Marine Accident Investigation Branch (MAIB) - Safety Digest 2/2004

Contents

Marine Accident Investigation Branch

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department for Transport, the Chief Inspector of Marine Accidents being responsible directly to the Secretary of State for Transport. The offices of the Branch are located at Carlton House, Carlton Place, Southampton, SO15 2DZ.

This Safety Digest draws the attention of the marine community to some of the lessons arising from investigations into recent accidents. It contains facts which have 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.

The Safety Digest and other MAIB publications can be obtained free of charge by applying to the MAIB.

If you wish to report an accident or incident please call our 24 hour reporting line
023 8023 2527

The telephone number for general use is 023 8039 5500.
The Branch fax number is 023 8023 2459.
The e-mail address is maib@dft.gov.uk

Summaries (pre 1997), and Safety Digests are available on the Internet: www.maib.gov.uk

Extract from The Merchant Shipping (Accident Reporting and Investigation) Regulations 1999

The fundamental purpose of investigating an accident under these Regulations is to determine its circumstances and the causes with the aim of improving the safety of life at sea and the avoidance of accidents in the future. It is not the purpose to apportion liability, nor, except so far as is necessary to achieve the fundamental purpose, to apportion blame.

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.

Glossary of Terms and Abbreviations

AB	-	Able Seaman
CO_2	-	Carbon Dioxide
DGPS	-	Differential Global Positioning System
EPIRB	-	Emergency Position Indicating Radio Beacon
GRP	-	Glass Reinforced Plastic
GT	-	Gross tons
IMO	-	International Maritime Organization
"Mayday"	-	Spoken distress signal
MCA	-	Maritime and Coastguard Agency
MGN	-	Marine Guidance Notice
OOW	-	Officer of the Watch
PPE	-	Personal Protective Equipment
RAF	-	Royal Air Force
RIB	-	Rigid Inflatable Boat
Ro-Ro	-	Roll on - roll off
TEU	-	Twenty Foot Equivalent Unit
UTC	-	Universal Co-ordinated Time
VHF	-	Very High Frequency
VTS	-	Vessel Traffic Services

Introduction

Herewith our latest batch of accidents and incidents; when you read them, please think of how they may apply to you in your sphere of seagoing, be it professional or for pleasure, in coaster, fishing vessel, ferry, yacht, deep sea trade or whatever. The lessons are often applicable to all seafarers. And many of the accidents we investigate result from a lack of understanding or appreciation of other seafarers' difficulties: in reading this Safety Digest, try to understand the perspective of the other sea users - in that way the sea will become a safer place for all of us.

A spate of accidents and near misses over the last few months (which will be reported in future Safety Digests) brings me back to the subject of lone watchkeepers. More and more vessels - be they merchant ships, fishing vessels or leisure craft - are depending on a single watchkeeper. Sadly, a single watchkeeper can make a mistake, can become incapacitated, can fall asleep, can become overloaded, can become distracted, all of which can - and do - lead to accidents. The MAIB is conducting a safety study into bridge watchkeeping, the results of which should be published at about the same time as this Digest. Read it on our website, or ring and get a free hardcopy; it will make salutary reading. In the meantime, remain alert for potential errors by other seafarers - it is the prudent mariner who takes early action, rather than staking his life on others getting it right.

Stephen Meyer
Chief Inspector of Marine Accidents
August 2004

Part 1 - Merchant Vessels

I was delighted when asked to write an introduction to the Merchant Vessels section of the August report, since in the past, I, personally, have been critical of the naming of ships in the *Safety Digest*. I'm happy to say that all this is now in the past and, unless you are directly involved in a report, it's quite difficult to identify participants (even the livery is changed) - and that's the way it should be. I welcome the new style and would support you to be open in your reporting so we can all benefit from it. Stephen encouraged this in the previous edition's introduction (which I fully endorse) - if you're in any doubt, just give him a call.

This edition of the *Digest* has the usual sprinkling of incidents: some could be amusing, some incredulous and some desperately sad. When reading the detail, I sometimes wonder how on earth the circumstances could arise. In my time at sea, I have experienced several narrow misses as a result of my own actions, and have witnessed many others. You learn from these, and do things to try and avoid a recurrence. I well understand how masters can end up being overcautious. I sailed a long time ago (and long before GPS etc.) with a master who insisted on courses being drawn to 5 miles beyond the range of a light: one's eyes would be straining trying to take a bearing of the loom! The poor man must have had a close shave to promote that. No matter how carefully you might have planned to do something, people make mistakes, and it is a dreadful shame these days that litigation is always just round the corner waiting for you. Read the *Digest*, circulate it, and try to be ahead of the game. It's not just a matter of risk assessment and paperwork, it's being advised, aware, alert and adopting a common sense attitude. We have a reputation in this industry for getting things done, and that's good, but please take a step back and think for just a moment.

There are many areas that we have to trade where we are operating close to the bottom, together with large tidal ranges. Regular trades, such as ferries in large tidal range areas, are well versed with this, and keep a very close watch on the state of the bottom in their ports. However, even they - with published timetables etc - have to operate within very strict underkeel clearances in order to avoid trouble, and some ferry schedules have to reflect this. I spent a lot of my junior years around the Indian coast, and recall well the care that masters used to take when going out from Calcutta, making sure that the vessel was in good water to the south before turning east for Chalna or Chittagong. Perhaps the master in the *"Treacherous Waters*" report wished he had given just a bit more offing. Don't chance it; just think of the paperwork!

Another incident in this *Digest* caught my eye, described in the article entitled *"Important Fire-Fighting Tool Overlooked*"; the equipment that apparently was not used was the water fog. As a result of amendments to SOLAS (Ch.II- 2/10.5.6), your vessel may already, or may soon, be fitted with water-based local fire extinguishing arrangements in Category A machinery spaces in addition to the existing arrangements. My company has had such systems fitted in selected vessels going back over 20 years, and we introduced water fog systems into high speed vessels about 9 years ago. As a result of our experience with the latter equipment, we have reviewed our initial response to engine room fires such that, at the first indication of a fire, bang on the water fog. By doing this, you do two things: you buy yourself safe thinking time, and the fog will be taking heat out of the area and/or converting

into steam. You may not want to shut off the engines in that space, and you might want to leave the ventilation exhausting heat and steam etc out. The message here is "*have a look at your engine room fire response plan if this equipment is fitted*"; the old methods might not be the best. I think more guidance is needed here from the experts.

This incident also brings another point to mind. By far the most frequent cause of engine room fires is oil spraying onto hot surfaces. By now, your vessel should have had jacketed piping for high pressure oil fuel pipes and insulation of surfaces with temperatures above 220°C (SOLAS II-2/15.2.1.12). But these regulations only deal with fuels, lube oils are just as liable to leak and to ignite. For many years now my company has fitted simple screening around vulnerable areas so as to dump any spray or leak into the bilge, rather than onto a hot surface. It's easy, cheap and effective.

In this edition, there are four lifesaving outfit incidents resulting in several serious injuries and one fatality. It is a sad fact that this equipment has either injured or killed more people than it has saved, and it needs careful maintenance and handling. In 2001, the MAIB produced an excellent Safety Study of lifeboat launching systems and accidents. If you haven't seen it yet, I recommend you do so. Just go to the MAIB website and you'll find it under publications. And it's free. As Malcolm Billings used to say in the BBC overseas Merchant Navy Programme:

"Have a safe voyage."

Garth Halanen
Garth Halanen is the Stena Line Group Safety Advisor. The Group operates passenger and ro-ro ferries around the UK coast, Ireland, Holland, Denmark, Sweden, Norway, Germany and Poland. He first went to sea in 1960 with Ellerman Lines until obtaining masters in 1970. He then went into tankers and bulk carriers with Hudson Steamship Company, and joined Sea Containers in 1980. When that company bought Sealin in 1985, he transferred into the ferry section. Sealink was bought by Stena Line in 1990. Garth represents Stena on various trade panels such as the UK Chamber of Shipping and the British Ports Association, and works closely with other trade organisations and government departments.

Case 1 Pleasure Cruiser Strikes Bridge

Figure 1 Vessel pinned to bridge (note: flow of river water by bow)

Narrative

One serious injury and 34 minor injuries were reported among 139 people who were dramatically evacuated from a river cruiser after she struck repair scaffolding under the centre arch of a main road bridge in a major city. The vessel suffered mainly superficial damage, but lay stricken for several days, attracting a great deal of attention from passers-by.

The accident occurred during darkness in winter, when the vessel was cruising upriver in strong currents and high levels of water. As she passed through the centre arch of the bridge, her starboard quarter struck scaffolding. The strong current pushed her on to the upriver side of the bridge's buttress, where she was pinned. She was further damaged when a scaffolding pole pierced one of the windows and side plating on the lower deck.

With the assistance of the emergency services, the passengers evacuated the vessel, some by climbing scaffolding, others using a hydraulic platform. It is miraculous that only one person was seriously hurt.

The accident happened because control of the vessel was lost in the fast and confused flow of water through the centre arch of the bridge; navigation under the bridge was already difficult, due to the repair scaffolding.

Figure 2 'Flotsam' on southern buttress

The Lessons

1. **This accident could so easily have become a major tragedy. All parties involved in carrying large numbers of passengers on UK waters must** *continually* **review their safety procedures and, if necessary, improve them. Safety is everyone's responsibility.**

2. **The city council had identified the hazards which were to be expected while the scaffolding was present, and had suggested possible control measures. However, it had assumed that the work would be completed before the winter. Therefore, by the winter, the control measures were inappropriate for the conditions. Risk assessments should be constantly reviewed to ensure that any changes - expected or unexpected - are taken into account.**

3. **A build-up of flotsam on the scaffolding had tended to divert the flow of water through the arch, so that on two previous occasions the vessel had been set close to the scaffolding. However, this did not deter the skipper from sailing through the arch on the evening of the accident. After the accident, the owner declared that the vessel should not sail under the bridge while the works were in progress, but this decision should have been taken as part of a risk assessment before the accident happened.**

4. **Poor communication was at least a contributory factor in this accident. Despite being a principal river user, the owner did not receive restriction notices. Furthermore, the local council and local navigation authority were not aware that the cruiser sailed in the winter. It is essential that any information affecting the safe navigation of inland waterways is brought to the attention of** *all* **users.**

Case 2 Treacherous Waters!

Narrative

An 80 metre commercial vessel, with a draught of 4.6 metres, was required to undertake a passage in a region where sandbanks were common.

Her third mate laid a course on the relevant paper chart. It passed over the narrowest part of a sandbank where the least chart depth was between 8 and 9 metres. Notes on the chart warned of *'Changing Depths'* in the area, and made reference to a 'Caution' highlighting the possibility that sandbanks in the area continually changed. The Admiralty Pilot book contained a similar warning, but also mentioned that buoyed channels should be used. The third mate was unaware of these cautions.

The master was mindful of the general features and characteristics of the local sandbanks, but felt happy with the chosen course, largely because charted depths, and the state of the tide, suggested he would have at least a 10 metre depth of water. He approved the course, and the third mate transferred it onto the chartplotter.

The vessel began the passage on autopilot, to the north of her intended track and with the master on the bridge. There was a strong tidal stream running to the south, and this was expected to compensate for the difference in starting position. As she passed over the bank, at about 9 knots, where the chart gave depths of 8 to 9 metres, the echo sounder gave a minimum depth of 10 metres, as the master had anticipated. Once the echo sounder began to give readings of 20 metres or more, the master assumed he was in clear water, and increased speed. He then handed over to the third mate and left the bridge.

