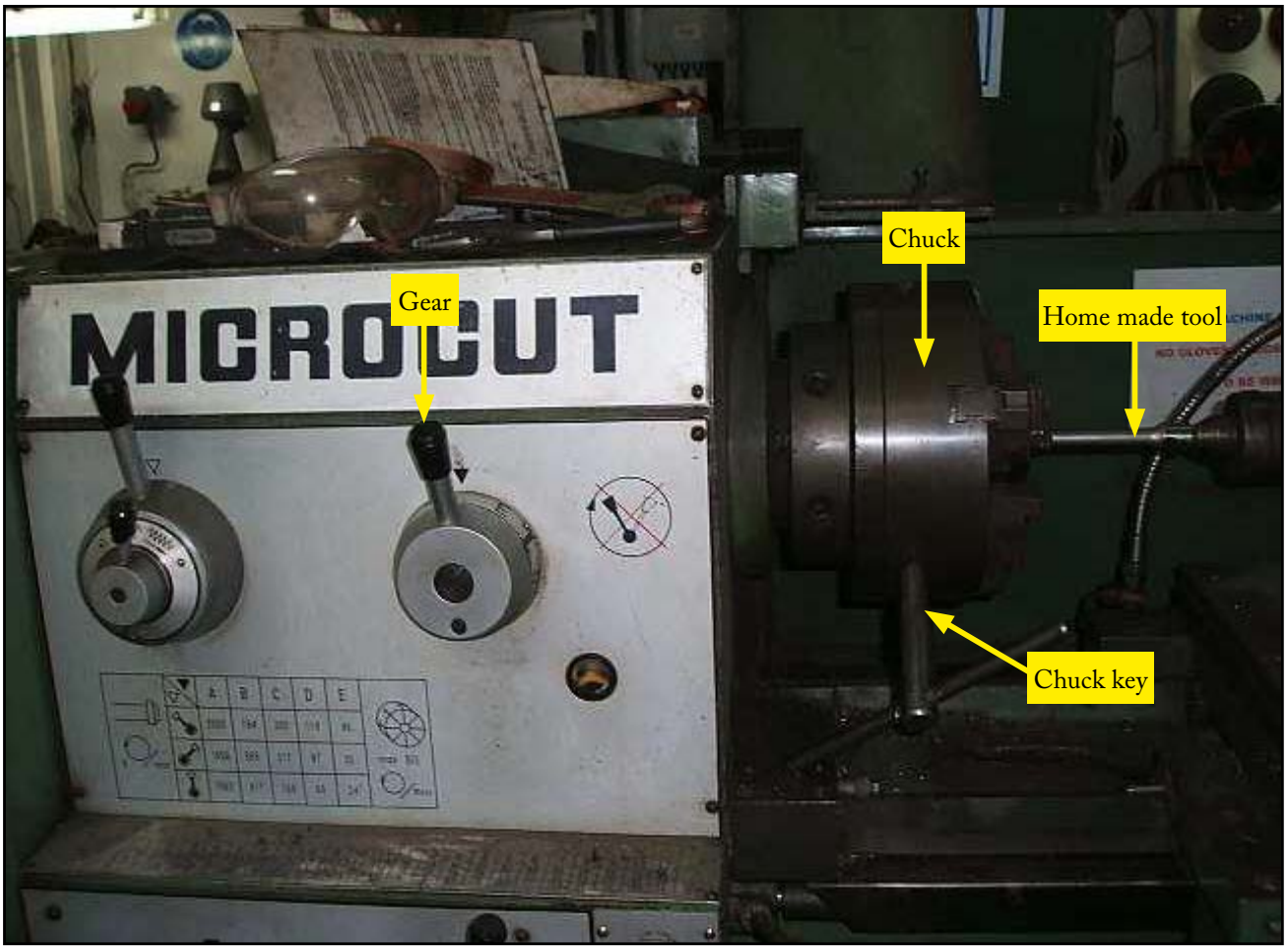
As a result of the chuck's rapid rotation, one of the engineer's fingers became trapped between the chuck key handle and the lathe's bedplate, causing the near amputation of the fingertip.

The Lessons

1. Overhaul of a fuel injector is a normal part of a vessel's routine maintenance, and had been completed using the ad hoc tool on numerous previous occasions. There is no evidence that the correct tool for removing the counter nut had ever been held on board. Lack of knowledge of a manufacturer's tool could be expected in a junior engineer, but the absence of a correct tool on board should have been identified by senior engineering staff. Only the correct tools or equipment should be used for a particular task.

2. The advice from a senior engineer to use the lathe as an ad hoc securing device demonstrates unsafe engineering practices and questions the underlying safety culture on board the vessel. The Code of Safe Working Practice for Merchant Seamen, Chapter 20 Use of Work Equipment, Paragraph 20.2.2 contains appropriate guidance.

3. Using the lathe's chuck key for any use other than its intended purpose for tightening the chuck is a particularly unsafe practice. Numerous accidents have occurred when lathes have inadvertently been started with the key still in the chuck. While this did not happen in this case, it remains a significant safety concern.



Lathe with chuck key in appropriate position where the finger was trapped

Part 2 - Fishing Vessels

I am very pleased to endorse the MAIB Safety Digest of 2015.

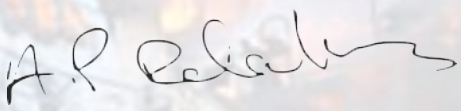
The UK fishing Industry faces many challenges and one of the most important is to continue to reduce the number of accidents on fishing vessels which cause injury and loss of life.

The MAIB Safety Digest contains case studies and lessons learnt which can help us improve safety aboard fishing vessels by learning from our mistakes.

In the forty years that I have been fishing there have been great improvements in safety, especially in recent years. These include the introduction of mandatory training courses for all fishermen; boat safety folders to inform safety assessments, and improvements in safety equipment, not least in the design of life jackets, which are now compact and much easier to wear whilst working on deck.

I have been especially pleased with the initiatives taken by industry organisations, including the National Federation of Fishermen's Organisations to encourage the wearing of lifejackets by bulk purchase and distribution to fishermen of PFDs at no or low cost. The NFFO Training Trust this year hopes to continue this proactive approach to building a safety culture by extending it to life rafts and EPIRBS for under-12m vessels.

Although accident figures are falling there is no room for complacency and we must continue our efforts to drive them towards zero.



Tony Delahunty

Tony Delahunty lives in Selsey West Sussex and is Chairman of the National Federation of Fishermen's Organisations. He began fishing in 1975 as a crew member and three years later bought his own fishing vessel and has been in the fishing industry ever since. He currently fishes the under-10m vessel, the Robert Louise.

Tony joined as a voluntary member of the RNLI at Selsey; serving as a Senior Helmsman of the Inshore Lifeboat and Deputy second coxswain of the All Weather Lifeboat for 29 years and now holds the position of Deputy Launch Authority.

A Lonely Death

Narrative

An 8m GRP prawn trawler (see figure) set off early in the morning towards its usual fishing grounds. The weather was poor, but the skipper had not been able to fish for 2 weeks and was keen to get out.

The skipper, who was fishing alone, telephoned his partner in the early afternoon and told her that water was coming in through the hatches and that the trawler was sinking. He also told her roughly where he was and that he was heading for home. The skipper sounded calm and asked his partner to call him back in an hour.

Ten minutes after talking to his partner, the skipper telephoned the vessel's owner. There was no answer so he left a brief message on the answer machine. The skipper then called a local ferry on VHF 16, but there was no reply. Seconds later he transmitted a "Mayday" on VHF channel 16 in which he stated that he was going down fast, and gave an approximate position. The coastguard responded, and advised the skipper to don a lifejacket. Nothing more was heard.

Many local vessels responded to the "Mayday relay" initiated by the coastguard but, despite a full-scale air and sea search, only flotsam was found; there was no sign of the vessel or the skipper. The wreck of the vessel was subsequently located and positively identified on the seabed; the skipper has never been found.

The vessel's aft hold, which accounted for one third of the vessel's volume, was prone to flooding from water entering from the deck through an unsealed flush deck hatch. The hold had a bilge pump and a bilge alarm, but neither was working. On this occasion, it is highly likely that the flooding of the aft store caused a significant loss of stability, which resulted in the vessel's foundering.

The vessel had been subject to an MCA inspection regime, although its next formal inspection was not yet due. The owner had a responsibility to annually self-certify the vessel and its equipment, a responsibility he was unaware of and which meant that out of date safety equipment went unnoticed on the vessel. Two lifejackets were carried on board but were never worn.

The Lessons

1. Although minor defects are an irritation, they can usually be tolerated until an opportunity to fix them arises. Living with serious defects is a different matter - it can be fatal. Make sure that all significant problems, such as leaks and defective bilge pumps and alarms, are put right before going to sea. Boats can be repaired, but piecing back together the shattered lives of those left behind when a fisherman is lost is much harder.

2. If a problem occurs at sea which potentially endangers a vessel, it is far better to let the coastguard know sooner rather than later. Informing the coastguard of a problem doesn't cost and it doesn't mean that a vessel's crew is incapable of looking after itself. It is, however, a very wise precaution which could be the difference between assistance arriving in good time or being too late.

3. Modern lifejackets are designed to not get in the way, and can be worn without difficulty when working on deck. However, those fishermen who still routinely do not wear lifejackets at sea must at least put one on when things start to go wrong. The carriage of lifejackets is a requirement, but to save lives they must be worn. Don't regret leaving yours in its packet on board ready for the surveyor's inspection.

4. Single-handed fishing is one of the most dangerous occupations, particularly when an emergency develops and several jobs need to be done simultaneously (fix the problem, steer, raise the alarm, and prepare to abandon). In such circumstances it is very easy for a lone fisherman to be overwhelmed. If possible, lone fishing should be avoided, but if this isn't feasible careful consideration should be given to how the risks involved can be reduced as far as is practicable.

