Marine Accident Investigation Branch (MAIB) - Safety Digest 02/2001

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MARINE ACCIDENT INVESTIGATION BRANCH

The Marine Accident Investigation Branch (MAIB) is an independent part of the Department for Transport, Local Government and the Regions, and is completely separate from the Maritime and Coastguard Agency (MCA). The Chief Inspector of Marine Accidents is responsible to the Secretary of State for Transport, Local Government and the Regions. 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 that 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.

The Safety Digest is only available from the Department for Transport, Local Government and the Regions, and can be obtained by applying to the MAIB. Other publications are available from The Stationery Office and the DTLR Publications Sale Centre, Unit 21, Goldthorpe Industrial Estate, Goldthorpe, Rotherham, S63 9BL (Tel: 01709 891318)

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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.

GLOSSARY OF TERMS AND ABBREVIATIONS

AB

Able Seaman

CCTV

Closed Circuit Television

CPA

Closest Point of Approach

DGPS

Differential Global Positioning System

ECDIS

Electronic Chart Display and Information System

ECR

Engine Control Room

EPIRB

Emergency Position Indicating Radio Beacon

GPS

Global Positioning System

IMDG

International Maritime Dangerous Goods Code

MCA

Maritime and Coastguard Agency

MGN

Marine Guidance Notice

PEC

Pilotage Exemption Certificate

RIB

Rigid Inflatable Boat

Ro-Ro

Roll-on, roll-off

SCBA

Self-contained Breathing Apparatus

SFIA

Sea Fish Industry Authority

TSS

Traffic Separation Scheme

UTC

Universal Time Co-ordinated

VHF

Very High Frequency

INTRODUCTION

A feature of accident investigation is the number of times a particular word will appear in conversation or writing.

I have in the past drawn attention to the number of times the word assume has featured in reports. Somebody in a stand-on vessel will assume the other ship was going to give way, or assume a gangway was properly secured, or the breathing apparatus was properly recharged after the last exercise. In each case such assumptions were unduly optimistic; the give way vessel failed to do so, the gangway collapsed while someone was crossing it and the BA set was empty when it was needed to fight a real fire.

The lessons are obvious. Dont assume. Good seamanship is all about anticipating the worst and doing something about it. It involves checking, double-checking and spotting the problem before it occurs. Accident prevention is infinitely better than sorting out the mess afterwards.

The word if is another word to appear regularly. People involved in accidents will often reflect on what has happened by saying If only

If only I had checked the valve was shut If only I had not been distracted by. If only I kept an eye on If only, if only, if only. It is perhaps the sentiment most frequently expressed by people who have been involved in an accident. Interestingly, very few ever seem to say, If only I had followed the regulations.

There isnt a seafarer afloat that doesnt complain about the number of regulations, rules, procedures and bylaws that have to be adhered to. They do, of course, play an important part in ensuring safety at sea, but even rigid adherence doesnt necessarily prevent the accident. Safety at sea is a product of training, professionalism, experience and an instinctive feel for when something isnt right. Safety breaks down when people dont know what to do, take a short-cut, are badly distracted, are too tired or are trying to do too much at once. It also breaks down when the seafarer forgets how accidents are caused.

Accidents rarely occur because of a single event; they are invariably the product of several things coming together in a certain sequence. In short, a chain of events, often unconnected, causes an accident and all that is needed to prevent it is for the sequence to be broken.

Very often it need be no more than a simple check or a routine action. It could be the process of thinking through the implications of a certain course of action, or comparing one source of information against another. It can be broken by being honest with yourself: by calling for help when you dont know how to do something or cant do it by yourself. Above all, common sense prevents accidents.

It is far better to prevent the accident than to be in the position of saying If only .. after the event. Accidents can be expensive, time consuming, commercially damaging, very painful and sometimes tragic. Dont let them happen.

John Lang
Chief Inspector of Marine Accidents
August 2001

PART 1 - MERCHANT VESSEL

Earlier this year the MAIB published Safety Study 1/2001, more usually referred to by its title *Review of Lifeboat and Launching Systems Accidents*. It makes sober reading.

The study was carried out following receipt of a number of reports from UK-registered vessels revealing that people were being injured or killed while using lifeboats during training exercises or when testing them. This prompted the MAIB to carry out an in-depth analysis to identify the reasons why. A root cause in many of the accidents was an over complicated design of launch system and its component parts. It also found that personnel handling lifeboats faced many risks.

The seafarer has no control over the design of the lifeboat launching system on board his ship, but he can reduce the risk of an accident by conscientious equipment maintenance, operation and training. The review identified that training, repair and maintenance procedures fell short of what was necessary.

As a seafarer you have an interest in the lifeboats on board your own vessel. You may not necessarily be involved in their maintenance, but you could be involved in using one. How well prepared are you? Are you aware of any shortfall in your knowledge and if so, what do you intend doing about it? How familiar are you with your lifeboats and launch systems? Try a self test. Have you ever sat in a lifeboat while it was being lowered? And if so, did you know what to do with your hands?

At face value these are two very simple questions. If the answer to the first question is no, and you dont know the answer to the second, you may well be one of the many people at sea who could do with some refresher training. You might have been told what to do but, unless you have actually tried it yourself, the chances are that you will have forgotten some crucial feature of the drill or may be unfamiliar with the equipment fitted. Dont be shy in admitting it. It is far better to find out now and do something about it, than be caught out when it really matters.

Try a different approach. Do you have confidence in the lifeboat system in your ship? You may well have heard ominous reports about people being injured or even killed when using them, or you may have looked at your lifeboat and seen the bilge keel grab rails corroding away. You could, as a result, be mildly apprehensive about getting into one. It is however, essential, that you have that confidence which only comes with familiarity in how to use them correctly and the knowledge they are correctly maintained and looked after.

If push comes to shove (metaphorically speaking of course) and you have to use the lifeboats, you will be banking on three things: it will function as designed, it wont kill anyone in the process, and you wont let anyone down by not knowing what to do.