A very few minutes later, the vessel stopped; a slight shudder was felt. The engine controls were pulled back to stop, and the master quickly returned to the bridge. The echo sounder showed no water under the keel, indicating the vessel had grounded.

The vessel's emergency plan for grounding incidents was activated. All crew were mustered and, after a headcount and a check for injuries, the vessel was examined for damage. All tanks were sounded and other internal spaces sighted. Lead line soundings were made all around the vessel. An effort to refloat her, using her own engines and bow thrust unit, was unsuccessful.

There were no injuries to the crew, or damage to vessel that was immediately apparent. However, the lead line soundings showed very limited water depth around much of the vessel; in some areas it was less than 3 metres. A position obtained by DGPS gave her position as being on a 20 metre contour on the chart (see figure).

With the assistance of both a rising tide, and a tug, the vessel was refloated several hours later, and was able to proceed to a repair yard for closer inspection.

The Lessons

For the guidance of her navigating officers, the vessel had clear written procedures for voyage planning that followed IMO recommendations. This passage was not closely monitored, as the guidance suggests. As a consequence, she was allowed to drift over a cable to the south of her intended track by the tidal stream.

Clearly, this sandbank had changed substantially in both depth and position since the area was last surveyed and the chart published. However, insufficient weight was given to the chart caution about changes in the sandbanks, probably partly because its wording was insufficiently forceful, but also because the master thought he knew the waters. A proper appraisal of the intended passage might have caused him to have second thoughts about the track selected by the third mate.

Suitable steps have been recommended to the surveying and chart publication body, but the advice that mariners should follow the appraisal, planning, execution and monitoring elements of a formal voyage plan remains.

Case 3 Lifeboat Winch Handle Injures Crewman

Narrative

A planned lifeboat drill was carried out on a coastal tanker while she was alongside in port for engine maintenance. The starboard lifeboat, with three crew members on board, was unlashed and lowered to the water.

After a successful test, the lifeboat was brought to the side of the vessel, the falls were reconnected and recovery began. The electric winch raised the lifeboat, and stopped when the forward limit switch was activated. At that point, the lifeboat slammed into the forward stops and jumped back about 30cms.

The master, anxiously looking on from the bridge, called a halt to further lifeboat movement until he was able to go down to the boat deck to inspect for damage.

While awaiting clearance to stow the lifeboat, two crewmen placed the manual winding handle into position on the winch, at poop deck level, and readied themselves to begin winding.

Meanwhile, the crewman who had operated the electric winch had reset the forward limit switch and returned to the electric winch control position on the boat deck. He informed the bosun that they could now continue raising the lifeboat.

The bosun operated the electric winch briefly, and the manual winding handle, in the hands of the two other crewmen, swung rapidly and struck one of them on the head.

The injured crewman was airlifted to the nearest hospital.

The Lessons

1. When crew critical to an operation are located out of sight of each other, it is vital that unambiguous information is relayed, and that all involved understand their role and responsibilities. This is especially important in the event of a problem developing. Remember, your actions, unless properly co-ordinated, could severely injure one of your crewmates. Think before you act.

2. The primary cause of this accident was the failure of the winch interlock microswitch, which should have prevented the electric winch from operating when the manual handle was inserted. We all put our trust in safety equipment, and assume it will be there for us when it is needed; clearly this isn't always so. Regular testing of safety devices will ensure that they are working when we most need them.

3. A contributory factor in this accident was the misunderstanding between team members, because the master did not have effective overall control of procedures. If you are in charge of an operation, ensure that the members of your team are in no doubt that you have overall control, and that you will make the decisions as to when equipment is to be operated.

Case 4 Constrained by her Draught?

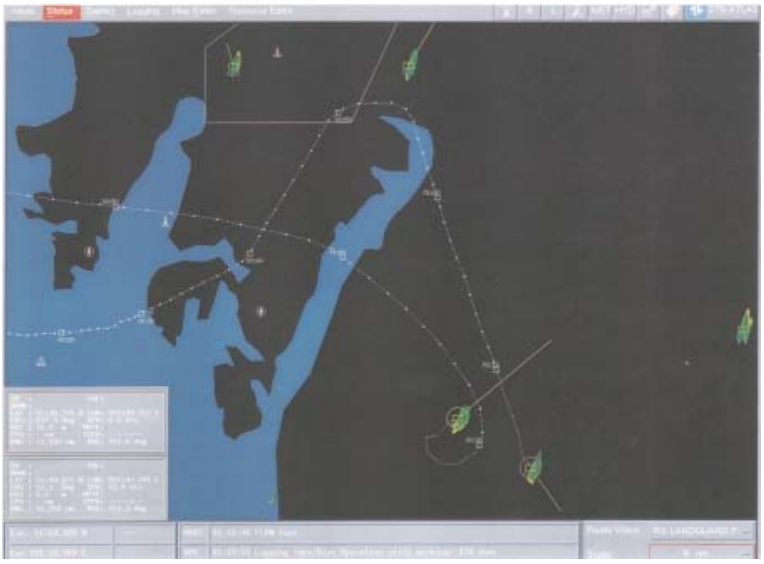
Narrative

At midnight, a 183m length bulk carrier, with a draught of 10.8m, disembarked her pilot. She then departed Sunk pilot station in the Thames Estuary, bound for Egypt. During the pilotage period, the vessel had been constrained by her draft, and had displayed the appropriate signal of three all round red lights in a vertical line.

After disembarking the pilot, the vessel continued to head through the port precautionary area in a north-north-easterly direction, before altering course sharply to starboard and proceeding on a course of 164° at a speed of 10 knots. The bridge team consisted of the master, second officer, third officer, quartermaster and a lookout. The visibility was 5 miles.

A passenger/freight ferry had left Harwich at about the same time, and was heading on a course of 100° at a speed of 14 knots. Her bridge complement was a second officer and a lookout. The ferry's OOW tracked the bulk carrier by radar as she headed in the north-north-easterly direction, and as she crossed ahead of the ferry at a distance of 3 miles. The bulk carrier's subsequent alteration of course to 160° meant that a close quarters situation now existed between the two vessels. The ferry's OOW believed the bulk carrier had then switched on the three red lights. He called the local VTS to ask them about the bulk carrier's intentions. The VTS advised him to call the other vessel to ascertain the information. On doing so, and requesting that the bulk carrier alter her course to starboard, the OOW on the bulk carrier replied that he intended to hold his course because he had another ship to port and shallow water to starboard (see figure).

The ferry's OOW asked the bulk carrier on two further occasions to alter to starboard. However, the bulk carrier took no action. The OOW on the ferry notified the VTS he was going to take a round turn to starboard to alleviate the situation.



VTS still

He then carried out the manoeuvre, which resulted in the ferry paralleling the bulk carrier's course at 0.5 miles and then passing safely astern and clear of her. It was noticed that during this manoeuvre the bulk carrier reduced her speed.

It is interesting to note that, after the incident, the bulk carrier's master stated that the ferry was overtaking his vessel, that his vessel had been constrained by her draught and had complied with the Collision Regulations in all respects.

The Lessons

1. The Collision Regulations define a vessel constrained by her draft as: *"... a power driven vessel which, because of her draft in relation to the available depth and width of navigable water, is severely restricted in her ability to deviate from the course she is following".*
It should be noted that during this period, the bulk carrier was no closer than 5 miles to any relatively shallow water. Thus, throughout the incident, the MAIB considers the bulk carrier was not such a vessel.

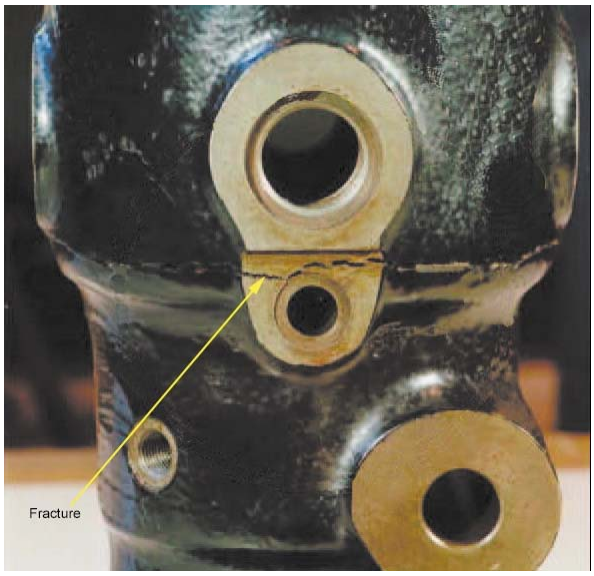
2. At the time the bulk carrier altered course broadly to starboard, the ferry's OOW believed they had then switched on three red lights. In fact, they had probably been obscured from his view as they had been left on since departure. This false presumption by the ferry's OOW had led to his questioning the "validity" of the bulk carrier being actually constrained by her draught, when in fact he did not know the situation on the other vessel.

3. The bulk carrier's OOW believed his vessel was constrained by her draft, so Rule 18 of the Collision Regulations applied, ie *a vessel constrained by her draught shall navigate with particular caution having full regard to her special condition.* **In this situation the bulk carrier did not comply with this rule because she altered course back towards the ferry at short distance, for no apparent discernible reason. The MAIB believes this action, taken in close proximity to the other vessel, precluded the ferry from taking action under Rule 8(f)(i), namely, a** *vessel which, by any of these Rules, is required not to impede the passage or safe passage of another vessel shall, when required by the circumstances of the case, take early action to allow sufficient sea-room for the safe passage of the other vessel.*

4. Attention should also be drawn towards MGN 167 (M+F), which highlights the dangers inherent in the use of VHF radio in collision avoidance.

5. This is a classic example of differing interpretation of the Rules. Assess all situations early, and be prepared for the other ship not to act as you would expect.

Case 5 Important Fire-Fighting Tool Overlooked



Pumps fractured body

Narrative

During a routine engine room visit, a motorman on a high-speed passenger ferry discovered a fire around one of the main engines. The vessel had two engine rooms, each with two main engines and two generators. He informed the bridge immediately and stopped the affected engine locally.

The motorman's immediate efforts to fight the fire, using portable extinguishers, were unsuccessful and he left the engine room.

The engine room's ventilation was shut down, fuel shut-offs activated, fire parties assembled and fire pump started.

Twenty minutes after the fire was discovered, the carbon dioxide (CO_2) smothering system was activated for this engine room. Forty minutes later, and after seeing smoke levels reduce, crew were able to enter the engine room. They found the fire had been extinguished.

The vessel was able to complete her passage on the remaining two engines and safely discharge her passengers.

Closer examination of the affected area found significant heat damage to the aluminium structure of the hull beneath the affected main engine. It was also found that the CO_2 system had failed to discharge. These points suggest the fire burned itself out, and, in doing so, generated significant heat.

The fire was the result of a defective high pressure fuel pump spraying fuel over a hot indicator cock on a cylinder head. The pump's failure was caused by a manufacturing defect, the likelihood and consequences of which could not have been anticipated by ship's staff. The pump's body fractured because of substandard properties of the casting (see figure). This problem has been addressed by owners and manufacturers.

The Lessons

1. Although the vessel was fitted with water-fog fire extinguishing systems in the engine rooms, these were not used in this incident. These systems can usually be quite safely activated while machinery is running. This has the advantage of allowing rapid activation, without delays to shut off machinery or ventilation, so tackling the fire very early and, if not immediately

extinguishing it, then controlling its spread and limiting the amount of heat generated. The structural damage caused in this incident might largely have been prevented if the water-fog had been used at an early stage.