5. Safety equipment that is out of date or not serviced might not work when needed. It is as simple as that.

8m prawn trawler

It's All in the Balance

Narrative

The two crew of a small beam trawler were lucky to escape with their lives when their fishing trip took an unexpected turn on a bracing but fine autumnal day. Fortunately, the sea temperature was 17°C, which was relatively warm for the waters around the British Isles.

The mate was halfway through the morning watch on board the fishing vessel while the skipper slept in his bunk in the cabin below. The beam trawler was heading towards the east, approximately 4nm off the coastline when the mate decided that it was time to reverse course. In preparation for the turn, the mate hauled the nets to the surface. He then raised the derricks to about 10° above the horizontal. Without warning, the beam trawler slewed to port and rolled onto its port side. This was probably caused by the contents of the starboard net breaking free.

Water rushed through the unsecured engine room hatch, fish room hatch and galley window. The mate shouted to the skipper below and then managed to escape through the wheelhouse door. He then scrambled onto the wheelhouse roof and untied and launched the liferaft. The liferaft inflated, but it was upside down.

The rapidly rising water level in the cabin assisted the skipper in getting to the wheelhouse. However, as the skipper tried to leave the wheelhouse, the vessel turned upside down. Luckily, the resulting sudden in-rush of water flushed the skipper clear and he was able to swim to the sea surface. The skipper and mate righted the liferaft and climbed inside it. The liferaft painter was then untied and the liferaft drifted away from the inverted hull.

The liferaft

The skipper was wearing just his boxing shorts and the mate was also lightly dressed. To keep warm, after bailing out the seawater they huddled together while the liferaft slowly drifted with the wind and tide towards the coastline. Many items that the skipper expected to see in the liferaft's survival pack, such as thermal protective aids, parachute flares and food appeared to be missing.

As the liferaft neared the coast, the skipper lit a hand flare, which was seen by a shore observer who called the coastguard. The crew were later safely recovered by the local lifeboat about 2½ hours after the vessel had foundered. They were taken to hospital for the treatment of mild hypothermia, but suffered no other injuries.

The Lessons

1. Beam trawling is one of the most dangerous methods of fishing due to the potential instability caused by uneven loads in the nets. The forces at work in this respect are so great that a beam trawler's stability cannot be fully guaranteed, even where vessels exceed current stability requirements. However, much can be done to reduce the risk of capsize by following the guidance provided in stability books (where provided), and by closing and securing all deck openings when fishing. As the length of derricks also significantly affects a beam trawler's stability, it is also worth checking that they are no longer than absolutely necessary to safely haul and shoot the gear.

2. Although the water was warm, at 17°C, neither the skipper nor mate were wearing lifejackets, and both were lightly dressed. Without the liferaft their expected survival time would have only been between 2 and 7 hours, providing they could have kept themselves afloat. Although liferafts are not required to be carried on smaller fishing vessels, one never knows when one might be needed.

3. The contents of the survival packs provided in liferafts vary according to the differing standards. A few minutes of investigation to find out what is in a survival pack is a sound investment as it could help to avoid disappointment should the liferaft ever be used.

4. Sea survival training is not just a regulatory requirement, it is essential to the safety of all mariners, whether fishermen or otherwise. In this case, the actions to release the liferaft, to right it, to bail it out, to huddle together to keep warm and waiting to use the emergency flares until the liferaft was closer to the shore, guaranteed the skipper and the mate's survival. It is highly likely the men would not have known to take these actions had they not completed the Seafish sea survival course.


Rescue

Crunch – Where Did he Come From?

Narrative

In the early hours of the morning, two stern trawlers, among a group of fishing vessels, set off from port for a day's fishing. With fairly good weather and just the occasional heavy rain during squalls, the two skippers had little to concern them.

By mid-afternoon Vessel A's skipper decided to haul his net, having completed his second tow of the day. Before starting, he looked at his radar display and noticed four radar contacts, whose relative positions he compared with the AIS targets displayed on his chart plotter. Three of the vessels were fitted with AIS and, therefore, their AIS target displayed on the chart plotter. However, one was not.

About 30 minutes later, with the net recovered, the skipper set a course towards port to land his catch. He made a quick check of the radar display, noting the new relative positions of the contacts and made a further comparison with the chart plotter. He then adjusted course to clear the three fishing vessels that were displaying AIS targets, assuming that the fourth vessel would be steering the same course as the others.

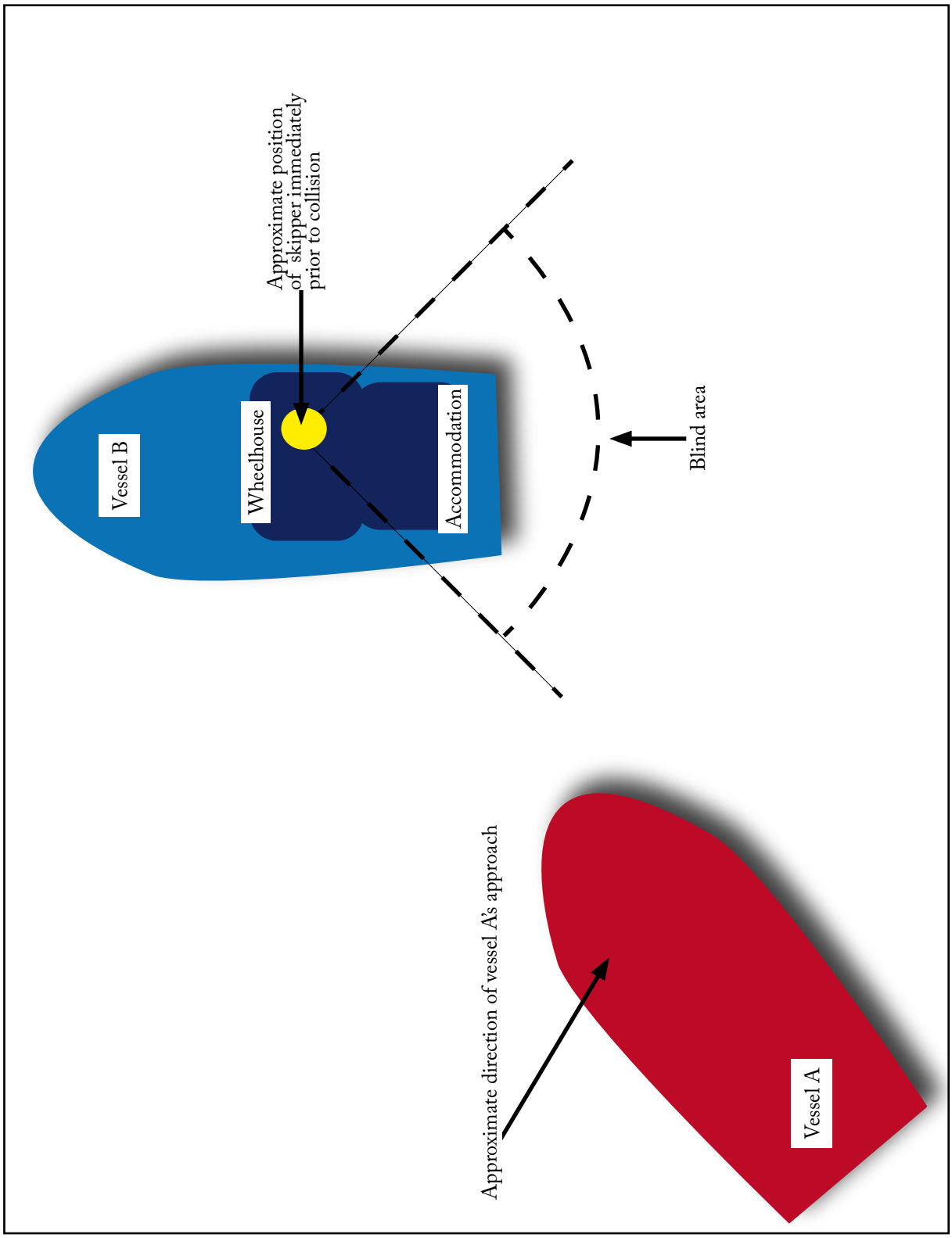
Meanwhile, Vessel B (the fourth radar contact) was continuing its tow on a westerly heading, its skipper blissfully unaware of Vessel A's approach (see figure). The skipper was thinking about hauling his net soon and so decided to complete his routine engine room checks prior to hauling. Before leaving the wheelhouse, he checked the radar display, saw a number of contacts astern, and assumed that no risk of collision existed.

Back on Vessel A the skipper had become distracted by the lights of another fishing vessel that it was overtaking and was now focused on passing clear of it. On Vessel B, the skipper finished his engine room checks and, after glancing at the radar display, was now concentrating on his chart plotter to monitor the vessel's progress between two underwater obstructions. Unfortunately, from where he was standing, the accommodation blocked his view in the direction of the vessel's port quarter.

Vessel A hit Vessel B on its port quarter, causing serious damage. Vessel B quickly flooded and sank within 3 minutes of the collision. Vessel B's skipper attempted to send a DSC distress alert but was unable to remain in the wheelhouse long enough to complete its transmission. However, he did manage to call Vessel A for assistance on a ship-to-ship VHF radio channel. Fortunately, the skipper and crew were able to inflate their liferaft.

However, they entered the sea before accessing their lifejackets, which were stowed in the shelter. Once in the water, with a liferaft that had inflated upside down, no lifejackets, one crew member drifting away from the liferaft, darkness approaching and no distress message sent, they were dependent on Vessel A's crew for rescue.