If the ship is sinking beneath you, or the heat from the fire is getting a trifle warm, it is probable you will be preoccupied with the problem of the moment. It is not the time to take a crash course in lifesaving equipment, to understand how to deploy it or how to use the lifeboats. If you have that uncomfortable feeling you need further training, do something about it. Now.

CASE 1
Lights Out!!

Narrative

Pride of Dover was on the 1945 passage from Calais to Dover when, at 2027, the fire alarm sounded. It indicated a fire in the machinery spaces.

The second engineer, on watch in the engine control room (ECR), saw the picture on the CCTV monitor covering the upper auxiliary engine room, turn grey to the extent it obscured any detail. On opening the ECR door to that space he was confronted by a blast of heat and zero visibility.

The Hi-Fog fire-extinguishing system was operated above Nos 2 and 3 generators, while the fuel shut-off system was operated for Nos 2, 3, and 4 generators. No 1 generator was already isolated and under repair.

The engineers alarm was sounded, the bridge informed and damage control groups assembled. At 2030 the vessel blacked out, causing the automatic emergency battery power system to activate. The emergency generator started automatically, but the breaker failed to engage with the emergency switchboard.

By 2036 visibility in the auxiliary machinery space had improved to such an extent that the chief engineer was able to advise the bridge that no fire could be seen from the ECR door.

A control team wearing self-contained breathing apparatus (SCBA) sets entered the auxiliary engine room to open the fuel shut-off line to No 4 generator. While there they found, and isolated, a broken high temperature cooling water outlet bellows on No 3 generator. The fire detection system was operating because steam was escaping from the broken bellows. There was no fire.

At 2040, No 4 generator was started to enable power to be restored, including that supplying the emergency switchboard. Because so much cooling water had been lost through the broken bellows, it took 30 minutes for the system to be refilled and the main engines restarted. The vessel was then able to resume her passage to Dover where she arrived at 2149. Once alongside, tests were carried out on the switchboard automation. No abnormalities were found and all the auto systems worked as intended.

The bellow failure followed other incidents over the years. In 1996, the quality and type were changed from a nylon-reinforced material to Purbunan material with wire reinforcing. Following a further failure in 1998, it was decided to upgrade it to an EPDM material with wire reinforcing. This new type of bellows is suitable for continuous use in a cooling water system at 100°C at a pressure of 4.5 bar with a suggested life of 5 years. At the time of the incident, these were being fitted according to the planned maintenance schedule.

An in-depth investigation failed to find a satisfactory explanation as to why the emergency generator breaker did not engage but, as a precaution to prevent it happening again, the generator card in the control system was changed and all relays and auxiliary contacts renewed. The breaker itself was also overhauled. Since then, the system has worked well and the emergency generator has always come on-line on demand.

THE LESSONS

1. During the emergency, an electrical officer was sent to the emergency generator room to place the generator on the switchboard. At the same time, attempts were being made to restore main power in the engine control room. Senior staff then realised that the two actions could lead to simultaneous engagement with resultant damage to the switchboard. Their concern was that manual engagement would override the electrical interlock. In the event, this didnt happen.

2. The need to consider abnormal operating procedures to meet a particular situation will arise from time to time. Unless those responsible for authorising them are fully conversant with the system, the chances of aggravating the situation further will be reduced if a check is made of both electrical circuitry and the system before any action is initiated. Better a short delay and get it right, than a rapid response and get it wrong.

3. A key feature of any emergency response team is that its members are familiar with the spaces they are about to enter. The emergency may not necessarily be the standard fire so often practised in drills. Choosing the most suitable people to lead SCBA teams deserves careful thought. Use qualified engineers to lead the engine room team.

4. Engineers reading this narrative will ponder the 30-minute delay in restoring main engine power while the cooling water was restored. In the event, the vessel was in safe water throughout. Next time a lee shore could be featuring as an unwelcome distraction to the old man on the bridge.

5. This particular company now requires a strategic reserve of six tonnes of fresh water to be held in the cooling water drain tank.

FOOTNOTE

This incident had a satisfactory ending. The ships staff were familiar with the routines for emergencies, and practised them regularly. It paid off.

But this incident demonstrated something else. It revealed how different the real thing can be to the training drill. It also demonstrated how important it is to take training seriously and to examine current safety procedures regularly.

Emergencies have a nasty habit of highlighting holes or concerns in what were thought to be safe procedures. The better trained people are, the more likely they are to cope with the unexpected.

CASE 2
Grounding of a Container Feeder

Narrative

The 2,481gt container feeder vessel *Coastal Bay* sailed from Dublin on the evening of 20 July 2000 for passage to Liverpool via The Skerries TSS.

The weather was fine, the sea calm, and traffic density light.

Shortly before 2300, the chief officer relieved the master on the bridge. He felt fine and alert. He was alone on the bridge, the bridge watch alarm was switched off, the ship was in autopilot, and navigation was being monitored on a DGPS plotter. About 30 minutes later the chief officer fell asleep. A planned course alteration due at 2350, taking the vessel into the north-east bound lane of the TSS, was missed, and the vessel ran aground in Church Bay, Anglesey at 0020.

She was later refloated. Damage to the hull was minimal. (Had she gone aground a few yards to either the left or right, it would have been far more serious.)

THE LESSONS

1. Vessels engaged in the short-sea trade invariably run to tight schedules. Passages can be rough. Port calls are frequent, cargo work has to be supervised, ships business attended to, and the never-ending army of port officials and surveyors have to be accommodated. The master has no say in the number of watchkeepers he has and with, so often, only two on board, the opportunities to take adequate rest are limited. It is no surprise, therefore, that many of those entrusted with the safe navigation become tired and run the risk of falling asleep, albeit briefly, while on watch. Fortunately, this does not always result in a fate similar to *Coastal Bay*s. Most bridge watchkeepers recognise the risk and take precautions to either reduce their chances of falling asleep, or ensure they are woken quickly, if they do.