2. Ship's staff followed fire-fighting procedures, such as using CO_2 flooding, as almost the first resort, learned during training courses taken early in their careers. This they did almost automatically, probably because they had not been fully convinced of the possible value and effectiveness of water-fog firefighting systems. To ensure emergencies are tackled effectively, training, exercises and drills should reflect the full range of emergency equipment and systems carried by a vessel.

3. The CO_2 system did not work because a pneumatically-operated valve failed, due to corrosion caused by water introduced into the system by humid compressed air. Clearly, it is important to use only dry air in any pneumatic system; particularly one critical to safety.

Case 6 Shift of Timber Deck Cargo

Narrative

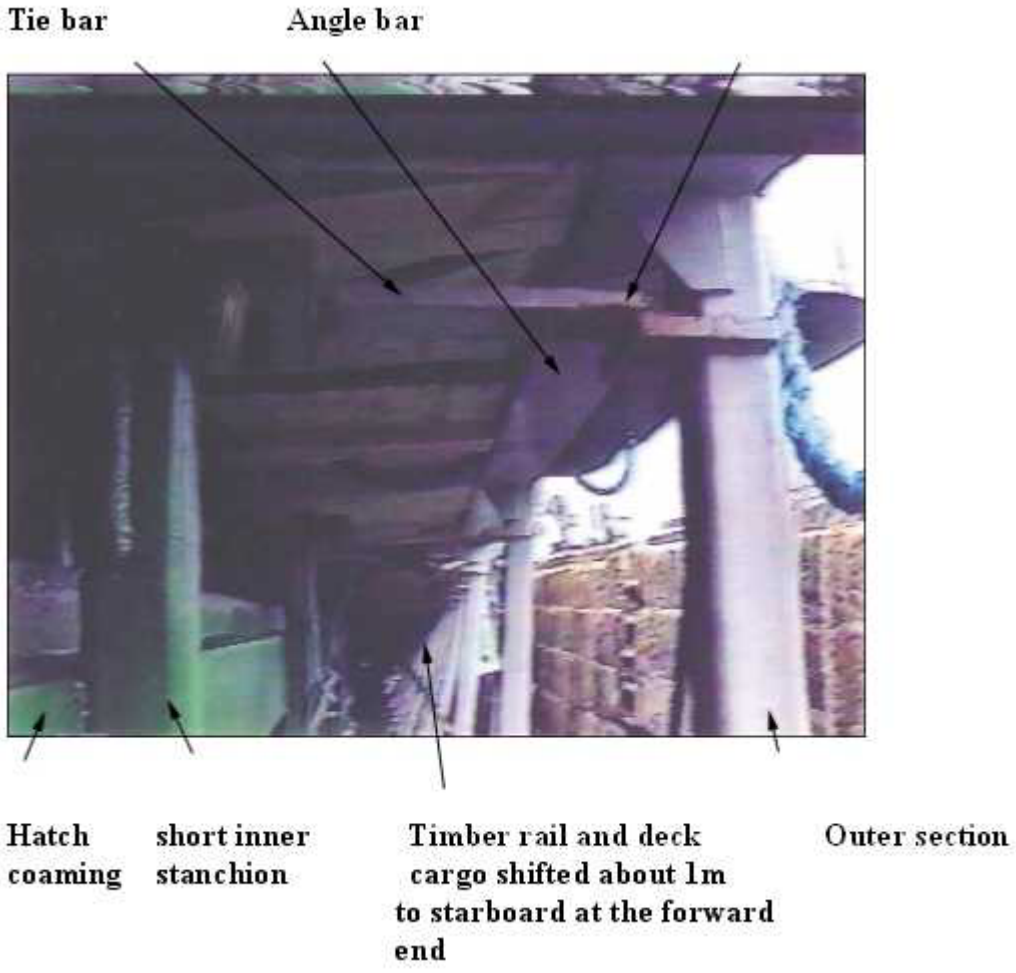
An 85m long vessel loaded a cargo of sawn timber in Scandinavia. Initially, her passage to the UK was uneventful, but things were to change when she reached the south-west coast of England. There, she met heavy weather, which was to put the vessel's lashings and starboard timber rail to the test.

A large wave hit the vessel on her port side, causing her to heel about 35° to starboard, before she came back to an average of about 25°. Her master turned on the deck lights, and saw that the timber deck cargo had shifted about a metre to starboard at the forward end. He informed the coastguard and then turned the vessel into the wind to minimise the motion. Once hove-to, ballast water was added to reduce the list to about 10°.

A search and rescue helicopter flew out to the scene and some of the crew were airlifted off as a precaution, leaving the master, mate and engineer on board. The vessel remained hove-to all night.

The next day, the situation was assessed. The master considered it safe to proceed to port, so they started making way, escorted by an MCA emergency towing vessel.

They reached port safely.



So what caused the timber to shift? Lashings had been secured to points at the port and starboard main deck edges. These had provided downward force, but initially did not prevent sideways movement. None of the lashings failed, and no cargo was lost during the voyage.

The main cause of the accident was a failed starboard timber rail. The timber rail was a steel framework, consisting of outer stanchions along the main deck edge, and short inner stanchions attached to the sides of the hatch coamings. The stanchions were connected with tie bars (see figure). A horizontal angle bar was welded to the tops of the outer stanchions, to tie the framework together and to stop the cargo shifting outboard.

When the wave hit, the heavy cargo probably moved slightly, and the tie bars failed, allowing the deck cargo to move further. No structural calculations had been made for the timber rails, and the framework's strength had not been properly verified.

Several timber packages were held together with steel bands (see figure). In some cases, these bands were in contact with the steel hatch covers. There is very little friction between steel surfaces, especially when they are wet. The absence of significant friction between the cargo and the top of the hatch covers was an important factor in the accident.

The Lessons

1. If you carry packaged timber on deck, and your vessel is fitted with timber rails, ensure they are strong enough to withstand the sideways forces generated during rough sea conditions. Detailed structural calculations should have been made to ensure that those fitted to this vessel were of adequate strength, and this should have been verified by a classification society.

2. Try to maximise the friction between timber deck cargoes and the hatch covers. In particular, steel-on-steel interfaces should be avoided, as they will not provide a non-slip surface, especially when they are wet. Wood against steel is better. A proprietary high friction coating, applied to the tops of the hatch covers, will greatly reduce the risk of cargo shifting.

Eight serious accidents involving vessels carrying timber deck cargoes were reported to the MAIB between 2001 and 2002. Concerned about an apparent trend developing, the MAIB initiated a study in 2003, the findings of which are published in its Timber Deck Cargo Study. Readers may wish to obtain a copy either by visiting our website or by writing to us at the address given at the beginning of this issue.

Case 7 Damaged Lifeboat - Successful Test

Narrative

A passenger vessel was having her lifeboats and davits load tested to 110% of full working load, to satisfy statutory requirements for periodic overload testing. These tests followed a detailed examination of the lifeboats, davits and winches by manufacturer's staff.

The overload tests were done by lowering each boat to the water, fitting load cells to the lifting hooks, raising the boat to embarkation level, placing water bags inside and filling the water bags until the load cells registered the required test load. Nobody was in the boats when fully loaded in this way.

With each boat fully loaded, its winch brake was released and then re-applied on a couple of occasions as the lifeboat was lowered to the water. This generated the required dynamic test loading on the boat and davit system.

Once waterborne, the lifting hooks were released and the lifeboat moved to the quay to empty and remove the waterbags. Following a final examination, each lifeboat was then returned to its davit and stowed away.

While one boat was being lowered to the water during the test, its aft suspension hook failed. This allowed the boat to swing down about the forward hook, which then tore free of the boat's structure. The boat fell to the water, having suffered serious damage, but nobody was injured.

Close examination found that the attachment of the aft hook to the boat's structure had failed owing to serious corrosion. This had probably been caused by small quantities of water sitting in the bilges for long periods, ensuring that the attachment plates and bolts never dried out. The area of corrosion was very difficult to inspect by simple visual methods. It was very low in the boat and partially hidden by structural members of the boat.

The Lessons

1. Although the incident resulted in a seriously damaged lifeboat, with the consequent cost and delay of repairs, it had a positive outcome: a serious defect in a major load-bearing component was prevented from remaining in service. The overload test thus proved its worth.

2. No matter how carefully a visual inspection is made, there are likely to be areas and types of defect which might go undetected. Again, an overload test is of value, by finding problems that otherwise might not be discovered without extensive dismantling. However, some dismantling for inspection may be justified where it is impossible to inspect critical components that are subjected to an unfriendly environment.

3. In this case, precautions were taken to ensure that nobody was in the lifeboat while it was in the overload condition. This is a sensible and essential precaution. Unfortunately it is one which has not always been taken during testing on other ships, and people have been killed and injured as a result.

Case 8 Galley Scald Injury

Narrative

Hot cooking oil is a major source of accidents in any kitchen, the galley of a ship being no exception. Most of these accidents arise because of overheating or spillage. The following narrative serves as a reminder of the dangers of transferring and draining hot cooking oil.

A cabin assistant working in the galley of a freight ferry drained some waste hot oil from the deep fat fryer into a suitable dry bucket. Although the oil was still extremely hot, he then carried it over to the waste food disposal unit and poured it in.

The waste food disposal unit was fitted with an integral water flushing arrangement for cleaning the tray. This was operated just after the hot oil was poured into it. When the water mixed with the hot oil in the unit, it "spat" a mixture of oil and scalding water back up and out of the disposal chute, showering the operator. The operator received scalds and burns to his face and hands, which resulted in a lengthy period of time off work.

The Lessons

1. An investigation of the accident highlighted the lack of any specific written procedures on board the vessel for the disposal of oil or, in fact, for any other potentially hazardous activities in the galley.

2. Once again we are reminded that even during times when galley staff are busy, and time is of the essence, it doesn't pay to rush a job.

3. Training and operational procedures, including risk assessments, should be checked regularly and, if applicable, updated for suitability, especially with regard to part-time and newly appointed staff.

4. Detailed advice regarding specific galley operations can be found in the Code of Safe Working Practices, Chapter 14.5.

Case 9 If It Can Be Done Wrong, It Will Be!

Narrative

The crew of a UK registered 5300gt ro-ro cargo ship, built in 1970, were undertaking a combined fire and boat drill, while alongside a UK port.

The vessel carried two deck cadets. To facilitate their training, the chief officer was overseeing one cadet who was taking charge of the lifeboat drill, while the second mate was overseeing the other cadet who was taking charge of a fire drill.

The vessel was equipped with two open, 40- person GRP lifeboats, which were suspended from independent forward and aft hooks, of the type shown in figure 1. These were secured by pins and 'R' clips, as shown in figure 2. The starboard lifeboat, which was equipped with an engine, was being used for the drill.

The muster lists on board specified the muster points and duties for every crew member. The second mate was designated to be the cox'n of the starboard lifeboat, and two ABs were tasked with releasing the forward and aft falls.

The alarm was sounded, and the crew were split so as to cover the fire drill and the lowering of the boat. The boat crew were all wearing selfinflatable lifejackets over their normal PPE. The boat was lowered to the water with a crew of five, although the second mate was not present since he was involved in the fire party. No replacement cox'n had been nominated because all the boat crew were well practised and familiar with their duties. The boat was instructed to sail around the harbour and pick up a lifejacket from the water to simulate a manoverboard.

Once this task had been completed, the boat was positioned under the falls, the fall rings were reattached by those who had taken them off, and the bosun started hoisting the boat under power from the embarkation deck - some 10 metres above. As the boat came level with the embarkation deck, and the falls block assemblies approached the davit arms, the bosun noticed a quarter twist in the aft falls. He was at the point of stopping the hoist when the aft falls block chain ring became detached from the boat.