Luckily, Vessel A had not suffered much damage as a result of the collision and its crew were able to rescue Vessel B's crew within about 15 minutes. However, no distress message was relayed to the coastguard. Importantly, Vessel B had been equipped with an EPIRB, which floated free after the vessel sank, and an alert was received by the coastguard, which then responded to the emergency.



Relative positions of Vessel A and B, and Vessel B's blind area when standing at the chart plotter

The Lessons

With both skippers distracted and a failure to adopt basic best watchkeeping practices it is not difficult to see why the two vessels collided.

1. Vessel A's skipper was distracted by the vessel he was overtaking because of its close proximity. It caused him to lose situational awareness and to stop maintaining a proper lookout. Vessel B's skipper left the wheelhouse for a short period, and on his return focused on the chart plotter display from a position in which he was unable to monitor the vessel's blind spot. Rule 5 of the COLREGS requires that a proper lookout is maintained at all times – that means moving around the wheelhouse to ensure all-round visibility.

2. Both skippers intermittently looked at their radar displays. However, an occasional glance at the relative positions of contacts around the vessel is not sufficient to ascertain whether they are approaching on a steady bearing, which would indicate a risk of collision. Rule 7 of the COLREGS requires that watchkeepers systematically observe, or plot, radar contacts.

3. Vessel A's skipper had become over-reliant on AIS target information displayed on his chart plotter, so much so that he chose to assume that a fourth radar contact would be doing the same thing as the other fishing vessels fitted with AIS. MGN 324 (M+F) provides useful guidance and advice regarding AIS usage. It warns that other vessels may not be fitted with AIS and that there is no provision for AIS in the COLREGS. Be careful what you rely on.

4. Having the right of way as a stand-on vessel does not excuse slack watchkeeping practices. Even as a stand-on vessel, Rule 17 of the COLREGS allows for action to be taken when it becomes apparent that the give-way vessel is not acting appropriately and, importantly, it requires that where the stand-on vessel finds itself so close to the other vessel that action by the give-way vessel alone cannot prevent a collision then it must take action.

5. With no DSC alert transmitted and no VHF radio communication on channel 16, the coastguard was powerless to provide immediate assistance. Fortunately, the EPIRB alert was subsequently received by the coastguard. However, this was a short time after Vessel B had sunk and introduced an unnecessary delay to the scrambling of SAR assets. If you are in trouble, call for help sooner rather than later. The best way to do that is by DSC as it prevents misunderstandings. If that's not possible, transmit a voice call over VHF channel 16. If that's not possible, hope that you had the forethought to carry an EPIRB.

6. If you are on a vessel in the area where another vessel is in distress, in addition to rendering assistance, transmit a relayed distress message on its behalf using either VHF radio or DSC.

7. The MCA provides some excellent guidance on best watchkeeping practice in MGN 313 (F) and has produced a 'Fishermen's Safety Guide' and various other safety literature. All of this is included in your fishing vessel certificate wallet – please take time to read it. It might just save your life.

The Perfect Gift

Narrative

Mullion compact 150N lifejacket

A potter, with one person on board was heading for home after a morning's lobster and crab fishing. The weather and sea conditions had been pretty good since sailing at around 0630 but the wind had started to freshen. Shortly after noon, the skipper hauled in his last string of pots and set a course for home on the vessel's autopilot.

On the way back, the skipper went on deck to tidy gear away and noticed water sloshing around. This was not unusual in the conditions but as a precaution he returned to the wheelhouse to check that the automatic bilge pump was operating. It was, and the skipper also switched on two other electric bilge pumps. However, he soon realised that water was coming into the boat faster than the pumps were pumping it out, so he broadcast a "Mayday" on VHF Channel 16. He also tried to activate his EPIRB that was fitted on the wheelhouse roof, but it smashed when he accidentally dropped it onto the deck.

Without warning a wave came over the starboard rail and the vessel began to roll to starboard and then capsized. The skipper entered the water and his vessel sank by the stern a few moments later. The skipper, who was a poor swimmer, was wearing an inflatable lifejacket (figure), which auto-inflated and kept him afloat.

After the coastguard received the "Mayday" call, a search and rescue operation was quickly started involving lifeboats and a rescue helicopter. About 45 minutes later, the skipper was recovered from the chilly and choppy seas; he had swallowed sea water which had made him sick. He was airlifted by helicopter, where he was treated for dehydration and hypothermia.

The Lessons

1. Lifejackets save lives. Wearing them at sea when on or around the working deck is common sense as it's impossible to know when they will be needed. It takes only seconds to fall into the water or for a vessel to capsize. This skipper had not routinely worn a lifejacket at sea until he was given one as part of the initiative by Seafish, the Fishermen's Mission, NIFPO, RNLI, MCA and Asda. It's a good job he did.

2. Broadcasting a "Mayday" or a "Pan Pan" as soon as things start to go wrong costs nothing, gets people's attention and helps to ensure that help is on its way. It's better to be safe than sorry.

3. Smaller fishing vessels are not required to carry a liferaft, but that does not mean they are never needed. You might not have to fit a liferaft but if there is room to stow one on board it is worth getting one. If the worst happens a lifejacket will keep you afloat but a liferaft will keep you relatively dry and warm until help arrives.

Double on the Rocks

Narrative

In similar locations and circumstances, two small, single-handed fishing boats foundered on rocks when working creels close inshore. Both skippers were experienced fishermen operating in familiar waters.

The first accident was on a clear, sunny afternoon with an onshore breeze and near the time of low water. The skipper was making an approach to pick up his final line of creels for the day. However, a combination of low tide and the onshore wind had resulted in the buoy marking the creels being too close inshore to reach. As a result, the skipper turned the boat round, set a course for home and increased to full power. Seconds later, the boat struck a reef and started to flood rapidly. Realising that the boat was foundering, the skipper tried to make headway back towards the shore and he also pressed the DSC emergency button on his VHF radio. The boat sank rapidly and the skipper abandoned it (Figure 1). The lifejacket he was wearing inflated and he swam the short distance to the safety of the shore. Although no VHF transmission was received ashore, the coastguard were aware of the accident after a 999 call from a member of the public.

In the second accident, as the skipper was hauling in his final creel he realised the boat was getting too close to rocks and he tried to move astern away from the danger. However, at this critical moment, the outboard engine's propeller became fouled by the creel's line and he lost propulsion. The boat was soon being bashed on the rocks by the swell and, although it was fitted with an auxiliary outboard engine, there was no time to start it. As the boat flooded and capsized (Figure 2), the skipper, carrying his lifejacket, jumped onto the relative safety of a nearby rock. From there, he was airlifted to safety after raising the alarm by waving at passers-by on the shore.

The Lessons

1. Both boats were lost and the skippers were fortunate to have escaped uninjured. Such accidents can happen to even the most experienced fishermen working in familiar waters.

2. Small creel fishing boats often operate around reefs, rocky areas and close inshore. Such regular close proximity to navigational dangers is not unusual but demands a high degree of readiness to react quickly to any difficulties arising, such as engine failure or grounding.

3. Lifejackets save lives. The first skipper's lifejacket worked effectively and was a significant aid for him once he had abandoned the boat into the water. The second skipper had his lifejacket with him but did not wear it as he was able to scramble to safety without full immersion in the sea.

4. With quick thinking, the first skipper attempted to raise the alarm using his DSC emergency button. However, no emergency transmission was received ashore probably because the boat's electrical system had failed as a result of water ingress by that time. Nevertheless, it was the right action to take and, had the system still had power available, would have transmitted the boat's location and emergency status to the coastguard.

5. Neither skipper was carrying a PLB, and both ended up relying on members of the public to inform the coastguard. Small, lightweight and unobtrusive, a PLB is a very reliable means of raising the alarm, including the position of the emergency. They are of particular significance for those proceeding to sea single-handed.

Figure 1: Vessel 1 abandoned on the rocks

Figure 2: Vessel 2 abandoned on the rocks

Part 3 - Recreational Craft

RECOGNISING RISK

"He that will not sail till all dangers are over must never put to sea." Attributed to Thomas Fuller

Risk is an inherent part of going to sea and it is perhaps the prospect of adventure and excitement that persuades so many of us to take up sailing, either as a profession, or as our main leisure activity. The level of risk that we expose ourselves to is, to some extent, controlled by us and the approach we take. Recognising risk, and developing sensible control measures to help mitigate it, is perhaps the first step in making sure that we, and our crew, will be reasonably safe at sea.

This is easier said than done. Striking the right balance between getting the job done effectively within reasonable margins of safety, and without inflicting unreasonable and impractical measures on the vessel's routine, requires work and professional judgement at every stage.

Accidents are rarely the consequence of one poor decision. They usually have several contributory factors aligning at the wrong time. Poor maintenance, the absence of training and practising routines, inadequate passage planning, poor communications, the lack of situational awareness and fatigue are all factors in accidents and tragedies that could have been avoided.

Maintenance

Reducing risk on board starts well before a vessel goes to sea and adhering to scheduled surveys, and following up the detailed recommendations, is a good start. Planned maintenance routines and ensuring that critical spares are carried on board, will also reduce the risk of getting into trouble at sea. Look after our boat and our boat will look after us.

Equipment

Incidents and accidents will occur at sea from time to time no matter how well the crew and boat are prepared and a good inventory of safety equipment can help save lives. Remember, lifejackets with spray hoods, safety harnesses, MOB recovery systems, kill cords, PLBs, AIS units and other communication equipment, should not only be on board, but our crew should be familiar in their use.

Case 18 "Mediterranean Mystery" was a sad example where the right equipment was not on board; and Case 17 "Are you certain you're clipped on" provides a good example of how a life was probably saved after a MOB, because of regular crew drills, and by having the right equipment on board.