2. The watch alarm is one way of ensuring that someone who falls asleep inadvertently is woken. But as many have found, it can be extremely annoying and there are few things more irritating than having to stop what you are doing to cancel the watch alarm at regular intervals. If you are busy with watchkeeping duties and the alarm distracts you from these, your frustration is understandable. If, however, it stems from the inconvenience of having to get up from a chair, and your solution is to turn the alarm off completely, dont.

A watch alarm wont stop you from falling asleep, but it should wake you up in time to save embarrassment, or worse.

3. Even when feeling alert it only takes a second for a watchkeeper to fall asleep, especially when he is comfortable and has little to do. By avoiding sitting down for long periods and remaining active, a watchkeeper can considerably reduce his chances of falling asleep.

4. An additional lookout at night is not only required by STCW 95, he is also company for the bridge watchkeeper. He may not be able to stop a very tired watchkeeper from falling asleep, but he should always be aware of the risk and do something to wake him in sufficient time to prevent a serious incident.

5. Navigation alerts, such as DGPS cross-track and waypoint alarms, are excellent tools to assist a watchkeeper who is awake, but due to their volume and frequency, they cannot be relied upon to wake up the one who is asleep.

6. The number of bridge watchkeepers allocated to a particular vessel must be carefully calculated, bearing in mind the opportunities for sleep afforded by a vessels schedule, and the need to comply fully with STCW 95.

FOOTNOTE

The owner was subsequently charged by the MCA under Section 100 of the Merchant Shipping Act 1995 for failing to ensure the safe operation of its vessel. It was fined £20,000 and ordered to pay £6,106 costs.

CASE 3
Ferry Grounds due to Shortfall in Bridge Team Management

Narrative

European Pioneer, a ro-ro cargo ferry, ran aground on a sandbank while departing Fleetwood in the early hours of the morning of 1 December 2000. She had 103 units of cargo and 57 passengers on board. She was only superficially damaged, and there was no pollution. She remained stranded over one tide, and was subsequently able to continue her passage.

European Pioneer runs a regular daily service between Fleetwood and Larne, together with two other similar vessels. At the time of the grounding the master, the chief officer, a seaman lookout and the bosun as helmsman manned her bridge. The master had the con. Both the master and the chief officer held a PEC for the port. The weather and visibility were good.

The approach to Fleetwood is a very narrow channel between drying sandbanks, which demands accurate navigation. The channel is buoyed. The bridge team was following a familiar passage plan which involved the master conning the vessel from the bridge front window by eye. The chief officer was operating the engine controls according to the masters instructions. It was the normal role of the duty second officer to monitor the navigation using radar parallel index techniques, and to advise the master accordingly. However, on departure from the berth the second officer had duties at a mooring station and no one monitored the radar in his absence.

A navigational mistake occurred before the second officer had taken up his duty on the bridge. A critical buoy was unlit which caused the master to underestimate a turn. By the time the mistake was noticed it was too late to correct it.

THE LESSONS

1. In pilotage waters, another competent navigator should, at all times, monitor the actions of the person with the con.

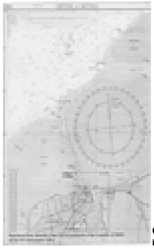
2. Bridge team management should be arranged to prevent a situation where a navigational error by one individual can remain undetected long enough to allow an accident to happen. In very confined waters the bridge management team should be particularly sensitive to this factor.

3. Never assume a buoy is in position and lit. Always cater for the unexpected.

DISCUSSION POINT

The question is asked whether the outcome would have been any different had the second officer been on the bridge and closed up on the radar on departure from the berth? Although it is tempting to be positive, there is a niggling suspicion that had he been there, the accident might still have happened.

Was there a flaw in the bridge team organisation? Only the company, the master and senior ship staff are in a position to judge what the best organisation should be for a given vessel on a particular route. Only they know the personnel involved, and will understand their skills and proficiencies, strengths and weaknesses, and to an extent this will dictate how people are used.

Select the thumbnail to view the accompanying chart (144KB)

The most difficult job, conning the vessel, is usually left to the most experienced person, the master. The least demanding, reporting any lights is allocated to the lookout.

The job of standing by the combinator, and monitoring the rudder indicator was, in *European Pioneer*, left to the chief officer; a master mariner and PEC holder. The officer on the radar had not personally set up the index lines, and wasnt there at the start of the channel transit. The bosun was on the wheel and, quite rightly, in hand steering. The arrangement was entirely conventional and made the most of a limited number of people. Or did it?

Apart from the obvious void created by not having the second officer on the bridge from the outset, the arrangement did not cover the most commonly found situation in many accidents investigated by the MAIB: someone in a position to stand back and absorb the overall situation. In the event of anything going wrong, that person will be in a position to identify it immediately, and initiate whatever action is necessary to prevent an accident. It can be argued that the person conning the vessel, usually the master, is already fulfilling this function. But this fails to recognise the psychology of someone already under pressure, and the limitations this imposes.

Man has a large capacity for sensing information, but his decision-making ability is confined to a single channel and is very vulnerable to overloading. When stress is high, such as not seeing an important navigation mark when expected, there is a tendency to concentrate on a single stimulus to the exclusion of other imperatives. In this particular accident, the moment the master failed to see No 16 buoy his mind was entirely focused on finding it to navigate safely. This was totally natural. For a few seconds he ignored his other priority, making sure the ship stayed safe; which is not quite the same thing.

In short, anyone conning a vessel and suddenly confronted by an unexpected situation, will invariably narrow his focus of attention on that problem and start overlooking other things. If that person is the master there is a natural tendency in such situations for the other members of a bridge team to follow the example being set.

Suppose, for a moment, the situation had been different and the chief officer or even the second officer had been conning the vessel with the master standing back. When No 16 buoy was seen as expected, the reaction would have probably been much the same, the conning officer would have posed exactly the same question: Where was it? This time however, there is every prospect the master, no longer being quite so personally involved, would have instinctively known it was necessary to keep coming round to port, and would have called for supporting information while the chief officer or second officer continued to look for the buoy.