The aft end of the boat fell away, throwing the boat crew into the water and leaving the boat swinging from its forward hook about 10 metres above them. One of the boat crew sustained fractures to his back and pelvis, another required stitches to his head. The rest were bruised, but otherwise OK.

Luckily, the incident was witnessed by another vessel, which was able to launch its fast rescue craft and retrieve four of the crew from the water within 7 minutes, and deliver them to an ambulance. One of the crew managed to swim to the quay and climb ashore where an ambulance picked him up.

The aft falls block chain ring had been placed in the hook securing bracket, and the safety pin pushed though it, as shown in figure 3. The hook was left in position, unused. The AB who had done this, recognised that something was not right, but could not see what it was, and did not ask anyone to check it. In the absence of a cox'n, no-one took control of the boat, checked that all was secure and instructed the bosun that it was safe to hoist.

Once the injured crew had been rescued, and were on their way to hospital, the lifeboat was lowered back into the water. When it entered the water, it took on some water, but was considered safe to board. The second mate climbed down the boarding ladder to the boat.

He re-attached the aft falls block chain ring correctly to the hook, and lashed the hook securing arrangement because the bracket had spread to the extent that the pin was not now long enough.

The forward hook assembly had sustained considerable damage. The bill of the hook had been bent down, and the hook support structure had also been clearly deformed - as shown in figure 4.

Figure 1 Lifting hook showing fall block chain ring correctly secured

Figure 2 Detail showing hook in the secure position with the safety pin and 'R' clip in place

Figure 3 Full blocks chain ring incorrectly positioned over safety pin

Figure 4 Forward hook assembly showing damage

The second mate then remained on the boat while it was lifted clear of the water, allowed to drain, and then hoisted to the embarkation level.

Since the fire drill had been completed before the boat had returned to the vessel, the majority of crew - including the master - had witnessed the entire event, including the boat being finally hoisted back on board.

The Lessons

1. The duties of the crew were designated on the muster list. Throughout their time spent on board, they carried out the same duties during drills. Boat drills were carried out regularly, often every week. In the absence of the second mate, no one considered the nomination of a cox'n to be necessary since 'everyone knew what to do'.

Clearly this was not the case. The AB refitting the aft fall block chain ring onto the hook, had performed this same task on many previous occasions. However, perhaps as a result of being so practised, he had a lapse of concentration and made a basic error. Had there been anyone in

charge on the boat, it is likely they would have checked the security of the hooks before instructing the bosun to hoist.

It is ill advised to nominate duties of personnel on muster lists, since it is likely that in the event of an accident or drill, someone will be unavailable. Better practice would be to rotate all crew so as to ensure that they are all drilled in every task necessary. In any event, the individual responsible for lowering the boat must ensure that every position is allotted, especially that of cox'n.

2. Following any accident, a certain amount of adrenaline will be flowing through the veins of those who witnessed it. Therefore, it is essential that the actions taken after the immediate response to the accident be clearly thought through.

Lifting the boat with the aft fall securing arrangement lashed, the forward falls possibly over stressed, and the forward hook of the boat clearly damaged, was a dangerous operation. The fact that the second mate remained in the boat, in the full view of the master and the rest of the crew, with no one commenting, is disturbing. This highlights the need to make formal risk assessments before carrying out operations. There was no need to retrieve the boat quickly. Once it was back in the water, the deck officers should have assessed the operation of bringing it back on board calmly and then gone about it in a safe and controlled manner.

Case 10 Failing to Plan can Mean Planning to Fail

Narrative

A tanker was preparing to leave her berth and depart the port by way of a narrow channel. It was daylight, but the weather was poor and rain showers were restricting visibility.

Prior to departure from a berth, the pilot boarded the tanker and advised the master that, after clearing the berth, he would leave the tanker and transfer to another (inbound) ship instead of conning the tanker through the fairway to sea. The master was confident of his own ability to unberth his vessel without the assistance of the pilot, so agreed that the pilot could leave before the ship departed from the berth. The tanker was manoeuvred clear of the berth with only the master, second officer and helmsman on the bridge. Courses had been drawn on the chart to follow the leading line of the main channel.

The inbound vessel was seen shortly after unberthing. The master contacted her by VHF radio and agreed a starboard-to-starboard passing, but it soon became apparent that the inbound vessel would impede the tanker's passage within the channel. The master initially altered course to port towards a secondary channel, but then had difficulty identifying one of its leading marks. When the inbound vessel eventually passed clear, the master decided to revert to his original plan and altered course to starboard, intending to enter the main channel. However, the resulting track passed across a charted shoal, causing the tanker to ground.

The Lessons

1. The master was over-confident in his ability to navigate with only rudimentary passage planning. He took no account of a number of buoys found missing on the inward passage, the possibility that visual leading marks might be obscured in rain showers, or that a deviation from the plan might be necessary as a result of unforeseen circumstances.

Contingency planning is an essential task. It needs to be done well ahead of when the contingency is likely to occur, and it needs to be done comprehensively. The possibility of meeting an inbound vessel in the main channel should have been considered during the planning stage. In this case, the master was aware of an inbound vessel, yet made no attempt to assess the implications of that fact. Instead, he was content to dispense with the services of a pilot, and depart the berth without considering an alternative plan should the main channel not be readily available for use. It was only after unberthing, and sighting the incoming vessel, that he decided on a starboard-to-starboard passing. This inevitably meant that one, or both vessels would have to deviate from the leading line. It was only when he saw that the inbound vessel intended to keep to the leading line that he recognised a need to deviate from his plan; by then, however, he had lost the opportunity to properly assess alternative options.

2. Of equal importance to planning a passage is its execution, which requires effective bridge teamwork. In this case, the master failed to include the second officer in his conduct of the navigation, thereby discouraging him from contributing to the process, and resulting in the master's error not being identified ahead of the vessel grounding.

Had the shoal been highlighted on the chart, and the second officer been consulted with respect to the tanker's position and track, the master would have been better placed to recognise that an alteration of course to starboard was inappropriate at that time.

All members of a bridge team should be briefed on the plan, encouraged to actively contribute to the vessel's navigation and, where appropriate, to challenge the master's decisions. The ship's position should be monitored and cross-checked using more than just one method, and the track projected ahead to ensure detection of any possible dangers.

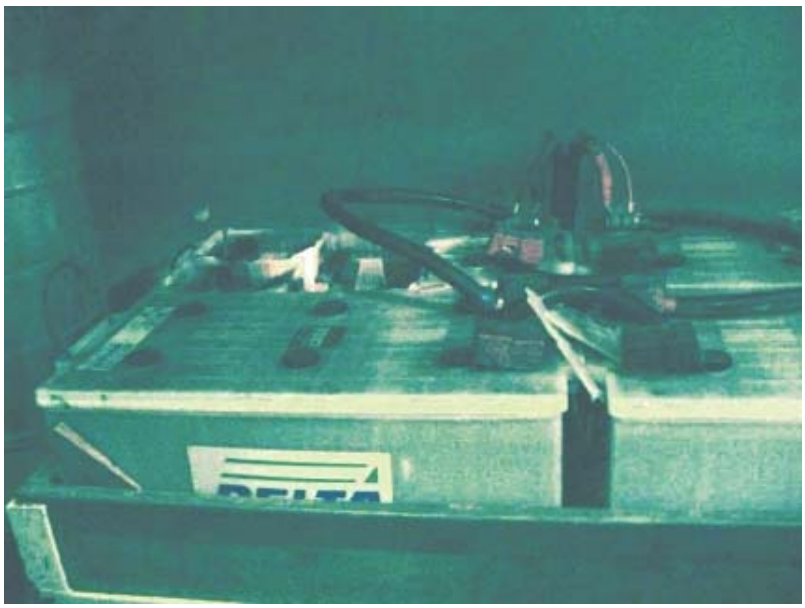
Case 11 An Exploding Battery

Narrative

A contractor was issued with a permit to work in a battery storage compartment on a cargo vessel undergoing a refit. The permit covered electrical isolation and, because an angle grinder was to be used, hotwork.

Part-way through the work, while the angle grinder was in use, there was an explosion in the compartment. The top of one battery was blown off and acid leaked into the surrounding containment tray (see figure). Fortunately nobody was injured.

An investigation found that the compartment's ventilation fan was out of order, and had been for some time. It was concluded that lack of ventilation had allowed hydrogen gas from the batteries to accumulate, to produce an explosive mixture that was ignited by sparks from the angle grinder.



Damage to battery

The Lessons

1. The risk assessment overlooked the significance of the defective ventilation fan, and the lack of positive ventilation. Consequently, the risk control measures in place before the permit to work was issued, and the angle grinder used, were inadequate.

2. A permit to work system has little value, unless a full risk assessment of the proposed work is performed, and any necessary steps taken to minimise the risk. To do otherwise, turns a potentially valuable system into a pointless paper exercise.

Case 12 Too Hot for Comfort

Narrative

During a particularly cold spell, a crew member on board a UK ferry awoke to find his cabin very chilly. Noticing that the air conditioning vent in the cabin was blasting cold air into the cabin, he decided to investigate ways of closing it.

Having fetched a screwdriver, he removed the vent diffuser to adjust the flow of air from the vent. Being unfamiliar with the adjusting mechanism, he couldn't do this, and decided instead to reduce the air flow by stuffing a towel into the vent trunking.

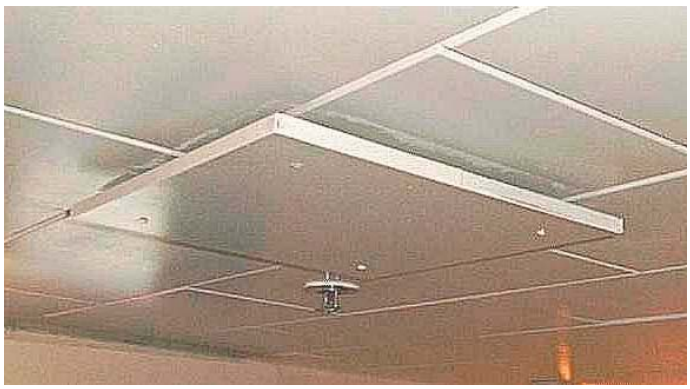
Some time later, and possibly after a number of crew changes, the crew member now using the cabin was feeling cold. To increase the temperature of the air coming out of the vent, he adjusted the thermostat mounted on the cabin bulkhead to its highest setting. He then left the cabin for a short period to warm up.

When he returned, he noticed a red glow from behind the diffuser and, realising that something was on fire, he manually ripped the diffuser off the deckhead. At that point the sprinkler head, located next to the vent, activated, and this, combined with the efforts of the crew member, extinguished the fire.

The alarm was raised. A team wearing breathing apparatus was prepared, and the surrounding spaces were checked to ensure that the fire had not spread. Having established that it had not, and that the situation was fully under control, the fire team was stood down. Thankfully, injuries were limited to the crew member burning his fingers while pulling off the vent diffuser.

The thermostat was connected to an electrical heating element within the vent. By turning the thermostat to fully on, this, in turn, switched the heating element fully on and ensured that it stayed on. At that stage, the towel, which had been stuffed into the diffuser area some time ago, caught fire.

The vent heaters were in addition to central air conditioning heaters. They were fitted to allow a degree of local control to the temperature of the air entering the cabin. As a result of this incident, the company has decommissioned all the vent heaters on board the vessel.



Sprinkler head

Electrical heating element

Burnt towel

The Lessons

1. Never restrict the flow of any ventilation, other than by using the available controls. This incident could have had a far more serious outcome if the crew member had been asleep in the cabin, or had not returned to the cabin when he did.