Training

There are excellent training providers in the UK delivering the world-leading RYA syllabus, and other competent-based training for the professional and leisure sailor, but we should remember that training should not finish when we have attained the minimum necessary qualification. Developing ourselves through extended training, as well as being receptive to learning from the challenges that we face at sea every day, will reduce the risk of things going wrong in the future.

Passage Planning

Passage Planning is an integral part of reducing risk and it does not have to be an arduous process but covering the basics will help us reduce the risk of encountering hazardous situations at sea.

Where we need to change our plan as circumstances change during a voyage, we should take time to re-evaluate our situation, project our revised strategy with ourselves and our crew, before proceeding. Case 20 "Lack of planning ends in adventure" is a reminder of how things can go wrong if we do not do this.

Using the Team
(or Bridge Resource Management)
The wise Captain who had the notice put up on his bridge *"I will make a mistake today, who will help me?"* knew how to get the best out of his team and understood the principles of Bridge Resource Management. The principles are the same whether we are on a large ship, or small craft. A skipper, who can create an open and transparent culture on board, where the team is encouraged to challenge decisions, will be less likely to 'screw up'. Case 20 "Lack of planning ends in adventure" is a clear example of failure in good BRM on a small vessel.

Situational Awareness
The root cause of many incidents is the lack of situational awareness. Remain alert to risks. Improved situational awareness leads to significantly improved safety. Case 24 "A fatal blow" is a graphic example of the dire consequences of what can happen when a skipper is distracted at the wrong moment and loses his situational awareness.

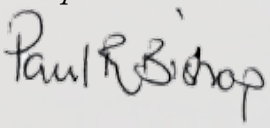
Fatigue and Complacency
Tiredness is a common cause of accidents at sea and if we plan to not let ourselves, or our crew, become exhausted, our judgement should remain unimpaired. The sea is unpredictable and occasionally there will be circumstances when our stamina will be challenged no matter how well prepared we are. Recognising the onset of fatigue enables us to implement coping strategies at the right time, such as going through handy check-lists, and cross-checking all key decisions with our team.

Complacency can slowly work itself into our daily routines over a long period. We should remember to ask ourselves on a regular basis *"are we getting complacent?"*

Luck has its part to play too. Unfortunate incidents have happened to the very best skippers who have just been in the wrong place at the wrong time. That said, a highly respected Captain of a Tall Ship once said *"A successful captain needs luck but it is hard work being a lucky captain."* The lazy-minded tend not to be great at recognising risky situations that can lead into tragic incidents.

And when things do go wrong, or we have a near miss, we should be frank with ourselves and learn from the incident. I have been a long-term admirer of the important work that the MAIB does and how it clearly draws out the lessons for all of us to see. I trust that you will continue to glean the valuable lessons from this and future editions of *Safety Digest*.

Perhaps if Thomas Fuller was writing an introduction for the MAIB *Safety Digest* he would have completed his quote by adding: *"He that will not sail till all dangers are over must never put to sea… but he who puts to sea prepared and alert is less likely to be beset by mishap, disaster or tragedy"*.



Paul Bishop
HEAD OF RACE DIRECTORATE, SAIL TRAINING INTERNATIONAL

Paul has been a passionate small boat sailor since the age of eight when his family moved to Cornwall and he started sailing dinghies, and small yachts with his father. This passion led to a career as a professional seafarer from the age of 21 skippering sail training vessels around Europe, several trans-Atlantic voyages and many Tall Ships Races including the Australian Bicentennial Tall Ships Regatta in 1988.

He spent two years as the Operations Manager of the Island Cruising Club in Salcombe, South Devon where he was in charge or a large and diverse fleet of sailing craft, from Topper dinghies, to a graceful 70' Edwardian Schooner and historic Brixham sailing trawler. He went on to become the Director of a sail training charity, the Rona Sailing Project, which operates three modern purpose-built vessels around 20 metres and an RYA training yacht.

He is an RYA Yachtmaster Offshore and Ocean Instructor and Examiner, and past member of the RYA Yachtmaster Qualification Panel and Certifying Authority.

He has worked for Sail Training International since 2006 in his current role where he heads up Tall Ships Races planning and operations and organises Tall Ships events around the world.

He retains his commercial licence and regularly sails as a volunteer skipper for a UK sail training charity but spends a lot of his leisure time sailing with his wife on their Westerly Konsort along the South Coast and across the English Channel.

Are You Certain You're Clipped On?

Narrative

A yacht was on an ocean passage in rough seas and strong winds. Two of the crew were on the foredeck changing a headsail. They were wearing lifejackets and dry-suits and were apparently tethered to the yacht.

The boat then suddenly heeled to leeward and one of the crew on the foredeck fell overboard. The remaining crewman on the foredeck made his way aft shouting 'man overboard' (MOB) as the helm brought the boat round into the wind. One of the crew was pointing at the casualty in the water as it quickly became apparent he had not been clipped on.

All the yacht crew came up on deck, the MOB button on the GPS chart plotter was pressed, the engine was started and the sail area reduced. Visual contact was soon lost with the casualty in the swell.

The yacht retraced its course back to the MOB position but there was no sign of the crewman. One of the yacht crew issued a "Mayday" distress call on VHF radio and a nearby vessel soon responded and headed towards the scene. The yacht crew then commenced a search pattern based on the estimated direction and rate of drift for the MOB.

During the search the MOB managed to activate the AIS PLB, which he had been carrying. The yacht headed to the indicated PLB position and, after bringing the crewman alongside, he was recovered on board. The crewman was taken below and removed from his wet clothing and placed in sleeping bags with hot water bottles to warm him up slowly. He was monitored closely for a couple of days and went on to make a full recovery.

The Lessons

1. The crewman had thought he was clipped on when he wasn't. Make sure you check that your tether is secure by giving it a tug once you have clipped on. Ocean-going yachts are fitted with jackstays that enable crew to move between the relative safety of the cockpit and foredeck without unclipping. In rough seas it's vital you remain secured to your yacht, with an appropriate length tether, at all times when on deck to prevent separation from your vessel. This accident is a stark reminder of the difficulties of locating and recovering an MOB in rough weather.

2. The personal safety equipment the MOB was wearing was crucial in ensuring his survival: the dry-suit he was wearing delayed the onset of hypothermia, the inflatable lifejacket kept him afloat with his head clear of the water, and the spray hood prevented him ingesting sea water spray. Consider carefully the safety equipment you need for your voyage; it may save your life.

3. The crew had practised MOB drills regularly and because of this were able to deal with the emergency effectively and without any panic. However, as visual contact with the MOB was lost very quickly and the actual rate of drift of the MOB was much higher than anticipated, the PLB was a life saver. Personal AIS devices and PLBs are now more readily available and affordable, so why not consider getting one?

Note: MAIB Report No 4/2012- Report on the investigation of a fatal man overboard from the Reflex 38 yacht *Lion*, includes greater discussion on tethers and manoverboard procedures.

Mediterranean Mystery

Narrative

Two friends set off in a 13m trimaran for a 5 to 6 day voyage in the Mediterranean. The boat's skipper spoke to his partner ashore by mobile telephone shortly after sailing – the weather was good and all seemed well. When the trimaran did not arrive at its destination as intended, the skipper's partner alerted the local coastguard through the British Embassy. A search was commenced, but there was no sign of the boat or its crew. The boat was fitted with a VHF radio and the crew had lifejackets. No liferaft, EPIRB, AIS or PLBs were carried.

About 1 month later, a cargo ship found the upturned and badly damaged hull of the trimaran (Figure 1) approximately 130nm to the north of the sailing vessel's intended track. The cargo ship towed the trimaran into port, where it was lifted from the water for inspection. The trimaran was dis-masted and both its outer hulls were missing (Figure 2). The body of the boat's skipper was found 3 weeks later. The crewman is still missing.

Due to the condition of the trimaran when it was recovered, it was not possible to determine when or how the vessel and its crew perished. However, in view of the prevailing current in the area and the positions in which the boat and its skipper were found, whatever happened probably occurred while the trimaran was near its intended track, which crossed a relatively busy shipping area. As a VHF call was not heard, it is also likely that whatever happened, happened quickly.

Figure 1: Upturned hull

The Lessons

1. There are rarely too many things to worry about when sailing in open water in good weather and in a seaworthy boat. However, things can and do change quickly and without warning. Unless the right equipment is carried to deal with the array of possible emergencies, the outcome can be catastrophic. Having the right safety, survival, navigation and communication equipment when embarking on longer, exposed, voyages is not a question of 'having all of the toys', it's a matter of life or death.

2. Some yacht types are less prone to capsize than others, but none are invincible. When a yacht does capsize, it usually happens very quickly, leaving little or no time to call for assistance. Without an EPIRB and PLBs to alert the coastguard and nearby vessels, there is a chance that no one will realise that something is amiss until it's too late.

3. Immersion in the relatively warm waters of the Mediterranean is likely to result in exhaustion and unconsciousness within 12 hours, whereas a liferaft provides the security and the means to survive indefinitely. It's good to have the option, particularly when out of sight of land and other vessels.

4. AIS was intended as an aid to security and is not required to be carried by leisure craft. However, its use on recreational craft assists:

    - OOWs on board merchant ships to detect smaller vessels (particularly as AIS is increasingly used on board these vessels for collision avoidance).
    - Skippers in identifying larger vessels and determining their intentions and the risk of collision.
    - Coastguards in locating vessels that are overdue or missing.

Figure 2: Hull lifted out of the water

Three Crew Down

Narrative

A yacht, with nine crew on board, had completed two races and was preparing for the next race. There was a steady force 6 strong breeze and sea conditions were rough. The boat was sailing just off the wind with some of the crew sitting on the windward rail.