If the chief officer had the con, who in the circumstances would man the combinator controls? The answer is: anyone who was sufficiently intelligent, reliable and capable of being trained. It could even be the seaman allocated lookout duties? Or is there someone else on board who could be trained? And as for monitoring the rudder indicator, this should be the person conning the vessel or, failing that, the master. If the conning officer cannot see the rudder indicator from where he stands, then there may be a flaw with the bridge design.

Navigation monitoring must clearly be the responsibility of a deck officer but, once again, the circumstances will dictate the solution. Does it have to be radar-based? Parallel indexing in a very narrow channel isnt that easy. Would a DGPS-based system, perhaps using ECDIS in a future design be more reliable?

None of these suggestions are being proposed as solutions, but it shows how fresh thinking on an old problem can be used to review an existing arrangement. Whatever such a review throws up, it must have one objective: to provide an effective system the next time the channel is navigated in the middle of the night and a key buoy is either unlit, or perhaps more difficult, dangerously out of position.

CASE 4
One Bad Practice Leads to Another

Narrative

The 425gt oil rig safety stand-by vessel *Grampian City* was on passage in the north sea to take up standby duties at the brae platform. At 0410 the main engine suffered a crankcase explosion. The machinery space filled with fumes and oil mist, which activated the fire alarm system. The watchkeeping engineer officer stopped the main engine and left the engine room immediately.

The second and chief engineer re-entered the fume-filled engine room. Satisfied that no fire existed, they started the auxiliary generator and machinery space exhaust-fan to remove the remaining fumes. They left the engine room to wait for the main engine to cool down and for all fumes to be extracted. Alerted by the alarm, a fire and BA party mustered, but was stood-down by the master after he had consulted with the chief engineer. The coastguard was informed, and the vessel returned to Aberdeen using the auxiliary Aquamaster drive.

The check for damage revealed the crankcase doors on nos 2 and 4 cylinders in a bank were bowed, and their rocker arm cover joints blown out. Testing of the crankcase relief devices proved satisfactory. No 5 cylinder bottom end bearing had failed, with indications of severe heating, and no 6 crankshaft main bearing shell had turned in its housing to restrict the flow of oil to no 5 bottom end bearing.

In determining the cause or causes, the main engines recent history was examined. This revealed it had recently suffered an over speed, following clutch disengagement. It also transpired that after some maintenance had been carried out, and prior to sailing, there had been cooling water problems during main engine trials. The jacket water temperature had increased, with eventual loss of fresh cooling water pressure, which led in turn, to the main engine being shut down. Although the trials were successful, it was decided to restrict the propeller pitch to 50% for the remainder of the tour of duty.

The owner concluded that the following reasons caused No 5 bottom end bearing to turn in its housing:

1. The fuel pump settings were incorrect, resulting in engine imbalance.

2. Previous over speed of the engine.

3. Lubricating oil pump being stopped immediately after stopping the engine on several occasions, causing an unnecessary build-up of heat in the bearing and journal.

The cause of the crankcase explosion was found to be the overheating of No 5 bottom end bearing as a consequence of No 6 main bearing turning in its housing and starving the bottom end of oil.

THE LESSONS

1. The business of locating the seat of a possible fire in a smoke-filled compartment should be left to the fire-fighting team, which should be properly trained to react rapidly and effectively. The temptation by senior officers to enter any smoke-filled compartment without being properly equipped with fire suits, fire-fighting equipment, and breathing apparatus should be resisted as this puts them in unnecessary danger.

2. Adjustments made to engine high-pressure fuel pumps should be very small, and should be recorded accurately. If not done, it may be impossible to stop the engine completely when required. For this reason large adjustments to balance exhaust temperatures should be avoided. The cause of any imbalance should be investigated further.

3. Normally, engine cooling pumps should be left running for a while after the engine has stopped to allow for gradual cooling of bearings and other hot surfaces. This reduces the possibility of pick-up when the engine is restarted.

CASE 5
"Blinded" by the Sun!

Narrative

Fast Cat Shanklin, a high-speed ferry, was approaching her berth in Portsmouth. As the master turned the vessel to starboard, he was blinded by the sun and lost sight of the pier. Realising the danger of continuing with his intended manoeuvre, he put the engines to full astern and the helm hard to port in an attempt to swing the bow away from the pier. Unfortunately, his action was too late to prevent a collision. Although some damage was sustained to the vessel, nobody was injured.

THE LESSONS

1. This was a new vessel following a new planned approach to the berth. The bridge team had never experienced blinding problems before. When assessing the risks and formulating a plan of approach, environmental factors such as wind and tide are routinely taken into account. However, it is evident from this accident that there are circumstances, such as manoeuvring in restricted waters, when the effect of the suns direction and altitude should also feature in the plan.

2. The master was blinded by the sun despite wearing sunglasses. In an attempt to prevent a recurrence of the accident, the operator has since fitted sun visors. Although not recommended for continuous use, the availability of sun visors can be advantageous in certain circumstances.

3. Sunglasses come in all shapes and sizes. If using them while in charge of a vessel at sea, invest in quality with an anti-glare capability.

CASE 6
A Crossing Situation is a Crossing Situation - TSS or not!

Narrative

Bytom, a 3,127gt bulk carrier, was proceeding in the south-west lane of the Dover Strait traffic separation scheme (TSS). The wind was southwest force 5 and the visibility range was between 2 and 3 miles.

Alexa, a 42,307gt container vessel, was crossing the TSS, having informed Dover Coastguard of her intention to do so. At about 0818 (UTC), she altered course to approximately 340°, before entering the south-west lane. Shortly after 0824, she altered course to about 010°. In the meantime *Bytom* was closing from the north. Having assessed *Bytom*s CPA as 0.75 mile astern, *Alexa*s master decided to maintain his course and speed and pass ahead of her. He attempted to communicate his intention to *Bytom* by VHF radio.

Bytom, which had been monitoring *Alexa* by radar, sighted her on his port bow at a range of 2.5 miles, and determined that a risk of collision existed. At 0827, *Bytom*s master attempted to communicate with *Alexa* without success, and shortly afterwards reduced speed.