2. Let the engineers on board fix problems of a technical nature. That is what they are there for. There any number of reasons why a cabin vent might be blowing out too much hot or cold air. If there are no accessible controls, or they do not appear to work, then report the problem.

3. When adjusting any temperature controller, it is good practice to wait to see the effect this will have before leaving the space.

4. Where thermostats, or any other heating controls, are made available, the operating instructions for them should be provided in the cabin, or stuck to the bulkhead beside the controller.

Case 13 Be Careful How You Rig Your Tricing Pendants

Lifeboat being released

Narrative

A lifeboat drill was being carried out on a cruise ship in port. The gripes were slipped and the winch brake was released to begin the launch. As the davit arms swung out and the boat began to

lower, a tricing pendant at one end became caught beneath the suspension hook's balance weight. As lowering continued, the tricing pendant tightened until it lifted the weight and opened the hook. The fall released and the boat swung; it was left hanging by the other fall (see figure).

Fortunately no one was in the lifeboat at the time.

Gripe, Tricing pendant and Unguarded suspension hook balance weight

The Lessons

1. Some lifeboats have cheek plates fitted either side of the suspension hook balance weight to prevent anything becoming caught underneath. However, this makes the weight more difficult to lift when the lifeboat needs to be released when afloat. Lifeboats like the one involved in this accident, where the balance weight is unguarded, must be prepared to prevent them being lifted inadvertently.

2. Figure 2 shows a lifeboat rigged in such a way that this problem could occur. When the gripe is removed, the tricing pendant will drop down under the suspension hook balance weight. When the boat is lowered, the tricing pendant will tighten and lift the weight.

3. When the mate or other responsible officer does his rounds of the lifeboats, he should check that tricing pendants are laid clear of unguarded suspension hook balance weights.

4. If unguarded balance weights are fitted, they should be observed while the lifeboat is being lowered, to ensure they are not lifted accidentally. If crew are in the boat when this happens, a serious accident could result!

Case 14 Vertical Chute Evacuation Drill Tragedy

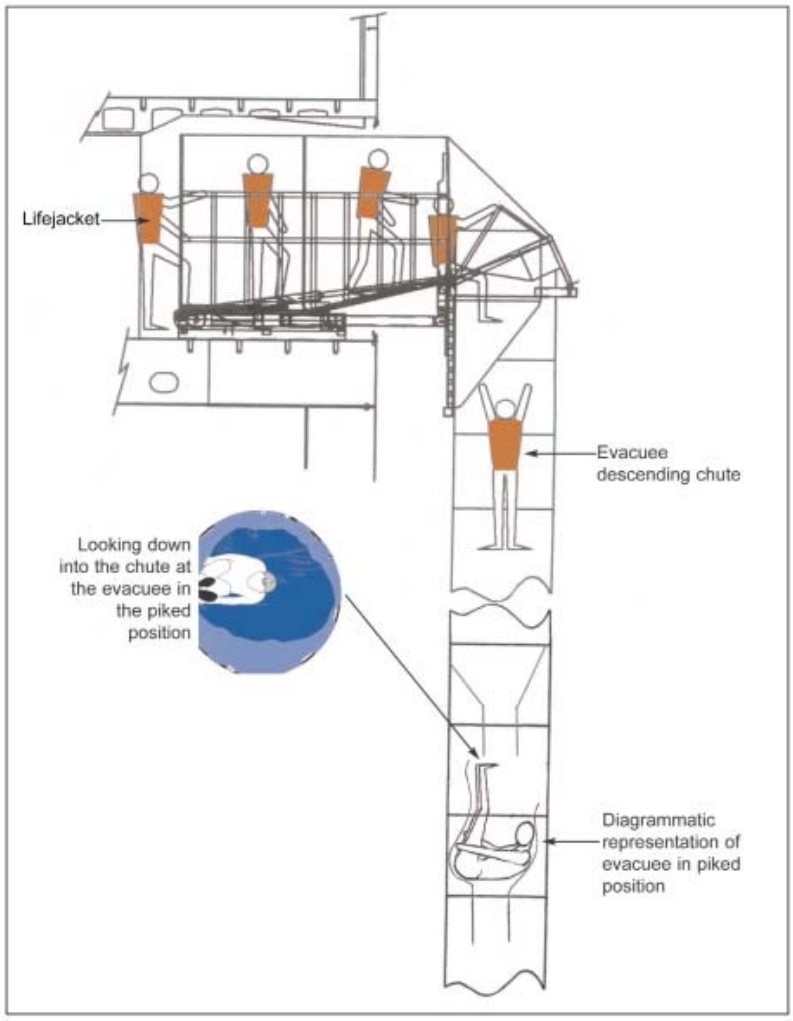
Narrative

Over 200 volunteers gathered on board a highsided ferry to take part in an evacuation drill. One which was to go horribly wrong. The drill was being conducted using a marine evacuation system consisting of two vertical chutes leading to two large, fully reversible enclosed liferafts.

After 124 people had slid down one of the chutes, a female volunteer began her descent. Nine seconds later, she shouted for help. A member of staff who had received training in how to clear blockages in such chutes, found her stuck in a piked position (hands and feet above her head) inside one of the elasticated tubes of the chute. Her lifejacket and jacket had come off, and both were near by. His efforts to pull her up were unsuccessful, and he quickly realised that she was not responding. The insides of two of the socks were quickly cut to allow her to slide down into the liferaft.

Ten minutes after the lady began her descent, she landed - unconscious - in the liferaft. She received first-aid, was evacuated ashore immediately and taken to hospital, but was pronounced dead on arrival. Enquiries concluded that the lady died from positional asphyxia.

There were no witnesses to the evacuee's descent, so it is impossible to determine exactly how she assumed the position in which she was found. However, she probably became stuck when her lifejacket rode up over her head and then, in the ensuing struggle to free herself, caught her feet so that her legs became raised in such a way that she assumed a piked position in the next tube.


Lifejacket
Evacuee descending chute
Looking down into the chute at the evacuee in the piked position
Diagrammatic representation of evacuee in piked position

Lifejacket having ridden up

The Lessons

1. The chance of a recurrence of this sort of accident happening during a drill is low. Nevertheless, operators should examine their risk assessments for these types of drills, especially in regard to selecting suitable volunteers, and ensuring that a chute never contains more than one person.

2. During an actual emergency, when tension is running high and stress is acute, the likelihood increases. Evacuees will be untrained, they may be unfit, and they might well be evacuating during poor weather or in darkness. Operators should take all these factors into account when they review a safety case.

3. Suitable equipment - such as a harness, lines, straps, knife, torch and radio - to assist in the task of extricating evacuees, should be provided. This is particularly important during an actual emergency, when people must be evacuated as quickly as possible.

4. Manufactures have been advised to revalidate the design of vertical chute marine evacuation systems so that it is impossible for evacuees to become stuck during their descent by removing any possible causes of blockages by redesign and/or other means.

5. The initial cause of this accident was the lady's lifejacket riding up. It is essential to ensure that lifejackets for use in vertical chutes cannot ride up.

Part 2 - Fishing Vessels

Tony Rae

Reading the *Safety Digest* is a reminder of both the MAIB's dedication to improving safety awareness, and just how quickly things can go wrong at sea.

Small events or omissions can combine to form a seemingly unlucky chain reaction, but almost always the individual events are avoidable in themselves.

Extending what skippers do naturally on a routine basis, a risk assessment on weather, crew, and fishing operations, to include "what if" scenarios can make a real difference:

- Always shutting the seacocks in port
- Checking out that tell-tale rust streak
- Fixing the dodgy bilge alarm
- Replacing that worn shackle
- Double checking for conflicting traffic.

Any one such item of good housekeeping might be the one! The one which halts that unfortunate chain of events before it becomes a catastrophe.

Skippers on fishing vessels nowadays have their hands full. Modern navaids and more comfortable vessels help, but reduced opportunities and appallingly complex Fisheries Regulations pile on the pressure.

Resultant reduced earnings may mean working short-handed, so more than ever, this requires skipper and crew to be alert to hazards both on board, and beyond the wheelhouse windows.

Forward thinking, or risk assessment, good seamanship always, and vital when working single-handed.

Tony Rae
Tony Rae, now ashore and West Country representative of a major marine insurance company, he first went to sea in 1955 and has owned and skippered a number of vessels. A successful pioneer of double rig beam trawling, he has experience of other methods around the UK and abroad, including trawling and seine netting. With practical engineering experience, he is a long time NFFO member of the UK Fishing Industry Safety Group and a number of its technical sub groups.

Case 15 I See No Ships!

Narrative

At about 1245 UTC, a fishing vessel was on ocean passage when returning to port on a course of 168° at a speed of 9 knots. Visibility was good, the wind was north-east force 6, and the sea state was 5. Her lone watchkeeper detected a container ship by radar and visually at a range of about 6 miles, and considered that she was on his starboard quarter and would pass under his stern. The container ship, however, which was about 4300 TEU, was on a course of 073° at a speed of 22 knots, and was forward of the fishing vessel's starboard beam. This was therefore a crossing situation, in which the fishing vessel was the give way vessel, and should have taken avoiding action. The OOW of the container ship was also alone, and did not see the fishing vessel on his port bow, either visually or by radar.

The watchkeeper of the fishing vessel did not keep a close eye on the closing container ship, and just before 1300 the two vessels collided. Initial contact was made several metres aft of the container ship's port bow, before the fishing vessel scraped down her port side. Almost immediately, the fishing vessel started to go down by her head, indicating that she had been holed below the waterline forward. A "Mayday" call was sent via VHF channel 16, requesting the ship that she had collided with to turn back and assist. The crew then abandoned ship using the vessel's two liferafts.

Container ship

At the time of the collision, the container ship's OOW was at the chart table completing the hourly entries into the deck log. He felt the impact of the fishing vessel, but considered this to have been caused by a large wave. Although he checked along the port side, the containers on deck obscured the fishing vessel. Shortly afterwards, the OOW heard the "Mayday" sent by the fishing vessel and, after seeing the fishing vessel about 4 miles astern, called the master to the bridge. The master immediately turned the container ship towards the stricken fishing vessel. As the liferafts were drifting apart, a lifeboat was launched to assist in their recovery.

The fishing vessel sank at about 1340 when her EPIRB was activated. All her 16 crew were recovered on board the container ship within 2 minutes, and only minor injuries were sustained.

Damage caused by impact

The Lessons

1. Passing ahead of other vessels at close range is asking for trouble. Even where it is estimated that the passing distance will be several cables, it only takes an error of judgment, a mechanical problem, or for the other vessel to alter course or speed, for the situation to change for the worse very quickly. As a give way vessel, it does not pay to try and cross the bows of the other vessel, particularly when it is much larger. There will only be one winner.

2. Ideally, when two ships are closing on a steady bearing, each is aware of the other's presence, and action is taken in accordance with the collision regulations. At worst, an accident can still be avoided if only one of the ships sees the other, providing the person on watch knows what is happening, and then does something about it. In this case, where the watchkeeper of the fishing vessel wrongly assessed the situation and did not alter course as the give way vessel, there would still have been hope had he kept a close eye on the container ship. Because he did not, the outcome was in the lap of the gods, who unfortunately did not smile on this occasion.

Regardless who has right of way, or the distance another vessel is passing, the actions of all ships passing nearby need to be closely watched until they no longer pose a threat. Self-preservation is an unwritten, but golden rule of collision avoidance, particularly for smaller vessels.