The skipper, who was on the helm, gave the order to get ready to tack, at which time some of the crew on the windward rail started to move inboard, ready to pass under the boom. As the skipper hardened up into the wind to go about, the boat rolled to leeward due to wind and wave action. One of the crew lost her hold and fell towards the leeward rail, banging her head on the boom as she went. She collided with two other crew, both of whom ended up falling and then slipping under the leeward lower guardrail and into the water. One of the two managed to hold on to a guardrail but the other became separated from the yacht. The lifejackets of both had automatically inflated.

While the skipper tried to slow the boat down, four of the crew, including the individual who had banged her head, attended to recovering the crew who was hanging on to the yacht. She was recovered after a few minutes and was then taken down below, undressed and put in a sleeping bag. Another crew member kept sight of the man overboard. The crew then lowered the headsail and the engine was started.

The casualty in the water realised waves were breaking over his head and so he deployed his spray hood, which was integral to his lifejacket. Concerned that it was taking a while for the yacht to return, he decided to activate his personal location beacon. However, he was unable to do so.

The yacht returned to the casualty and the crew threw the rescue sling after removing it from its bag on the transom. However, the sling had not been properly secured to the throw line and it floated away. The line was retrieved and then attached to a horseshoe lifebuoy, which was then thrown towards and grabbed by the casualty. He was pulled to the stern of the yacht where he was able to climb up the boarding ladder with assistance of the crew. He went below, undressed and was wrapped in a duvet. By now the crew member who had banged her head had started to drift in and out of consciousness.

The skipper alerted the coastguard and the yacht motored into sheltered waters. A helicopter recovered the crew member with the head injury and transferred her to hospital, where she was monitored overnight. The other two crew were transferred to hospital by ambulance after the yacht made its own way to a nearby harbour, and were discharged later the same day.

The Lessons

1. Even in a well-equipped yacht with plenty of experienced crew, this accident demonstrates how challenging an emergency situation can be. It was fortunate the skipper was able to recover the man overboard on the first attempt, as after only 15 minutes in the water the casualty was becoming hypothermic despite being appropriately dressed. Transmitting a distress call on VHF radio must be a priority in a manoverboard accident; any delay reduces the chances of survival. It is very fortunate that the consequences were not more serious in this case.

2. The outcome could also have been very different if the casualty had not been wearing an inflatable lifejacket. The fact the lifejacket was fitted with an integral spray hood and the casualty knew how to use it further assisted his survival. Spray hoods limit the inhalation of sea water spray. If your lifejacket is not already fitted with one, consider buying a separate spray hood that can be stored in a pouch on the lifejacket waist strap.

3. The personal location beacon was lost during the recovery of the casualty so the reason for the casualty being unable to operate it is unknown. However, the benefits of being fully familiar with your personal safety equipment are clear. Sometimes dummy units are available from retailers or sea survival training providers, allowing greater familiarisation than simply reading the operations manual.

4. Safety equipment will often appear ready for use when supplied. However, to ensure confidence in its functionality always check, as far as you can, to ensure it has been assembled correctly, and then continue to do so on a regular basis. If in any doubt refer back to the manufacturer. When sourcing safety equipment don't be influenced by costs alone. Always take into account the conditions in which you may have to use it.

Lack of Planning Ends Adventure

Narrative

Three qualified coastal skippers took the opportunity to gain some experience under the watchful eye of an RYA instructor. A group of small islands was the perfect venue for their sailing trip until they came to an abrupt but perhaps not totally unexpected halt.

The three men had chartered the 14.4m GRP sailing vessel with a commercially endorsed yacht master who was familiar with the vessel. The yacht had a full set of admiralty charts and functioning electronic navigational aids, including electronic charts of the area.

The learning experience and indeed the trip were progressing well. One morning, one of the qualified coastal skippers was tasked by the instructor to prepare a passage plan to take the yacht from its overnight berth to a position 7nm along the coast. The passage was completed without incident and the yacht arrived safely at the planned destination early in the afternoon. However, the instructor then decided to proceed to an anchorage further to the north, the feasibility of which was briefly discussed with the others on board. One of the coastal skippers then went below and began to prepare a passage plan in the knowledge that the yacht had to avoid an outlying rock connected to the headland by a submerged reef.

The coastal skipper planning the passage soon advised the instructor of a natural transit and a compass course to follow, which would keep the yacht to seaward of the rock and hidden dangers. This advice was either not heard or was misunderstood. The instructor considered that a passage between the rock and the headland would be interesting and decided to navigate between the shore and the outlying rock by eye.

As he did so the yacht grounded on the reef at a speed of 4kts, causing extensive structural damage to the hull and keel. One of the crew suffered a fractured rib.

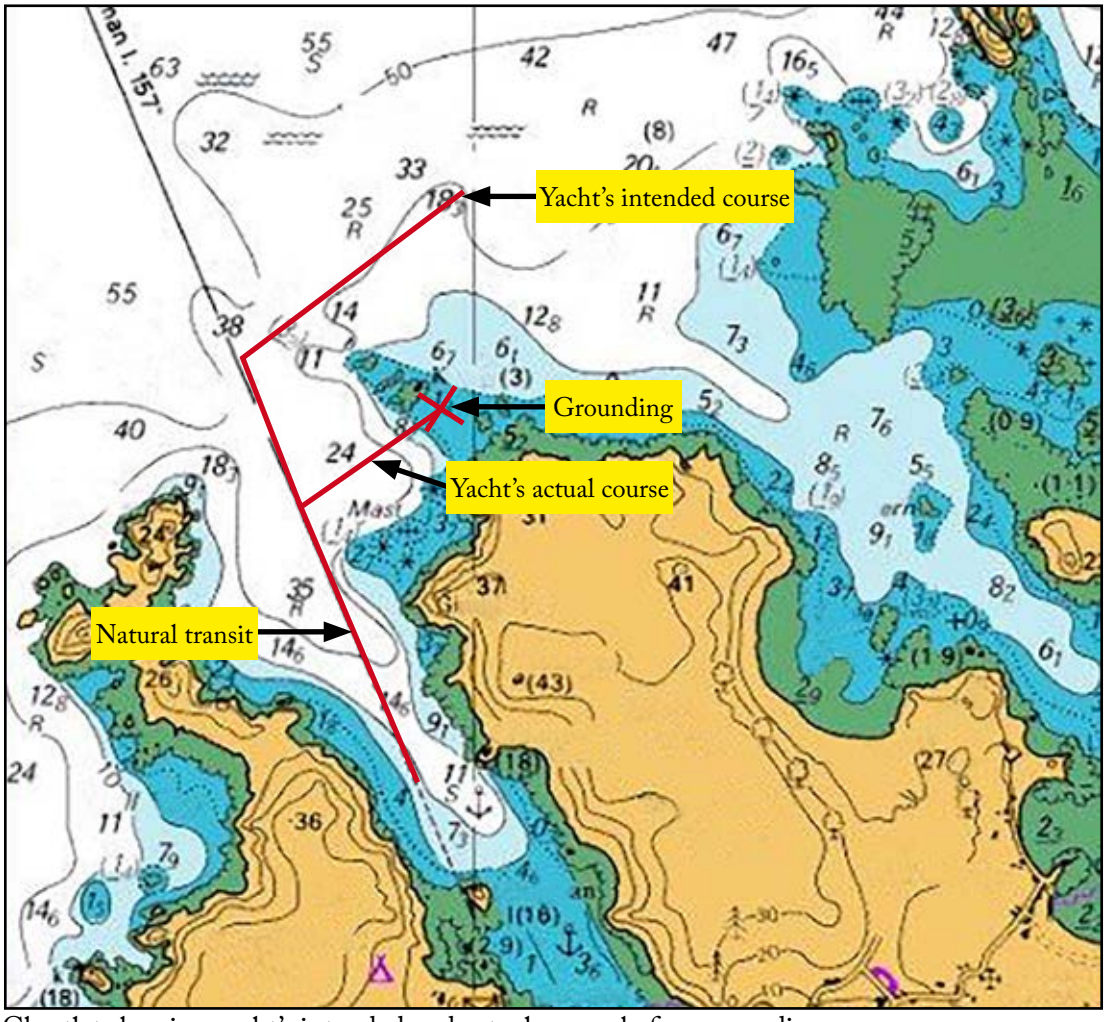
The Lessons

1. Planning passages from berth to berth can sometimes seem to be an unnecessary burden, but the consequences of not doing so may be disastrous. Therefore, plan your passages thoroughly and, if the conditions or your situation change, don't rush. Slow down, stop or even anchor and revise your plan before proceeding.

2. Get in the habit of plotting your position at regular intervals and check your vessel's position by alternative means. Remember that if you are guessing where you are, then you really don't know where you are.

3. If a situation appears untoward or dangerous, don't be shy about coming forward and letting people know. The person in charge might appear to be in control of the situation, but appearances can sometimes be deceptive.

4. Communication is a key factor – always ensure that all instructions and information are received and understood.



Chartlet showing yacht's intended and actual course before grounding

A Back-Breaking Experience

Narrative

A group of 27 members of a boating club arrived in three RIBs at a marina in preparation for an 'exhilarating' trip to a local sightseeing spot. The group was divided into nine passengers per RIB, and each passenger was given waterproof clothing and a lifejacket.

The passengers were then taken to the boats. Once on board, the coxswain of each boat gave a safety brief to his passengers, which included: the need to wear the waterproof clothing, the correct fitting and inflation of lifejackets, the seating options available in the boats, the nature of the ride to be expected, and the importance of advising the pilot of emergency situations such as a man overboard. The passengers were also told to advise the coxswains of any medical conditions they might be suffering, particularly any problems related to the heart or back.