At 1030, *Alexa* crossed ahead of *Bytom* at a range of about 0.5 mile.

THE LESSONS

1. Rule 10 of the Collision Regulations requires a vessel to avoid crossing traffic lanes but, if obliged to do so, to cross on a heading as nearly as practicable at right angles to the general direction of traffic flow.

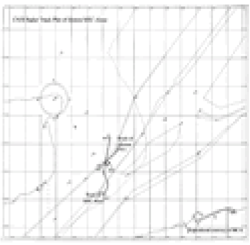
***Alexa*s heading of approximately 340° was reasonable, but her subsequent alteration of course to about 010° was not. Not only was it contrary to Rule 10, but it also resulted in an unnecessary risk of collision with *Bytom*.**

Although the report to Dover Coastguard of *Alexa*s intention to cross the south-west lane was prudent, it should in no way have been construed as a licence to deviate from the requirements of the Collision Regulations.

In accordance with Rule 15, *Alexa* was required to keep out of the way of *Bytom*. Although her master had interpreted *Bytom*s CPA as 0.75 mile astern, he recognised that a dangerous situation existed. Once he saw how small the other vessel was in comparison to his own, and realised how limited the available sea room was, he considered that *Bytom* should take avoiding action. He therefore stood-on.

Unable to communicate his intention to the bulk carrier, *Alexa*s master maintained course and speed on the assumption that *Bytom* would recognise his intention and take avoiding action. This was an unseamanlike, and potentially very dangerous, assumption.

Although Rule 2 of the Collision Regulations requires seafarers to have due regard to any special circumstances, including the limitations of the vessels involved, which may make a departure from the Rules necessary to avoid immediate danger, it should be used only in exceptional cases, and then with extreme caution. It should certainly not be relied upon without clear justification.

 Select the thumbnail to view the accompanying chart (66KB)

***Alexa*s master attempted to communicate his intention to *Bytom* by VHF radio, without success. Similarly, *Bytom*s master attempted to communicate with *Alexa* when he, too, became concerned with the situation. The failure to establish communications in such situations is all too familiar.**

3. There is an enormous temptation to resolve perceived Rule of Road ambiguities by establishing VHF communications with the other ship. Those having charge of vessels in such situations must be extremely careful before they resort to such methods. Many collisions or near misses have occurred because of uncertainties about the identification of the other ship, or the interpretation of messages received. Valuable time can often be wasted in attempting to make contact on VHF radio instead of complying with the requirements of the Collision Regulations. Unless there are no doubts at all about who you are talking to, and you are equally certain that the other person knows who you are and where, the safest option is to abide by the rules in good time, and with due regard to the observance of good seamanship.

4. If you are the stand-on vessel, never assume the give-way vessel on your port bow is going to oblige, especially if nothing has happened by the time the range has closed to 2 1/2 miles.

FOOTNOTE

Marine Guidance Note (MGN) 27 (M+F), which was issued by the MCA in August 1997, highlights the dangers in using VHF radio in collision avoidance. The note concludes with the advice:

> *Although the practice of using VHF radio as a collision avoidance aid may be resorted to on occasion, especially in pilotage waters, the risks described in this Note should be clearly understood and the Collision Regulations complied with.*

CASE 7
Overheated Diesel

Narrative

On 2 November 2000 the 25,031gt motor-driven container vessel *Queensland Star*, was about to sail from Wellington, New Zealand. During her time in port some repairs had been carried out on the generator fuel cooling system which necessitated the generators to operate on diesel fuel. She sailed at 0613 and, with the cooling water systems back in use, the generator fuel system had been switched back to heavy fuel oil.

Three diesel generators were running, and a fourth was on stand-by. The fuel was being supplied through a seastar blender and filters. About 20 minutes after leaving, one of the fuel filters on the blender became blocked. The second filter was brought into the system but this, too, suffered the same fate. With no fuel getting through the blender, the generators showed signs of fuel starvation.

At 0629 the master was warned of the developing electrical problems, and started to reduce speed. The chief officer went forward to prepare for anchoring, while the third officer remained on the bridge. As each generator started to slow down in turn, the electrical load shifted to the next, until all electrical power was lost at 0635.

Without electrical power, both the main engines, steering and all other controls failed. The vessel was still doing about 11 knots and starting to sheer towards shoal water. In an attempt to slow the vessel so she could anchor safely, the port anchor was let go to three shackles. The brake was applied. The starboard anchor was then let go, but the brake was unable to stop the cable running out, with the result that both anchor and cable were lost and the brake lining burnt out.

At 0636, both main engines became available and the way was taken off.

Although an auto-start emergency generator was fitted, it failed to function due to the failure of a low voltage air start solenoid. On the fuel changeover, the diesel oil remaining in the system was subjected to heating, with the result that on entering the filters, the lighter fractions flashed off causing the filters to gas up. As each filter became blocked with gaseous fuel, discharge to the generator fuel pumps slowed down. This in turn caused the generators to slow, tripping the breakers off the main switchboard under low voltage.

THE LESSONS

A total loss of electrical power is serious at any time, but in restricted waters, it has the potential to create a major accident. It can result in damage to the vessel, injury, or loss of life to the crew and passengers, and serious environmental damage/ contamination. This accident highlights a number of important points.

1. Fuel starvation
On completion of any maintenance or repair work to an essential system, it is important that the system involved is not only checked initially for correct operation, but is monitored closely over the next few hours. If possible, operate the system for a few hours before leaving port. CHECKS at this stage could prevent problems at a later stage.

Heating any fuel oil results in the lighter fractions being released into a gaseous state. If the fuel system uses both heavy fuel oil and diesel oil, be certain:

a. That the vessel is clear of the port or any restricted navigational areas before changing it over, or;

b. That any diesel oil has passed through the system before stand-by is rung for departure.

As an added precaution, this vessel now operates one generator exclusively on diesel oil during standby situations.