3. Bridge watches during ocean passages can be a little tedious, if not boring, with nothing to see, no contacts on the radar, and no navigational worries. Even when other ships are sighted, they tend to be large and are easily detected. In such circumstances, it is probably human nature for a degree of complacency to set in, with the checks out of the window and on the radar becoming less frequent in keeping with the slow pace of activity. When this happens, the chances of not detecting smaller craft, such as sailing and fishing vessels, which are seen on the oceans in rising numbers, increases. Ocean watchkeeping is not usually busy, but the need for vigilance remains.

4. The use of an additional lookout on the bridge can give a huge amount of support to an OOW. It increases the chances of detecting other vessels, it allows a lookout to be maintained while the OOW is occupied with other tasks such as completing logs or fixing the ship, and, importantly, it provides stimulus to an OOW when there is apparently little going on. Although an additional lookout is only required by STCW during darkness and restricted visibility, the benefits of having one closed up at other times should not be overlooked. Two pairs of eyes are always better than one, no matter where a ship is or what she is doing.

5. Electronic detection aids, such as automatic target acquisition and radar guard zones, can only help bridge watchkeepers if they are used.

6. "Mayday" calls, liferafts, and EPIRBs are effective. And they save lives!

Case 16 Fishing Vessel Flooding and Foundering

Narrative

While trawling 60 miles from land, it became evident that problems possibly lay ahead for the crew of a fishing vessel. Her trawl doors had closed up, which indicated that a heavy weight had been picked up in her nets.

The crew were called, and the engineer went to the engine room to start the hydraulics ready for hauling. On reaching the engine room, he became alarmed to discover the vessel was flooding rapidly; by that time, water was well above the engine room floor plates.

The engineer alerted the skipper, and both men attempted to locate the source of the ingress. Their attempts, however, were made futile because the water was black with oil, believed to be from the main engine sump. Due to the level of floodwater in the engine room, the crew were unable to reach the engine room bilge discharge pumps. The vessel was fitted with a bilge alarm, but it had failed to activate.

After informing the coastguard of the situation, arrangements were made to have an emergency pump flown out to the scene. Another vessel that was fishing in the area also stood by.

When the pump arrived with the rescue services, the crew did their best to pump out the floodwater. However, they were unable to get the piping fully into the engine room, so were forced to abort the attempt.

Anxious about the rapidly deteriorating situation, the skipper instructed the crew to abandon the vessel. They were transferred safely to the other vessel that was standing by. Fifteen minutes later, the flooded vessel sank.

The Lessons

1. The flooding is thought to have been caused by engine room seawater piping failure, due to erosion or corrosion. Sadly, this is nothing new: the MAIB is aware of many fishing vessels having flooded and, sometimes, having been lost as a result of engine room seawater piping failing. In light of this, it is wise to carry out simple regular checks on all pipework, especially in the engine room and in places which may, at first, appear to be inaccessible. A simple check for signs of corrosion or weeping pipework, culminating in the repair or replacement of the piping, might well save your vessel.

2. Another frequent problem in the fishing industry, is the failure of high-level bilge alarms. They are the last line of defence against flooding, yet all too often are not properly inspected and maintained. Always ensure high-level bilge alarms are not only accessible, but that they are also inspected and maintained on a regular basis. They should be tested daily. A fully operational bilge alarm would have bought this crew valuable time by giving them early warning of the flooding, which might have resulted in a different outcome.

Case 17 Bilge Alarms, Bulkheads and Televisions

Narrative

A 26m long fishing vessel (see figure) was trawling north of the Shetland Islands in fair weather and a force 3 wind. The skipper and engineer were on the bridge and the two deckhands were turned in. They were about half way through a tow and there was little traffic about. The bridge team was monitoring the trawl and the other bridge instruments, but they were also chatting and watching television.

Shortly before midnight, the skipper noticed that the engine room bilge alarm light was on. The light was partially obscured by the fish plotter. The engineer went to investigate and found floodwater up to the top of the main engine. He started the bilge pump immediately and told the skipper. The skipper informed the coastguard and the two deckhands were roused.

The floodwater was so deep when it was first discovered that it was impossible to locate its source. The rate of ingress was high, and it soon became apparent that the bilge pump was not coping. The skipper was concerned that the vessel would capsize, so instructed the crew to deploy a liferaft without delay. The main engine stopped at around that time. With the situation deteriorating rapidly, the skipper had no choice but to abandon ship. He alerted the coastguard and gave their position. Just before they abandoned the vessel, one of the deckhands peered down the hatch into the fish room, and found that space to be flooding also. The crew boarded the liferaft moments before the vessel sank, and were picked up by another fishing vessel.

The Lessons

1. An *audible* bilge alarm might have given the crew sufficient time to identify and stem the source of the flooding. Currently, fishing vessels over 24m do not have to be fitted with them. The requirements for 15 to 24m vessels have recently been revised and *audible* bilge alarms are now required for this size of vessel. Although those for over 24m vessels will be revised shortly, and will include the fitting of audible bilge alarms, owners should not wait for this requirement. They should, instead, fit audible bilge alarms to all the main watertight compartments as soon as possible.

2. The flooding spread from the engine room to the fish room. This is puzzling because the bulkhead between this space and the engine room was supposed to be watertight. It is possible that a non-watertight penetration of this bulkhead was made at some stage. Watertight bulkheads are a very important safety feature. If it is necessary to run a cable or pipe through a watertight bulkhead, a proper gland should be used.

3. Clearly, the television in the wheelhouse was a major source of distraction for those who should have been paying full attention to their duties. Without it, the bridge team might have noticed the bilge alarm before. Televisions should never be sited in a wheelhouse; the proper place for them is the accommodation. Unless, that is, you are looking for a little more 'entertainment' than you previously bargained for.

Case 18 Anchored Bulk Carrier Sinks Fishing Vessel

16 metre wooden fishing vessel

Narrative

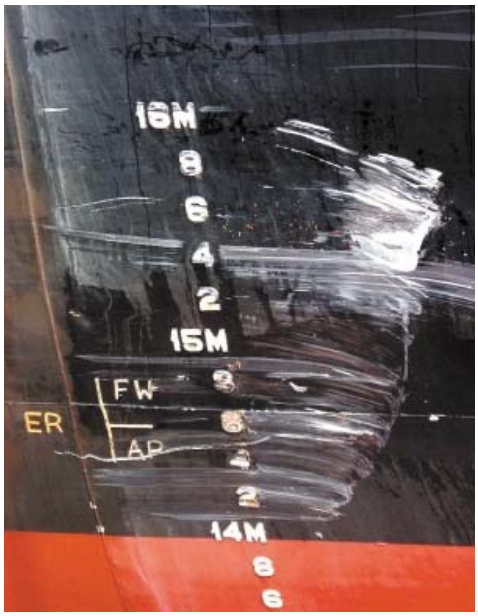
A 16-metre wooden fishing vessel was returning from fishing grounds after a successful trip. It was the early hours of the morning and, although rainy and overcast, visibility was good. Three crew were on board, along with three passengers gaining experience of being at sea on a fishing vessel. At the grounds, they had worked for 12 hours, taking just a 1 hour break. They had then anchored for 4 hours in an area between sandbanks, while all on board slept, before another 4 hour stint of hauling.

The fishing had been good recently, and the vessel had been working a schedule of 2-day trips with a day off in between. Everyone on board was tired, and a couple of the regular crew were on leave, so the men were keeping 1 hour watches on the return voyage.

After two uneventful watches, the skipper took over. He left the wheelhouse briefly to make a cup of tea, and settled down in the chair to compose a poem. It was then that he noticed a large vessel about 6 miles ahead. He thought she was moving, but didn't check her range on the radar. Almost immediately, the battery alarm sounded. He cancelled it, and descended briefly to the engine room to find out why. Everything appeared normal, so he returned to the wheelhouse.

Straightaway, both the battery alarm and bilge alarms sounded together. The skipper had just seen there was no water in the bilges, so he cancelled the alarms; both continued to sound.

Thinking this most unusual, the skipper decided to return to the engine room. He glanced out of the wheelhouse window, and saw the large vessel



now much closer. Checking her position on the radar to be at about 1.5 miles range, he thought he had plenty of time to investigate the alarms.

No water was evident in the engine room. Glancing over the engine, he saw two parted wires, which were normally clipped together, and thinking that he had time to deal with them, went over and twisted them together. Suddenly, he remembered the vessel ahead, so ran back to the wheelhouse, now in darkness due to the shadow of the vessel, which by now was towering above. Grabbing the wheel, he twice spun it hard over to port, but with no effect, before realising too late that the autopilot was still engaged. The fishing vessel collided head-on with the port quarter of the anchored bulk carrier, before bouncing along her port side.

There were no injuries or fatalities on either vessel, and the bulk carrier suffered only minor damage. The fishing vessel was severely damaged, and soon began to flood. All on board, with the exception of the skipper, donned lifejackets, and the skipper decided to head for port, with all three bilge pumps operating. As the flooding worsened, the engine and pumps failed, and the liferaft was inflated ready to abandon ship. The skipper then informed the coastguard - over half an hour after the collision.

An RAF helicopter, and various vessels, were soon in attendance, and all on board were evacuated to the lifeboat. Although the lifeboat attempted to tow the fishing vessel back to port, the flooding worsened and the vessel subsequently sank.

The Lessons

A large vessel is immediately ahead, when alarms start to sound. It is easy, given hindsight, to suggest that before leaving the wheelhouse the skipper should have altered course or woken one of the crew to assist. But it is early morning, you are exhausted, and faced with a similar split-second decision. What would you do?

The skipper here was highly experienced, and should have known better. But it is evident that fatigue, low manning, and poor watchkeeping practices all played a part in this collision, the consequences of which could have easily been so much worse, both for those on board the fishing vessel, and whatever else she might have collided with.

1. Manning levels depend on various circumstances, and there may be a temptation to cut back for financial reasons. This is all very well when everything goes according to plan, but, when things go wrong, it might leave you dangerously short of cover.

2. It is human nature to keep working when times are good, pushing yourself to the limit to make the most of a good spell of fishing, especially when you know this won't last forever. But don't let it catch up with you. This skipper felt tired, and fatigue probably allowed him to become distracted in the engine room, helped him lose track of time and affected his decision-making when it mattered.

3. The MCA publication MGN 84 (F) *Keeping a Safe Navigational Watch on Fishing Vessels*, **provides sound advice on the importance of maintaining a proper watch at all times. Its message is clear, and, if followed, would have prevented this accident. The watchkeeper's job is paramount. He must be fit for duty, and not be distracted from maintaining a proper lookout.**

4. MGN 84 (F) also strongly recommends the installation of a watch alarm where there may only be one person on navigational watch. Had this been fitted with a suitable time interval, and relayed to the accommodation, the wheelhouse might not have been left unattended for 8 minutes before the collision. The skipper had considered fitting a watch alarm after a recent near manoverboard incident on his vessel, but had "not got round to it": a phrase all too often used when it's too late.

5. Following the collision, the skipper chose not to don a lifejacket, nor to call the coastguard immediately. He considered that he had assessed the situation and may have thought that he had everything under control; he chose not to let others know of his predicament. Had the coastguard been informed earlier, a pump might have been dispatched in time to save the vessel, and the safety of those on board would have been more assured.

6. The lead up to the incident highlighted the practice of mooring up in the hours of darkness to allow all on board to rest before another shift of work. The need to reduce fatigue has been stressed above; by all means stop for a rest, but don't rely on someone else to keep your lookout. Otherwise you might not be as lucky as the bulk carrier in this case!

7. If passengers are to be embarked on your vessel, for whatever reason, ensure they are aware of what to do in an emergency situation. No regular drills were carried out on this vessel, and the passengers had not been briefed. Fortunately, in this case, there was plenty of time to muster and prepare for evacuation, but what would have happened if this vessel had sunk almost immediately? Be prepared for the worst!