A married couple on one of the 8.5m RIBs chose to sit in the boat's rear bench seat (figure), which was described by the boat's coxswain as the 'G and T' seat because it was the most comfortable (1" foam) but the least exciting seat on board.

The three RIBs then left the marina at slow speed and accelerated clear of the navigation channel. Once in open water, the sea conditions slowly deteriorated and the wave height gradually increased but, although slightly concerned, the married couple were enjoying the trip and trusted the coxswain's judgment.

About 25 minutes into the trip, the RIB seemed to hit a large wave and became airborne and then landed in a trough between two waves, slowing the RIB noticeably. The female screamed in pain so her husband shouted at the coxswain to stop. The coxswain stopped the RIB and it was quickly apparent that the female had suffered a debilitating injury. The coxswain then radioed the other RIBs and informed their coxswains that he was returning to the marina.

The RIB's speed was kept to a minimum, but the female passenger was clearly in a lot of pain. The coxswain radioed the marina and requested the emergency services to meet them on arrival. When the RIB arrived alongside, the female passenger was taken by air ambulance to hospital where she was diagnosed with compression fractures to her vertebrae.

The Lessons

Every year, several people seriously injure their backs as a result of being lifted from their seat and landing heavily when travelling in RIBs or similar craft. The injuries sustained are usually connected with compressive fractures, which inevitably require hospitalisation followed by several months of immobilisation in a body brace. Consequently, they are frequently life-changing.

Much can be done to prevent these injuries from occurring, such as conducting comprehensive briefings and identifying those people most at risk. However, whenever a boat is manoeuvred in such a manner that causes it to become airborne, such as when riding over a wake or waves at speed, the risk of back injury is increased significantly. Some seats provide more protection than others in this respect, but the risk of back injury is seldom eliminated completely.

RIB rides are not exciting at slow speed and therefore a great deal of common sense and judgment is required to achieve the right balance between 'exhilaration' and danger. This is easier said than done, and the only way for serious back injuries to be avoided is for boat coxswains to be alert to the risk and slow down sooner rather than later.

Rear seat

Slippery Slope to Danger

Narrative

A family's day out in their sailing boat could have ended before it began when their lugger (Figure 1) and trailer careered down a slipway (Figure 2).

As the car reversed the boat on its trailer down the public slipway, the trailer moved from the level area at the top of the slipway onto its downward slope. As it did so, the trailer became detached from the car's towing hook. The trailer rolled about 5 meters down the slope until it slewed sideways towards the seaward side of the slipway. The trailer and boat finally came to rest when one wheel of the trailer came off the slipway, leaving both balancing precariously on its axel.

Three children were in the boat throughout, all were wearing lifejackets. After the boat and trailer came to rest over the edge of the slipway, the boat had to be stabilised using planks of wood to enable the children to be rescued. The boat and trailer were then lifted back on to the slipway with the aid of a forklift truck.

Figure 1: A typical example of the sailing boat

The Lessons

1. Things can and do go wrong so don't put more people in the boat than absolutely necessary. It's not a fun ride.

2. Towing hitches wear over time, causing trailers to uncouple without warning. It is therefore important that the hitches are routinely inspected and maintained and that safety chains or breakaway devices remain fixed every time a trailer is attached. Help and advice on towing boat trailers and towing hitches are available at www.gov.uk.

Figure 2: The public slipway

A Narrow (boat) Escape

Narrative

It had turned out to be a regular annual arrangement for a group of long-standing friends to spend a weekend on two narrow boats.

One of the groups comprised three people, all of whom had varying experience in operating narrow boats and canal locks. Consequently, the group leader decided there was no need to look at the safety video sent to him by the narrow boat hire company, which covered the safe navigation of locks and the need to keep well clear of the lock's cill as the water level dropped in the lock.

The weather was fine as the party arrived at the hire company's offices. Keen to get onto the water so that they could meet with the crew of the other narrow boat at a nearby pub, they once again declined the offer to view the safety video. With the briefing on the narrow boat's equipment out of the way, the group leader confidently manoeuvred the vessel away from the bank as the other group members settled down to enjoy the last of the day's sunshine.

The group leader safely negotiated three locks, the balance beams of which were fitted with posters highlighting the cill dangers, before the group met up with the others from the second boat for a few drinks before returning back on board.

Both narrow boats sailed early the following morning. The smaller of the two, with the group of three on board, made better progress in navigating the locks and so soon left the larger boat behind. The least experienced group member was on the tiller as the vessel entered a lock. The gearbox was in neutral and the engine at idle as the lock gates were closed and the vessel remained stationary, above the lock's cill, which was clearly indicated on the lock's side coping stone (Figure 1).

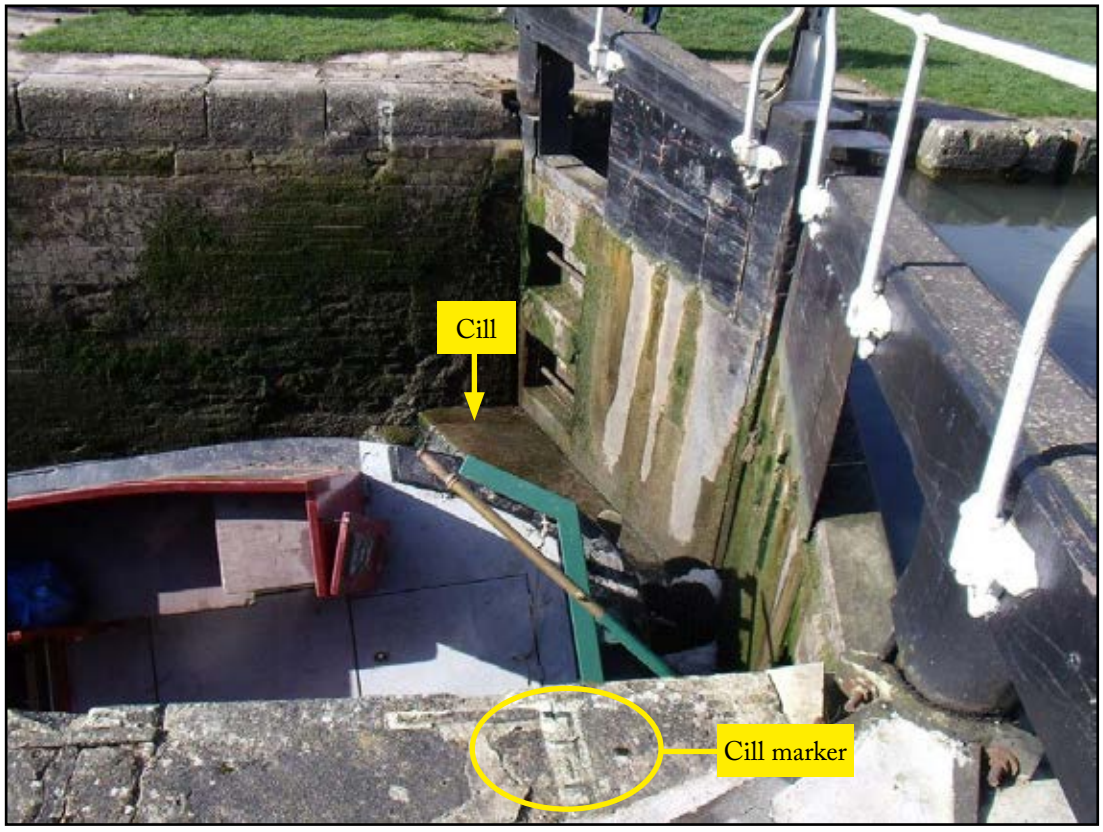


Figure 1: Showing cill and marking

The other two crewmen then opened the lower lock gates to balance the water levels to enable the narrow boat to exit the lock.

Alerted by a rapid change in the engine revolutions, the group leader looked towards the vessel as the helmsman attempted to drive the narrow boat forward. However, before the boat moved forward, he saw its bow dip downwards into the lock as the stern hung up on the lock cill. The lower gates were quickly closed but not before the vessel's bow touched the lock's bottom and rolled to port (Figure 2). The group leader then 'cracked open' the lock's upper gates in an attempt to refloat the vessel. However, this was unsuccessful because the bow was already full of water, causing the helmsman to rapidly scramble up onto the canal bank.

The operating company was notified and representatives attended the scene. The crew were shocked but otherwise unharmed.

The Lessons

The narrow boat hire company took reasonable steps to provide the hirers with safety advice by recommending that they watch the safety instructional video and read the Boater's Handbook. Despite the hirers' apparent experience, viewing the video and reading the handbook should have reminded them of the need to keep well clear of the lock cill while the lock was in operation.

Luckily, on this occasion there were no injuries. However, if there had been young, elderly or disabled persons in the forward section of the narrow boat the outcome would probably have been far more severe.