2. Emergency power
Emergency generators are just that they MUST be able to start on demand when everything else fails. Those responsible for them must periodically test the complete emergency system, including any automatic starting arrangements. If necessary consider arranging for daily checks of the power supply and control circuitry.

3. On board communication
Power failures have the ability to frustrate all normal communications. In exercises, communications are invariably available and ships staff assume that in an emergency they will function as normal. Such an assumption may be over optimistic. In this incident they did not.

When trying to cope with an emergency, slow or difficult communications increases stress levels among the crew. It is good practice during any exercise of emergency procedure to TEST the communication systems under electrical black out conditions. If you can function WITHOUT normal communications being available, you are prepared for anything.

4. Passage Planning
When planning a passage, account has to be taken of a variety of factors, including the reliability of the propulsion and steering systems. Normally one can be confident they will function as designed, but even in the best maintained vessels, failures can, and do, occur.

If there are known problems do not assume 100% integrity. In coastal or restricted waters the margins of safety can be critical. With limited time and space in which to take corrective action, it is important that no operational action is undertaken which might result in machinery failure or malfunction.

Changing from diesel fuel to heavy oil when still in stand-by conditions, or in confined waters, is not a sensible action. Think and plan ahead either change over before departure, or after full away has been rung. Such a precaution minimises the risk of machinery failure due to fuel system problems.

5. Emergency speed reductions No two ships are the same, and individual masters will be aware of the capabilities and limitations of their own vessel and equipment. Taking the way off in a hurry, when propulsion and steering has broken down, is one of those nightmare scenarios that you always dread being quizzed about by the examiner. Letting go sufficient cable to allow the anchor to reach the bottom will effectively reduce a ships headway in an emergency. The flukes cannot dig into the ground and the anchor acts as a dredge. If too much cable is let out there is a risk the anchor will bite and, if the headway is still too much, the brakes are unlikely to hold. The prospect of losing both anchor and cable is high.

It is also necessary to keep well clear of the cable as it runs out. An unrestrained cable is frightening, very noisy and extremely dangerous.

The loss of an anchor cable, when set against the potential damage of grounding is relatively modest, particularly when the chances of it being retrieved are good.

6. Contingency planning
PLAN AHEAD!

One of the oldest practices in the book is to ask yourself what you would do if, as either the engineer officer of the watch, or the person in charge on the bridge, something goes badly wrong at the most inconvenient time..such as suddenly losing electrical power?

And what will YOU do when electrical power is suddenly restored?

In what order should YOU restart engineering systems?

And how much cable would you let out if you HAD to reduce headway in a hurry?

THINK PLAN REHEARSE!

FOOTNOTE

The starboard anchor and cable were later recovered and refitted in the vessel.

The company has recognised the problem of potential communication failure and placed six portable VHF sets on board.

CASE 8
A New Meaning to Smoking in the Toilets

Narrative

On the morning of 13 December 2000, the ro-ro *Stena Explorer*, had almost completed a passage from Holyhead and was entering the port limits of Dun Laoghaire.

Four contractors were renewing the deck covering in a toilet space which served a passenger area. A permit to work had been issued, but no risk assessment had been made.

The single access door was kept closed to prevent adhesive fumes entering the passenger accommodation. The spaces normal ventilation system was working. Adhesive was being spread over the new vinyl floor covering and the deck. A heat gun was also being used to warm the vinyl to increase its flexibility.

When the heat gun was no longer needed, it was switched off and placed on the deck. The adhesive on the deck ignited immediately.

The four men evacuated the compartment; one threw a jacket over the fire, and raised the alarm. Another found a fire extinguisher and returned to tackle the fire. However, he returned to find the sprinkler and fire alarm system had activated. Crew members had also arrived by this time. Except for the area of the adhesives container, the fire had been extinguished by the sprinkler system.

Heat and smoke damaged some panels and fittings, but there were no injuries.

THE LESSONS

1. Before work starts, it is important that there is liaison between ships staff and contractors to identify hazards, and decide whether a risk assessment is necessary for the planned tasks.

2. If unacceptable levels of risk are identified by the assessment, efforts should be made to reduce the risk. If this is not immediately possible, consideration should be given to postponing the work.

3. In this case, it might have been advisable to delay the work until passengers were off the vessel, and arrangements could be made for better ventilation.

CASE 9
Steering Gear Failure

Narrative

In the early hours of the morning, and while on passage to Catania, Sicily in the Mediterranean, the passenger ship *Caronia* experienced loss of control of the steering gear. The nearest land was 15 miles away, and the nearest ship 5 miles.

The vessel was stopped for an initial investigation. This determined that neither of the two DC Ward-Leonard set motors coupled to the common worm drive input shaft of the gearbox, and driving the feed screw for the main hydraulic pump stroke control floating lever, would turn.

It was thought initially that the cause was a seized bearing in one of these motors. The motors and gearbox were de-clutched from the feed screw to enable the steering gear to be operated by local hand control with the helmsmen following orders from the bridge. The passage was resumed with the steering in hand control, and the vessel docked at Catania with little delay.

The motors were found to be free when disconnected from the gearbox, but the gearbox would not turn. Although not conclusive, the cause of this temporary seizure appeared to be the float on the crown wheel, due to incorrect shimming. This would allow the crown wheel and worm to eventually separate and seize. Once cleaned, new bearings fitted and correctly adjusted, the steering system worked correctly.

No record could be found of the last time the gearbox was checked or overhauled.

THE LESSONS

1. Although infrequent, steering failures usually occur at the most inconvenient times. This incident occurred when there was plenty of sea room available and no other ship close enough to be embarrassed by what happened. It can never be assumed it will always be that way, and every effort should be made to ensure the emergency steering arrangements work effectively when required. Every bit as much attention should be given to making sure the system works as any other item of essential equipment.

2. This crew reacted well to discover which part of the steering had failed. A team that has no idea how to check what part of the system might be affected (including the indication circuitry rather than the main system), is not well placed to react to a critical failure that may need remedial action being taken very rapidly. In many instances the failure will have no impact whatsoever. It only becomes an emergency when nobody knows what to do, or the vessel is in danger of being involved in a situation such as a collision or grounding.