Case 19 The Price of Coronation Street

Narrative

During the late morning of a cold winter's day, a 21 metre wooden fishing vessel had most of her crew working on deck, with her skipper in the wheelhouse.

Although there was nobody in the main cabin, it was usual practice to leave the cabin's TV switched on. A 24Volt to 240Volt inverter in the cabin supplied power to the TV.

Since beginning work that morning, all had run smoothly, except for a few rather odd problems with the two plotters and radar in the wheelhouse. At intervals of several minutes, each of these pieces of kit had given 'loss of power' signals, or had spontaneously shut down and restarted. Although the skipper went to the engine room to check the electrical system, he could find no problems or explanation for these symptoms. However, he did not look into the cabin because he saw no need to do so.

About 30 minutes after the radar shut down and restarted, the skipper smelled smoke emanating from the area of the galley. After knocking the engine out of gear, he went to the galley and found smoke coming from the hatch leading to the cabin. Looking down into this hatch, he saw flames and smoke coming from the open cabin door.

He immediately contacted the coastguard by VHF and alerted the crew working on deck. One of the crew promptly tackled the fire with a foam extinguisher. This appeared to put out the flames, but the smoke then changed from white to black, rapidly filling the galley and wheelhouse and forcing everybody onto the open deck.

In the meantime, the remainder of the crew had launched the liferafts and had prepared them for embarkation. Brief consideration was given to tackling the fire with a hose, but this was quickly dismissed as thick smoke and flames coming from the cabin door prevented access to the engine room to engage the fire pump.

After closing the windows and doors of the wheelhouse and galley, all the crew then assembled on the forward deck ready to take to the liferafts, if necessary. The skipper released the EPIRB from its mounting, unsuccessfully attempted to activate it and then carried it forward. However, nobody was wearing a lifejacket as these had been stowed in the cabin, with survival suits, and the fire prevented access. About an hour after calling the coastguard, skipper and crew were safely lifted from the vessel by helicopter. The still burning boat drifted for several more hours before sinking.

The Lessons

1. Domestic TV sets might not be capable of operating continuously, day and night, under the conditions of vibration, shock and humidity found on fishing vessels. When they fail, they might do so in a way that results in a fire. Similar comments can apply to inverters, particularly those aimed at the budget end of the market. When not in use, keep these non-essentials switched off.

2. An early warning from a fire alarm and detection system might have given the crew time to tackle the fire in its very early stages, but this vessel was not fitted with a system covering the accommodation and galley. This incident shows their potential value.

3. Keeping the cabin door open at all times obviously made day-to-day access easier. However, the open door allowed flames and smoke to escape into the access trunk between the cabin and the galley. As access to the engine room door was also from this trunk, the crew were prevented from getting into the engine room to engage the fire pump. An important fire-fighting system was thus disabled. Fire doors have no value unless they are kept closed.

4. Although not affecting the outcome of this incident, the unsuccessful attempt to manually activate the EPIRB could have been important had the skipper not been able to contact the

coastguard with a position. It is important to know how to manually activate a vessel's EPIRB, as it provides an important method of raising the alarm and giving the coastguard the vessel's position in an emergency.

5. Stowing lifejackets and survival suits in the cabin had the advantage of keeping these items clean and free of damage. However, if space permits, keeping these important items in a locker in the wheelhouse would give the crew an improved chance of being able to reach them when things go wrong.

Case 20 Seacocks - So Important

Narrative

A 16.5m length vessel was fishing to the northeast of Scotland. The sea was moderate to rough, with the wind about force 5. The first indication of a problem was when the bilge alarm activated. The engineer went below to investigate and found the engine room flooding, so he quickly lifted some floor plates and closed all the vessel's seacocks. This stopped the floodwater rising, which indicated that saltwater pipework was the source of the ingress.

While the engineer was dealing with the problem in the engine room, the skipper was handling the situation on the bridge. He transmitted a "Mayday" call on VHF channel 16, which another vessel relayed to the coastguard. The skipper also arranged for another fishing vessel to provide a tow to keep the vessel's head to the weather, to help minimise motion.

The main engine could not be used because the cooling water had been shut off. There was a small air-cooled engine, which powered an auxiliary bilge pump. This was started but, owing to its low pumping rate, it did not reduce the level of the floodwater perceptibly. A search and rescue helicopter flew out to the vessel, and a portable pump was lowered. It took about an hour to pump out the engine room.

With the floodwater evacuated, the engineer was able to inspect the pipework below the floor plates. The source of the flooding was found to be a fractured pipe in the refrigeration system serving the fish room. The seacock for the refrigeration system (figure 1) was kept closed while the others were opened. The vessel was then able to sail back to port under her own power.

The fracture occurred at a screwed joint between steel and brass piping; the problem was probably caused by galvanic action (figure 2).

Watertight bulkheads fitted at either end of the engine room prevented the floodwater spreading.

The Lessons

This is largely a good news story. Although something did go wrong - from which we can all learn - there were good safe practices which meant that a problem did not become a tragedy:

1. The seacocks on this vessel were well maintained. The engineer was in the habit of closing them before leaving the vessel in harbour. This served two purposes: it kept the seacocks in

working order, and it helped to prevent flooding in harbour if a problem with the pipework occurred while the vessel was alongside. This routine is considered to be good practice and should be followed by all fishing vessels. The MAIB has come across many cases where seacocks have been seized open, preventing their operation in an emergency.

2. Many fishing vessels of this size do not have a dedicated engineer, and responsibility for engine room maintenance is left entirely with the skipper. The MAIB does not consider such a system of manning to be safe. It is very difficult for one qualified person to adequately monitor what is happening on both the bridge and in the engine room during a fishing trip lasting several days. This vessel did carry a dedicated engineer, who was able to deal with the flooding while the skipper handled the overall safety of the vessel and put out a distress call. The skipper was also able to continue to maintain a proper lookout.

3. The MAIB has often reported cases where bilge alarms have not worked. It is therefore pleasing to see that in this case adequate warning of flooding was provided. Bilge alarms are very important pieces of equipment. Good quality, robust and reliable units should be fitted, and they should be checked for correct operation at the start of each fishing trip and every day while at sea.

4. One way to minimise galvanic action in salt water piping, where this is made of dissimilar metals, is to fit sacrificial anodes in sea water systems. However, the pipework should be opened up periodically to inspect such anodes and, if found to be badly corroded, they should be replaced.

Case 21 One Skipper's Relief Causes Stress to Another

Narrative

Three anglers were fishing from a 6m sports pleasure craft at anchor when they saw a fishing vessel heading quickly and directly towards them. An attempt was made to call the fishing vessel on VHF radio channel 16, but no reply was heard. As the fishing vessel closed, the anglers shouted and sounded the boat's horn, but this had no effect; they also tried to cut the anchor rope. With collision imminent, the anglers were forced to abandon the boat just before the fishing vessel collided with their boat's port side.

The 8.7m fishing vessel had been on autopilot, and her skipper had been absent from the wheelhouse while relieving himself over the stern. On his return to the wheelhouse, he did not see the pleasure boat because steam from a kettle had misted over the wheelhouse windows.

Following the collision, the anglers swam back to their boat, and the fishing vessel skipper agreed to keep an eye on them while they returned to shore. Soon after, however, the skipper of the pleasure boat became concerned that his boat had taken on a lot of water during the collision, and his engine was not working correctly.

Unfortunately, the fishing vessel was now slowly disappearing into the distance, and although attempts to recall her via VHF radio were made, they were unsuccessful. The anglers then contacted the coastguard, and a lifeboat was able to escort them safely to the shore.

The Lessons

1. Leaving a wheelhouse unattended with the autopilot engaged is dangerous at the best of times, to do so when on passage in close vicinity to other vessels, and not keeping any form of lookout ahead, is asking for trouble. The wheelhouse is the only place on board where it is possible to maintain a good visual and radar lookout, control the steering and main engine, operate the sound signalling apparatus, monitor and use the VHF radio, and monitor the vessel's internal alarms. This is not by chance, it is by design and at some expense. It's a shame not to make use of it.

2. Windows aren't windows unless they are see-through. Keeping wheelhouse windows clean can be a bit of a pain, but allowing kettles to boil for several minutes is a bit of an own goal.

3. After a collision, it is unwise to assume that just because a vessel looks seaworthy, she actually is seaworthy. Not all damage sustained might be readily apparent; it can take some time before its effect on a vessel's seaworthiness can be determined. That is one reason why all vessels involved in a collision are required to remain in attendance until released by the damaged vessel (s) or, where involved, the coastguard. However, even in situations where there does not appear to be a need to remain in close proximity to another vessel following collision, it costs nothing to keep in touch via VHF radio, should something untoward become apparent.

Part 3 - Leisure Craft

Robin Knox-Jonston

Seamanship is a hands-on skill. It is learned best through experience. The more time spent at sea, the more the mistakes that will be observed or made, and the more the seaman learns. There is nothing that focuses the mind more than finding oneself in command in an awkward situation, and it is when dealing with that situation that seamen draw upon all their knowledge and experience to extricate their vessel and avoid risking the lives of their crew.

The sea is an unpredictable environment. Bureaucrats cannot legislate against its moods. They can create rules, which they can enforce in the safety of a dock or marina, but once the vessel has gone to sea, the safety of all aboard is down to the competence and experience of the master or skipper.

This is the reason why the Marine Accident Investigation Branch's *Safety Digests* should be compulsory reading for everyone who goes to sea, from the largest oil tanker to the smallest yacht. So often one reads them and thinks "*there but for the Grace of God go I".* The clear description of the accidents, the analysis and conclusions, enable seamen to expand their knowledge. The incident being described may not be totally appropriate to the yacht, but it may have unforeseen parallels sometime in the future.

Sir Robin Knox-Johnston

Robin Knox-Johnston
Robin Knox-Johnston went to sea as a cadet with the British India Steam Navigation Company, and passed his Master's Certificate in 1965, holding a command on the African Coast in 1966. In 1968 he set out from Falmouth as an entrant for the Sunday Times Golden Globe, to be awarded to the first person to ever sail alone around the world non-stop. He was the only finisher in 312 days. Subsequently, he won the Jules Verne Trophy, for the fastest sailing circumnavigation of just under 75 days in 1994. He has twice been British Yachtsman of the Year, and, in 1995, International Yachtsman of the Year. For 10 years, he was President of the Sail Training Association, and currently is Chairman of Clipper Ventures plc, the company which organises around the world races for amateur crew. He was knighted for services to yachting in 1995, is a Younger Brother of Trinity House, member of the Council of the RNLI, and Fellow of the Royal Institute of Navigation.

Case 22 Winter Storm in Biscay Claims Life

Narrative

A 24 year old skipper died following an abortive attempt to carry out a transatlantic delivery voyage from a popular sailing port on the west coast of France in December.

He and his two crew had spent several days preparing the new 15m yacht for the voyage that was expected to take up to a month and would take them via the Canaries and the trade winds route to the Caribbean. There, the yacht was to be chartered by a holiday company. The only safety equipment provided was a liferaft, with the skipper and crew being responsible for providing their own lifejackets, harnesses and foul weather gear. The skipper was being paid for the trip via a UK-based agency and, as is common in the delivery industry, was being paid a lump sum from which all expenses had to be met. This extended to other safety items such as flares, and only a minimal set of hand-held flares was purchased. The skipper brought along his own EPIRB, registered in his name, and other safety measures such as jack-lines on the deck were improvised.