1. **Narrow boat hire companies should take the necessary steps to ensure that hirers view the Canal and River Trust's (CRT) "The Boater's DVD" which provides comprehensive safety advice.**
2. **Hirers should also be made aware of the safety advice and operational guidance contained in the CRT's "Boater's Handbook".**
3. **It is advisable that the risk of 'hanging up' on a lock cill, and how to avoid doing so, are specifically brought to the hirer's attention. A model of a lock is often used to illustrate how to operate locks and show the position and risks associated with cills, as well as how their position is identified – if you do not have one, the investment is well worthwhile.**
4. **Do check your Safety Management System to ensure that it comprehensively covers safety briefings and the process of checking and recording that these have been undertaken – remember PREVENTION IS ALWAYS BETTER THAN CURE.**

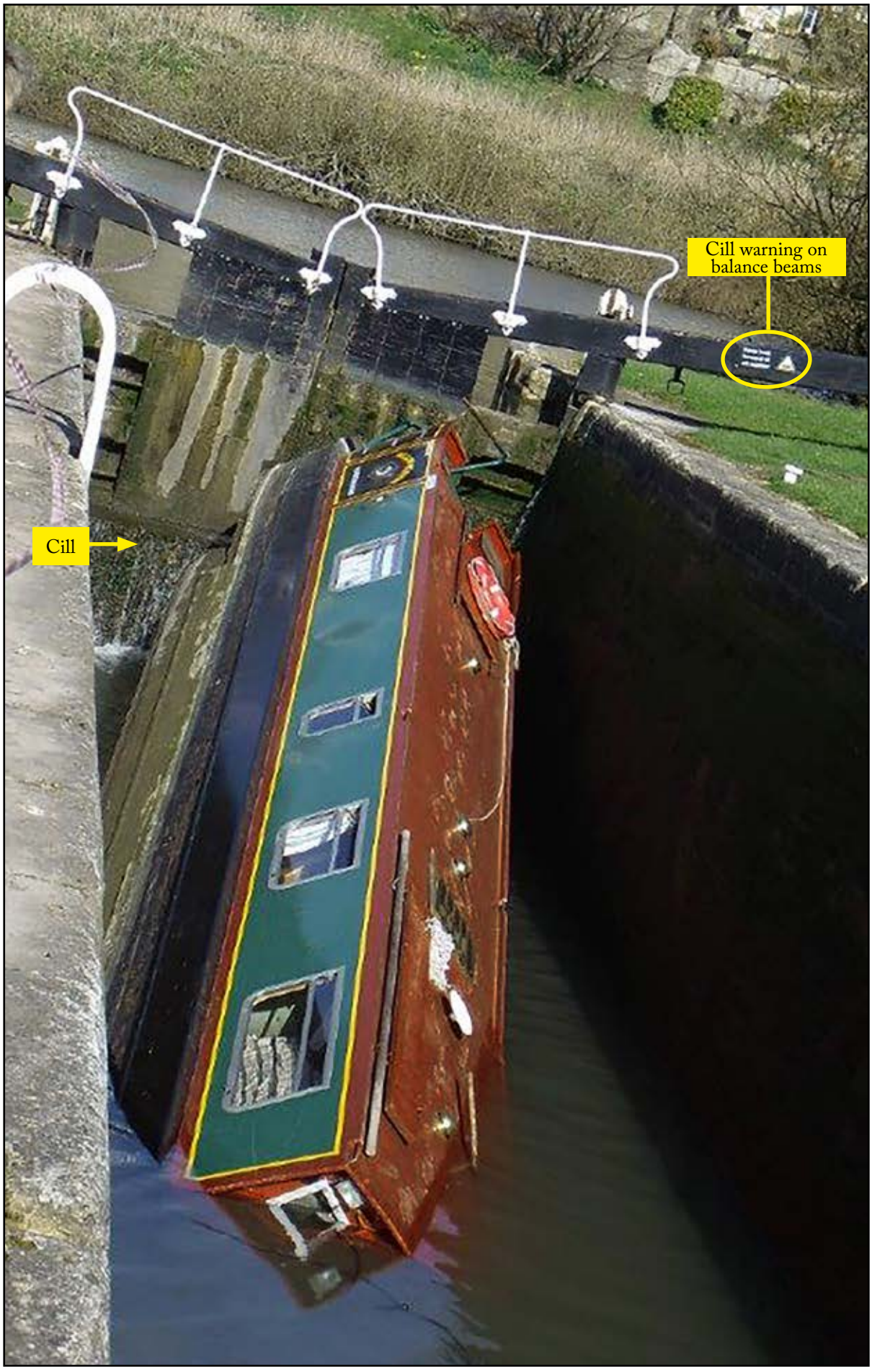


Figure 2: Narrow boat 'hung up' on lock cill

A Fatal Blow

Narrative

The owner and skipper of a sturdy, ocean-going yacht invited some friends to join him for a summer holiday on board. The skipper was very experienced and held an RYA yachtmaster qualification. Although a couple of his friends had previously sailed the boat, none of them were particularly experienced sailors.

The skipper prepared the boat for the trip and was careful to brief his friends about safety on board. With everything ready, they departed the marina and headed out to sea. The weather conditions were fair but the sea was choppy and there was a strong wind. Once clear of the estuary, the mainsail was reefed and the boat was motor-sailed upwind towards the planned harbour for the first night of the trip. However, in the poor conditions, sailing upwind became uncomfortable and a couple of the crew were feeling seasick. As a result, a decision was taken to change the plan and head for a different destination, which meant sailing downwind instead.

The boat was turned round and the mainsail eased out on a downwind course. On the new point of sailing, the conditions on board were much improved; less motion and no spray, which provided an opportunity for everyone to enjoy the sunshine. Following the change in course, an unusual noise was heard coming from the boat's steering system, which the skipper started to investigate. At about the same time, one of the crew decided to sit up on the boat's coach roof to enjoy the more pleasant conditions. Not long after, the stern was lifted by a wave, causing the boat to make a large and unexpected turn; this resulted in an unplanned gybe and the boom flew rapidly across the boat. As it did so, it violently struck the head of the crew member who was sitting on the coach roof. Despite the best efforts of the others on board and rescue services, he did not survive the injuries sustained.

The Lessons

1. When sailing downwind in windy conditions, an unplanned gybe probably presents the greatest risk to safety. Serious consideration should be given to rigging a line to prevent an accidental gybe. With or without such a preventer line, it is absolutely vital that those on board the boat keep clear of the boom.

2. Despite being safety conscious and having briefed his friends about safety on board, the skipper was distracted by his investigation of the unusual steering noise. Becoming distracted, even if momentarily, is a very common feature in accidents. In this instance, it probably took the skipper's attention away for long enough to allow his friend to sit in the way of the boom.

3. Although a couple of the crew had sailed before, it was really only the skipper who was qualified and experienced to operate the boat in the prevailing conditions. All the more reason to be focused and for everyone on board to think and act safely, as well as looking out for one another.

Reconstruction of the crewman's sitting position on the coach roof showing the boom at the same height as his head

One Slip Away From Disaster

Narrative

A small powerboat was returning to its mooring with its owner at the helm. As he approached his mooring stemming the tide, he disconnected the kill cord from his leg to reach over the side for the mooring buoy strop. As he did so, he slipped and came into contact with the throttle, which was still in the ahead position, pushing it further ahead.

Runaway speedboat being captured by RNLI crew

The boat accelerated and threw the owner overboard. His lifejacket inflated and he swam towards the shore away from his boat, which, out of control, collided with other moored vessels.

A tug corralled the boat and contained it until the local lifeboat arrived on scene. The lifeboat crew managed to secure a line on the vessel so that they could reach over and pull back the throttle.

The powerboat suffered substantial damage to its bow, but was not holed below the waterline. Some of the other moored vessels were also damaged, but, fortunately, the owner suffered no injuries as a result of his ordeal.

The Lessons

1. The kill cord is intended to prevent this exact situation occurring. Operating single-handed often requires greater skill than when other crew are to hand. Some standard operations, such as picking up a mooring, have to be adapted so as to be conducted safely. Having to remove the kill cord with the engine still running ahead is not a safe practice.

2. In small craft with a narrow beam it is better to place a buoy on the opposite side of the vessel to the throttle, to minimise the chance of accidentally operating the throttle. If this is not feasible, a boat hook or other device should be employed to ensure there is no need to remove the kill cord to pick up the buoy.

3. The merits of wearing a lifejacket are reinforced again with this accident. Once in the water, the owner was able to concentrate on getting ashore and out of the way of the boat rather than staying afloat. Some water users routinely remove their lifejackets as they enter the relatively calm waters of a harbour. Don't - this is precisely the time you are more likely to fall in.

APPENDIX A

INVESTIGATIONS STARTED IN THE PERIOD 07/08/14 TO 28/02/15

Date of Occurrence	Name of Vessel	Type of Vessel	Flag	Size	Type of Occurrence
07/08/2014	*Sapphire Princess*	Passenger ship | Only passenger | International	UK	115 875 gt	Occupational accident (1 fatality)
29/09/2014	*Pride Of Canterbury*	Passenger ship | Passenger and ro-ro cargo | International	UK	30 635 gt	Fire
02/11/2014	*Ocean Way*	Fishing vessel | Trawler | Stern	UK	80 gt	Foundering (3 fatalities)
09/11/2014	*Dover Seaways*	Passenger ship | Passenger and ro-ro cargo | International	UK	35 923 gt	Contact
30/11/2014	*Vectis Eagle*	Cargo ship | Solid cargo | General cargo	UK	6 190 gt	Grounding
21/12/2014	*Orakai* *Margriet*	Cargo ship | Liquid cargo | Chemical tanker Fishing vessel | Trawler | Stern	Gibraltar UK	3 953 gt 441 gt	Collision
03/03/2015	*Hoegh Osaka*	Cargo ship | Solid cargo | Ro-ro cargo	Singapore	51 770 gt	Listing
03/03/2015	*Cemfjord*	Cargo ship | Solid cargo | Other	Cyprus	1 850 gt	Foundering (8 fatalities)
06/01/2015	GPS Battler	Service ship | Special purpose ship	UK	90 gt	Occupational accident (1 fatality)
10/02/2015	Beryl	Fishing vessel | Trawler | Stern	UK	331 gt	Occupational accident (1 fatality)
11/02/2015	Ever Smart Alexandra 1	Cargo ship | Solid cargo | Container ship Cargo ship | Liquid cargo | Oil tanker | Crude oil	UK Marshall Islands	75 246 gt 79 779 gt	Collision
18/02/2015	Lysblink Seaways	Cargo ship | Solid cargo | General cargo	UK	7 409 gt	Grounding