3. The crew should have ready access to operating and change-over instructions for emergency steering systems. They should practise them regularly, and no less often than other safety systems.

4. It is important that maintenance records are accurate and kept up to date for the information of staff in the future. Because of the importance attached to having a reliable steering system, any defect, no matter how small or insignificant, should be fully investigated and the causes identified. The more widespread the findings are known, the more reliable the system is likely to become.

CASE 10
Automatic Chaos

Narrative

P&O Nedlloyd Southampton, an 80,942gt container vessel, was in the eastern Mediterranean on passage towards the Suez Canal. As she approached Port Said, preparations for transiting the canal were being made.

The fire and general service pumps on this vessel are fitted with automatic valves, together with an integrated control circuit linked to essential services. The first engineer, having closed the seawater valves, and switched off the circuit breaker for the aft fire and general service pump, told the petty officer engineering to remove and clean the pump filter. The petty officer disconnected the air control lines to the automatic valves on the pump, opened the strainer vent, and started to remove the strainer cover of the forward pump. Although this pump was set to operate in the general service mode, it was neither pressurised, nor in service, thereby allowing the cover to be removed without causing a flood.

The first engineer, on seeing that the wrong strainer had been opened, decided to play safe by isolating the pump by switching off the circuit breaker. The petty officer had in the meantime removed, and was cleaning, the filter basket.

Without warning, water suddenly surged into the strainer, and from there into the engine room with such force that neither the petty officer nor the first engineer were able to replace the strainer cover. The bilges began to fill. Realising things were getting out of hand, the chief engineer was called and the bridge informed.

Main engine speed was reduced to half ahead while the engine room emergency bilge suction valve was opened. The aft fire and general service pump was started with the pump discharging to the deck wash line. This reduced the pressure of the inrushing water on the strainer of the forward fire and general service pump and allowed the strainer cover to be replaced and tightened down.

With the flooding now under control, the emergency bilge suction was closed, and the remainder of the bilge water removed through the oily water separator.

During the 15 minutes the emergency bilge suction was in use, both the suction and the overboard discharge were monitored visually. No oil discharge was seen.

The subsequent investigation found that the control system was so designed that on removal/ failure of the circuit breaker for the pump, the pump valves automatically changed over to fire duty, opening up to allow direct sea suction. The first engineer was unaware of this automatic action, and had assumed the flooding was due to a failure of the sea inlet valve.

THE LESSONS

This incident highlights the importance of thoroughly understanding machinery you are about to work on, and the system to which it is connected. In this case the chief engineer solved the immediate problem by applying practical common sense.

1. If your vessel is fitted with automatic valves, study the system that controls them. Look for any safety features, interlocks, or alarms and check they are still operational. If disconnected

or switched off, find out why. Check labels and guidance notes for accuracy and clarity. Drawings and manufacturers manuals are usually available if in any doubt ASK!

2. When instructing staff, always make sure they understand what you are asking them to do. If you have any doubt, insist on being called when they are ready to undo the first nut so that you can check they are working on the correct part before they start.

3. With electrical isolators often some distance from the item of machinery you are about to start work on, always check it is the correct one. There is an old saying: MEASURE TWICE, CUT ONCE! It is good advice. For safety sake, follow it.

FOOTNOTE

This incident happened at sea. Had the incident occurred in harbour, the port and pollution authorities would not have been happy with engine room water being pumped overboard, no matter how clean it was.

CASE 11
Control Failure on Small Ro-Ro Ferry

Narrative

Loch Tarbert, a small inter-island ro-ro passenger ferry operates between Portavadie and Tarbert, Loch Fyne. She is propelled by two Voith propulsion units, one forward and one aft; each driven by its own engine.

Preparing for service on 7 November 2000, the generator was started, followed by both propulsion engines. The aft main one was started successfully but, because the forward batteries had insufficient charge, the forward engine had to be started using jump leads from the aft battery.

Routine pre-operational checks were carried out but, before the main steering controls were tested, the electrical supply was changed from emergency batteries to main power. (The system was designed for auto emergency battery connection on failure of main power.) While the chargehand tested the steering controls, the motorman checked the hydraulic controls for the ramps. Following a successful test, the ferry started work for the day. Her outbound passage from Tarbert to Portavadie was uneventful.

Just before she arrived back at Tarbert slipway on the return trip, the motorman was given permission to disconnect the emergency batteries to replace a dead cell with a new one. He did so, but found the connecting bridge for the cell was too short. On arrival, he went ashore to the nearest garage to get a longer connecting bridge. The other crewman also left the vessel to get stores and some small change, while the chargehand remained on board. There were no passengers or vehicles on board.

About 4 to 5 minutes later an alarm sounded, showing main electrical power had been lost on main steering control. Despite accepting the alarm, the chargehand was unable to restore main power. He changed over to emergency power and regained control. Shortly afterwards the alarm sounded again, this time for the forward main engine. On this occasion he was unable to cancel it and the stern began to slew to starboard. He attempted to correct the movement by using the aft unit but, once again, the controls failed. He tried to restore both main and emergency power, but neither would engage. Unable to do anything further, he allowed the vessel to slew until it settled against the shore. He then called the harbourmaster with the request that he contact his two crew and tell them to return on board immediately.

With the vessel now lying at about a 90° angle to the slip, the chargehand tried to shut down the forward main engine so that his crew could board over the ramp. The engine failed to respond.

With the vessel now moving slowly along the beach, the motorman finally managed to get onboard through the car deck gate, assisted by the chargehand who had left the bridge to help him. Once aboard, the motorman went to the engine room where he found the emergency battery charger switch had tripped. He reset it and went to the bridge to assist the chargehand.

With control regained on the aft unit, it centred, but the forward unit remained in the ahead power position. Its throttle was pulled right back, whereupon the bow began to slew to port, bringing the stern even closer to the beach. The motorman raised the ramp to enable the vessel to move ahead, while the chargehand attempted to use the aft unit to drive her into deeper water. While doing so two bangs were heard from aft. She had touched bottom.