On the day of departure, the early morning weather forecast from the French weather service Météo-France, posted up by the marina office, gave SW becoming NW 6-7. It was felt this was going to be a little unpleasant, but would not worry them unduly given the size of the yacht and the experience of the crew - they were all qualified RYA Yachtmasters. They sailed at 1200 without seeing the updated forecast at the marina office which showed that the weather situation was deteriorating, with the forecast wind strength having increased to force 8-9.

The UK Met Office had mentioned the possibility of wind strengths up to force 9 in its early morning forecast, and by lunchtime it was forecasting SW veering NW 7-9, occasionally force 10. However, the crew of the yacht had no long wave radio receiver on board and were thus unable to pick up the UK forecasts. Their French was not good enough for them to understand the local radio forecasts so, once they sailed, they had no means of receiving updates.

By 1800 they were 30 miles offshore and the wind had risen to SW force 9-10. Because the wind had increased quickly, the short steep sea was kicking up and they were having difficulty keeping the yacht under control. With no storm sails on board, they were sailing with a doublereefed mainsail (there was no third reef) and a small amount of headsail unfurled. It was now dark and a large wave knocked the yacht down, throwing the two crew who were on deck, flat in the cockpit.

Shortly after this the headsail sheet broke, presumably under the strain of the conditions. It was deemed too dangerous to try to reeve another sheet, so the sail was furled away completely. At this point they decided to turn back to seek shelter in the port from where they had sailed.

Broad reaching under reefed main the return leg was uneventful until they began to pick up the lights that they hoped would lead them to safety. Close to the harbour entrance, and motoring, a large wave caught them and capsized the yacht.

One crew felt himself pinned under the water until his combined lifejacket/harness broke, allowing him to swim to the surface. The other crew had had to cut his harness line to free himself - however, he managed to stay on board the yacht when she righted herself. The skipper was in the water with his lifejacket inflated.

The two in the water were about 100m from the yacht but could see she had been dismasted in the capsize in relatively shallow water. Swimming closer, they shouted to the crew in the cockpit to set off the EPIRB. Hand flares were also set off. The VHF radio was now useless as the aerial had been at the top of the mast - they had no back-up.

However, they were unable to get close enough to the yacht to have a chance of being recovered, and eventually lost contact. The crew whose lifejacket had been ripped off him was being helped to stay afloat by the skipper, and they decided to try to swim to the shore. By the time they reached shallow water, with surf breaking around them, the skipper had lost consciousness and appeared to have

stopped breathing. The crew attempted to resuscitate him, but was forced to leave him clear of the water, on a rock, while he sought help. No-one was to be found in a nearby caravan site that was closed for the winter, and the crew collapsed in a service building that had been left open. He remained unconscious for several hours until recovering to flag down a car to take him to raise the alarm.

By that time, the French search and rescue authorities, having been alerted by the EPIRB signal relayed to them by HM Coastguard at Falmouth, had rescued the other crew from the now grounded yacht, and had found the skipper's body on the beach. Both crew recovered in hospital.

The Lessons

1. A yacht equipped primarily for cruising in the Caribbean is not necessarily going to be able to handle everything a winter storm in the Bay of Biscay can produce. There are particular problems facing a delivery skipper of a new yacht in these circumstances. Owners will not want to spend money on equipment that is only likely to be needed on the delivery voyage. Delivery skippers will not want to cut into their profit for the trip by having to buy costly safety items such as flares which they won't be able to recover or use again - such items cannot easily be taken on aircraft. Storm sails are heavy, bulky and impractical for a skipper to take from yacht to yacht. However, had this yacht been better equipped, the outcome might have been different.

2. It is important to have a means for receiving and understanding weather forecasts. An inexpensive LW receiver would have been able to pick up UK Met Office forecasts at least to the latitude of the Straits of Gibraltar. On a trans-ocean passage it might be tempting to imagine that you will have to put up with whatever the weather will throw at you when over a thousand miles from a safe haven, but in the case of this voyage, the most hazardous part was in the first few hundred miles.

3. Approaching any lee shore in storm force conditions is going to be hazardous. The decision to return to the port of departure was understandable, but events proved that staying out at sea would probably have been safer. There were other options on the west coast of France, but all had their hazards and none were familiar to the skipper or crew. The UK Met Office forecast, broadcast at around the time they decided to turn back, was already predicting that the wind would drop to force 5-7 within the next 24 hours. Had they been able to receive this, they might have chosen to press on.

4. Having a storm jib and trisail which can be properly rigged are essential items for any trans-ocean passage. A mainsail with only two sets of reefing points is not going to be suitable for sailing in storm force conditions. A deep third reef at the very least would have been helpful in these circumstances. A roller-reefing headsail - even if it is almost completely furled away - is not a good substitute for a heavily constructed storm jib.

5. Anyone considering working as a delivery skipper or crew should be aware of the potential problems that exist owing to the fact that a yacht may be being delivered between two relatively sheltered cruising grounds across open ocean. Some yachts, generally those that have already been owned by safety conscious owners, will be adequately equipped. Many, particularly new yachts, will not be. There is therefore a significant difference for the recently qualified Yachtmaster between working for a UK-based sailing school or charter company where the yachts have to comply with MCA Codes of Practice, and the delivery of craft where none of these safety measures apply.

Case 23 An Inverted RIB

Narrative

Having completed their planned training programme in smooth water, a powerboat instructor decided to give his two trainees experience of slightly rougher conditions.

He briefed the trainees on the plan to go towards the sea and over the closest wash line, turn round and return. This was achieved successfully.

This was repeated and, after climbing a wave, the rigid inflatable boat (RIB) was turned to come into shore, power was put on and driven down the wave. The RIB's nose dug in, filling the front of the boat and causing it to handle sluggishly. The next wave pushed the stern of the boat round, putting it broadside to the wash line.

The next wave inverted the RIB, spilling all three occupants into the sea. They were all able to quickly grab the upturned hull and verbally confirm none was injured. The engine had stopped automatically when the 'kill cord' was pulled as the helmsman went overboard.

All three managed to climb on to the inverted hull. Several attempts were made to locate the safety equipment pack and the radio stowed in the steering console. However, there was no air pocket beneath the hull and these efforts failed. The wave action on the inverted hull, together with the cockpit's self-draining 'elephant's trunk', had acted as an air pump. The rising wave compressing air beneath the hull and pumping it out of the 'elephant's trunk' at the stern. The falling wave was then unable to draw air in because the reduction in pressure caused the elephant's trunk to collapse.

They managed to recover one paddle, and used this to attempt to row for the shore. Fortunately, their plight was seen by a member of the public ashore, who telephoned the coastguard. Equally fortunate was the presence of a search and rescue helicopter on exercise, a few minutes flying time away. All three were recovered from the water by this helicopter just 15 minutes after the RIB capsized.

Elephant trunk

The Lessons

1. The risk assessment prepared for these training operations did not cover the hazard of inversion. The operators are to amend this omission and will include any control measures in

their operations. A portable radio, attached to the helmsman, has been proposed as one possible measure if future operations extend into similar waters.

2. The helmsman had correctly fitted the engine's kill cord to his leg. This ensured the engine stopped as soon as the RIB ran into trouble. Although the RIB inverted, which generally causes most outboard engines to stop, this precaution ensured no difficulties were caused by the engine and propeller, a particular danger to people in the water.

3. The absence of an air pocket beneath the inverted hull was a surprise to the instructor, and was the main reason why the emergency pack could not be recovered. Because RIBs rarely invert, this mechanism might not come to the notice of most users. However, by making the RIB sit deep in the water, this did result in the inverted RIB providing a good stable platform for the survivors.

Case 24 What Boat?

Narrative

A yacht was under full sail on a starboard tack, and was being set to port by a strong cross-tide. Her two occupants were maintaining a lookout from the cockpit, and failed to see a small anchored angling boat, which was obscured by the sails and towards which the yacht was crabbing.

The yacht collided with the angling boat and then fouled her rudder on the boat's anchor rope, which subsequently had to be let go to free the yacht.

The Lessons

1. Collision avoidance relies on a proper lookout being maintained. Avoiding action will not be taken unless a risk of collision has been identified, and a risk of collision will not be determined unless the situation has been fully appraised in accordance with Rule 5 of the Collision Regulations.

2. When sails, or other obstructions, make it difficult to maintain a lookout in the normal way, Rule 2(a) makes it clear that those charged with keeping a lookout must take any necessary precautions to ensure their obligations are fully met. In other words, just as in a car, a "blindspot" is no excuse!

Appendix A

Preliminary examinations started in the period 01/03/04 - 30/06/04
A preliminary examination identifies the causes and circumstances of an accident to see if it meets the criteria required to warrant an investigation, which will culminate in a publicly available report

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
28/02/04	*Atlantic D*	Fishing vessel	UK	137	Personal injury
09/03/04	*Golden West*	Fishing vessel	UK	11.11	Flooding
14/03/04	*Sabre of Newquay*	Fishing vessel	UK	9.91	Flooding
16/03/04	*Jubilee Quest* *Linda Buck*	Fishing vessel Dry cargo	UK Cyprus	178 2295	Near Miss
05/04/04	*Barmouth dory*	Pleasure craft	UK		Capsize
22/04/04	*Hoomoss*	General cargo	UK	794	Personal injury
26/04/04	*Kingfisher*	Fishing vessel	UK	12.07	Fire
03/05/04	*Orient* *Supidana*	Fishing vessel General cargo	UK Denmark	5.66 1109	Collision
10/05/04	*Julian Paul*	Fishing vessel	UK.	29.35	Grounding
15/05/04	*Lord Nelson*	Sailing training	UK	368	Contact
03/06/04	*Atillio Levoli*	Chemical tanker	Italy	4450	Grounding
03/06/04	*Pinnochio*	Pleasure craft	UK		Personal injury
20/06/04	*Waverley*	Passenger vessel	UK	693	Grounding
21/06/04	*Hyundai Dominion* *Sky Hope*	Dry cargo Dry cargo	UK Hong Kong	74373 6899	Collision

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Investigations started in the period 01/03/04-30/06/04

Date of Accident	Name of Vessel	Type of Vessel	Flag	Size	Type of Accident
05/03/04	*Elegance*	Fishing vessel	UK	357	Fire
06/03/04	*Ocean Rose* *Reno*	Fishing vessel Chemical tanker	UK Portugal	40.45 2238	Collision
21/03/04	*Dart 8*	Dry cargo	Bermuda	22748	Personal injury

02/05/04	*Star Clipper*	Passenger vessel	UK	60.7	Personal injury

Appendix B - Reports issued in 2004 in the period 01/03/04 - 30/06/04

Breakaway 5 - capsize of *Breakaway 5*, River Bure, Norfolk on 19 July 2003 Published 12 February 2004

Donald Redford - investigation of the aggregates dredger *Donald Redford* colliding with Hythe Pier, Southampton Water on 1 November 2003 Published 6 May 2004

Elhanan T - flooding and foundering of the fishing vessel *Elhanan T* on 14 August 2003 Published 4 March 2004

Loch Ryan - swamping of unnamed cabin cruiser in Lady Bay on Loch Ryan, 3 September 2003, and associated wave generation issues Published 22 April 2004

Loch Ryan - swamping and foundering of a 4.6m grp open sports boat, with the loss of three lives, on Loch Ryan south-west Scotland 12 July 2003 Published 22 April 2004

Trident VI - investigation of grounding of the inter-island passenger vessel *Trident VI* in Percée Passage, off Herm Island near Guernsey in the Channel Islands 23 August 2003 Published 30 January 2004

Annual Report 2003	Published June 2004
Leisure Craft Safety Digest	Published January2004
Safety Digest 1/2004	Published April 2004

A full list of all publications available from the MAIB can be found on our website at www.maib.gov.uk