Reports issued in 2014

Achieve
Foundering and the death of a crew member north-west of the Island of Taransay, Western Isles on 21 February 2013
Published 10 January

Amy Jane
Fatal man overboard from the recreational fishing boat, Near Cadgwith, Cornwall on 4 December 2013
Published 18 September

Apollo
Contact of the oil tanker with the quayside at Northfleet Hope Container Terminal Tilbury, River Thames on 25 July 2013
Published 12 June

Bayliner Capri
Capsize of the speedboat, resulting in three lives lost on 10 March 2014
Published 16 October

Celtic Carrier
Fire on board, 24 miles west of Cape Trafalgar, Spain on 26 April 2013
Published 16 July

Christos XXII
Collision between mv *Christos XXII* and its tow *Emsstrom* off Hope's Nose, Tor Bay on 13 January 2013
Published 10 April

CMA CGM Florida and Chou Shan
Collision between the container vessel and bulk carrier 140 miles east of Shanghai, East China Sea on 19 March 2013
Published 1 May

Corona Seaways
Fire on the main deck of the ro-ro cargo ferry in the Kattegat, Scandinavia on 4 December 2013
Published 3 July

Danio
Grounding off Longstone, Farne Islands on 16 March 2013
Published 2 April

Douwent
Grounding of the general cargo vessel on Haisborough Sand on 26 February 2013
Published 29 January

DUKW amphibious passenger vehicles
Sinking and abandonment of the DUKW *Wacker Quacker 1* in Salthouse Dock, Liverpool on 15 June 2013 and the fire and abandonment of the DUKW *Cleopatra* on the River Thames, London on 29 September 2013
Published 17 December

ECC Topaz
Fire and subsequent foundering of workboat 11nm off Lowestoft on 14 January 2014
Published 26 February

Endurance
Loss of a crewman overboard from the motor tug 2.3 miles west-south-west of Beachy Head, UK on 5 February 2013
Published 5 June

Eshcol
Carbon monoxide poisoning on board the fishing vessel in Whitby, resulting in two fatalities
Published 11 June

Horizon II/New Dawn
Fatal man overboard while climbing on board the fishing vessel *New Dawn* to access the fishing vessel *Horizon II* at Royal Quays marina, North Shields on 9 November 2013
Published 10 September

Isamar
Grounding of the pleasure vessel off Grand écueil d'Olmeto, Corsica on 17 August 2013
Published 9 April

JCK
Foundering and the loss of skipper in Tor Bay on 28 January 2013
Published 9 January

Karen/Sapphire Stone
Collision between fishing vessels *Sapphire Stone* and *Karen* resulting in the loss of *Karen* 11 miles south-east of Campeltown on 22 January 2014
Published 16 July

APPENDIX B

Key Bora
Failure of the controllable pitch propeller of the chemical tanker after heavy contact made with the jetty in the port of Hull on 20 December 2013
Published 7 November

Milly
Ejection of six people from the rigid inflatable boat in the Camel Estuary, Cornwall, resulting in two fatalities and two people receiving serious injuries on 5 May 2013
Published 30 January

Navigator Scorpio
Grounding of the liquefied gas carrier on Haisborough Sand, North Sea on 3 January
Published 6 November

Ovit
Grounding of the oil/chemical tanker in the Dover Strait on 18 September 2013
Published 11 September

Paula C/Darya Gayatri
Collision between the general cargo vessel and the bulk carrier in the Dover Strait Traffic Separation Scheme on 11 December 2013
Published 17 September

Prospect
Grounding on Skibby Baas and foundering in the north entrance to Lerwick Harbour, Shetland Islands on 5 August 2013
Published 19 February

Rickmers Dubai, Kingston, Walcon Wizard
Collision of *Rickmers Dubai* with the crane barge *Walcon Wizard* being towed by the tug *Kingston* in the south-west lane of the Dover Strait Separation Scheme on 11 January 2014
Published 23 October

Sally Jane
Capsize and foundering of the beam trawler in Christchurch Bay on 17 September 2013
Published 21 August

Sea Melody
Crewman lost overboard in Groveport, River Trent on 18 December 2013
Published 18 June

Shalimar
Contact with the quay and subsequent foundering of the fishing vessel in Scrabster, Scotland on 30 April 2014
Published 8 October

Sirena Seaways
Heavy contact with the berth at Harwich International Port on 22 June 2013
Published 31 January

Snowdrop
Falling overboard and recovery of a young child from the passenger ferry whilst alongside Seacombe Terminal, River Mersey on 14 October 2013
Published 28 August

Speedwell
Foundering and the loss of skipper in the Firth of Lorn on 25 April 201 Published 8 January

Stena Alegra
Anchor dragging and subsequent grounding off Karlskrona, Sweden on 28 October 2013
Published 9 May

Tyrusland
Fatality of an able seaman on board ro-ro cargo ship in Tripoli, Libya on 15 May 2013
Published 16 July

Reports issued in 2015

Arniston
Two fatalities due to carbon monoxide poisoning on board the Bayliner 285 on Windermere on 1 April 2013

Published 16 January

Barnacle II
Fatal manoverboard from the creel fishing vessel, west of Tanera Beg on 13 May 2014

Published 8 January

Diamond
Foundering of the fishing vessel, resulting in one fatality, West Burra Firth, Shetland on 25 March 2014

Published 11 February

ECC Topaz
Fire and subsequent foundering of the wind farm passenger transfer catamaran, east coast of England on 14 January 2014

Published 11 February

Millennium Diamond
Contact made with Tower Bridge on the River Thames on 4 June 2014

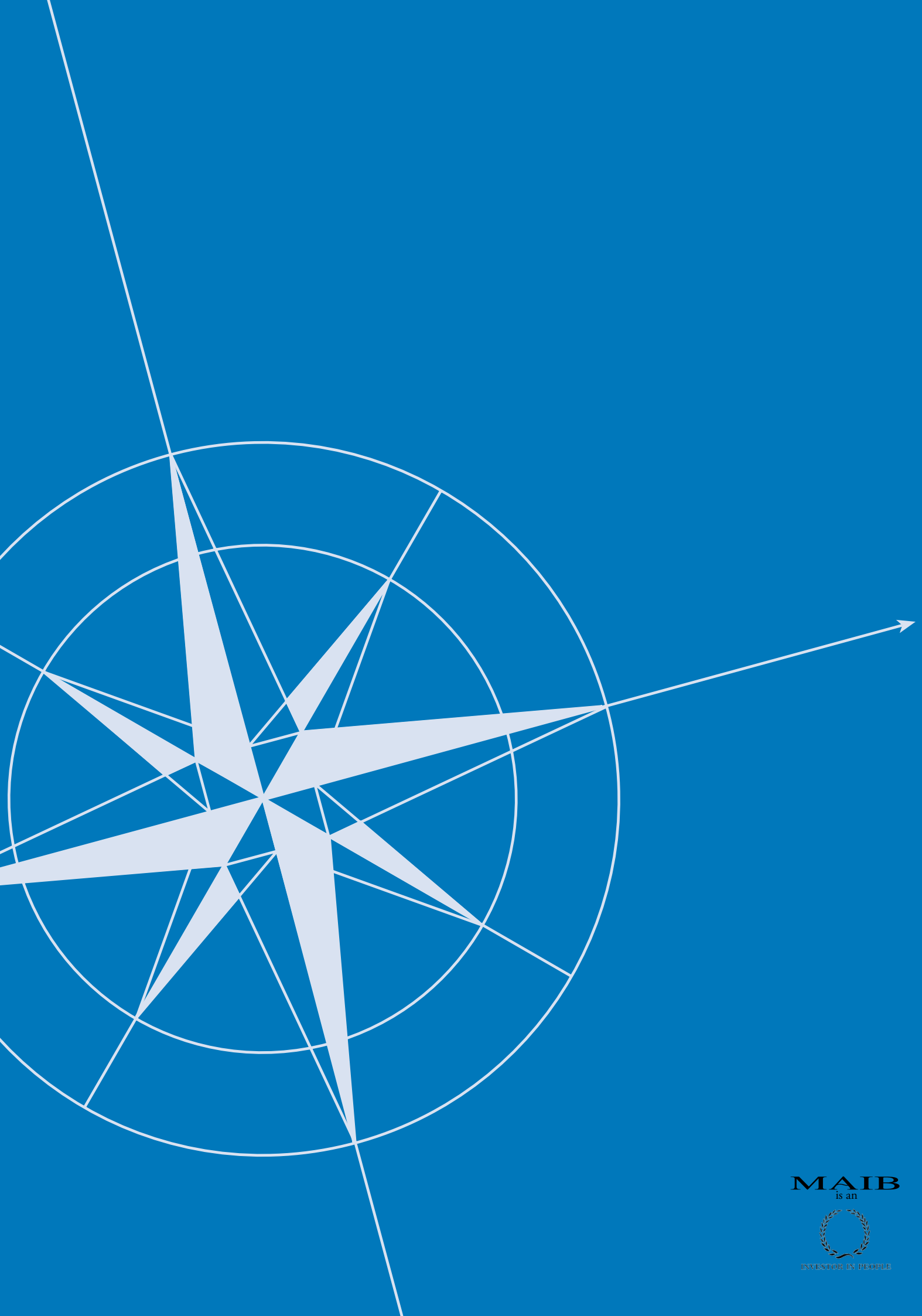
Published 5 March

Wanderer II
Serious injury to a crew member, 1 mile east-south-east of Wiay Island, Outer Hebrides on 19 November 2013

Published 12 February

Water-rail
Disappearance and rescue of the small fishing vessel, North Sea on 20-22 May 2014

Published 29 January



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