The vessel made her way somewhat erratically back to Columba Pier where she was finally secured alongside.

The chargehand then instructed the motorman to reconnect the emergency batteries so that main control could be restored. The motorman reported that oil had been lost from the aft unit, which suggested the unit had been damaged while getting off the beach.

Before the vessel was allowed to return to her berth, the harbourmaster asked that manoeuvring trials be carried out. These were carried out successfully, albeit at reduced power due to the loss of oil in the aft unit.

On approaching the berth, and when still about 75m from it, the engine room alarm sounded and the forward main engine shut down. An investigation revealed the forward main engine emergency stop solenoid was smoking and overheating. Using the aft engine, the chargehand brought the vessel alongside and shut down the engine.

The vessel was also checked for water ingress following the grounding, but none was found.

An examination showed no significant damage to the hull, but some to the aft Voith unit. Three blades had minor damage; the fourth was badly bent and distorted. It had displaced the blade seal, allowing loss of oil and seawater to enter the hub.

A technical investigation found that:

Forward ME:	Batteries showing minimum charge
	Engine-driven charging alternator not working
	Independent diesel generator not in use
	Battery charger not working due to fault (fuse blown)
	Stop solenoid burnt out.
Aft ME:	Batteries charged, all charging systems working.

Emergency battery charges not working (fuse blown).

The reason for the control failure requires a very brief explanation of how the system works. The emergency batteries feed the steering controls in the wheelhouse, with each engine battery feeding the emergency steering for its main engine alone. With minimum charge in the forward battery, and the emergency batteries disconnected, steering control was slowly lost on the forward main engine unit.

Main engine power was, however, available throughout as the throttle control is mechanically linked to the wheelhouse. The crew had received no training on the control and operating system.

The company subsequently recommended that:

- A warning notice should be placed on the main battery box lid to advise that the batteries should not be disconnected unless the vessel is securely moored alongside.
- A meter should be fitted to monitor the output from the engine-driven alternators.
- A meter or alarm be fitted to the output side of the battery chargers to detect fuse failure.
- An alarm should be fitted to the wheelhouse voltmeter.
- A review of the daily maintenance checklists be carried out.
- Clear and simple instructions on critical ship systems be added to the vessel operating instructions.
- Maintenance work on critical ship systems be carried out using a permit to work arrangement.
- Improvements are made to crew training and vessel induction courses when vessels relocated.

THE LESSONS

This incident illustrates how a relatively simple and straightforward operation can fall apart when the monitoring of routine tasks becomes lax. To quote an old maxim: familiarity breeds contempt.

1. If a new vessel is introduced into a service, or staff are required to handle a vessel that has been in use elsewhere within the company, DO NOT ASSUME the crew can operate her with the minimum of training. A qualification is one thing, experience is another!

2. Simple, one line diagrams, together with concise and explicit guidance or instructions, are essential when facing an emergency. Place or fix them at or near control stations so that they are readily available.

3. The level of instrumentation and alarm system should reflect the capability of the crew do not expect crew members to cope with situations they are not trained to deal with.

CASE 12
Who Should Check the Lashings?

Narrative

The ro-ro vessel *Neptunia* had left Boulogne for Folkestone with 50 people on board. Despite several attempts, heavy seas prevented her from entering harbour. Rolling caused one or more drums of trimethylacetyl chloride to fall from a pallet loaded on to a flat deck trailer on the upper deck. The drums split in the fall, and the contents started to spread over the deck; releasing toxic fumes which irritated eyes and lungs.

The ferry returned to Boulogne.

The pallets were not properly secured to the trailer, and the drums were only lashed around themselves. They had not been secured to the pallet.

THE LESSONS

1. Trimethylacetyl chloride is a flammable liquid with a flash point of 19°C. It reacts with water evolving hydrogen chloride, a corrosive gas apparent as white fumes. In the presence of moisture, trimethylacetyl chloride is corrosive to most metals, and its vapour irritates mucous membranes ie nose, eyes and lungs.

2. Special requirements for the carriage of such a substance are laid down in the *International Maritime Dangerous Goods* (IMDG) Code.

The Code requires that harmful substances shall be properly stowed and secured, to minimise the hazards to the marine environment without impairing the safety of the ship and persons onboard. Transport by road, rail and sea can be particularly hazardous, and shippers must ensure that loads are secured correctly using lashings that will withstand leakage of the chemical in the event of spillage.

3. Often trailer loads are undercover, so the loading officer cannot always see that they are not properly secured. It is unreasonable to expect the officer to stop and check every covered vehicle.

However, if the loading officer notices any unusual bulge in the cover, the vehicle must be checked.

4. On open flat deck trailers, the loading officer will be able to see whether the load is properly lashed. If not, he or she has a duty not to accept the trailer for loading and/or have it removed from the ship.

5. *The Code of Practice, Safety of Loads on Vehicles, gives advice on securing of drums on flat bed trailers. Drums standing on end must use lashings to prevent lateral movement. Further, cross lashings must be applied; if on their sides, the drums should have at least one cross lashing for each item. If there is more than one layer, the rear-most drum must be restrained by lashing, or blocking, against rearward motion.**

CASE 13
Costly Transfers!

Narrative (1)

Mv Drumsand, a small passenger ferry working out of Hound Point Marine Terminal, River Forth, South Queensferry, was engaged in transferring crew members to and from the terminal to various vessels off the port. The weather at the time was generally good with moderate sea conditions and low wind speeds.

At about 1100 on 8 November 2000 mv *Drumsand*, having picked up a crewman for the tug *Hopeton*, had secured alongside while he boarded. With the transfer completed, one of the *Drumsand*s crew went to release one of the mooring ropes. This mooring line was made fast to a cleat mounted on top of the tugs rubbing strake, which was about 80mm higher than open deck of the ferry. Although standing behind the safety rail, to reach and release the mooring rope the crewman moved his right leg outboard of the rail. While in this position both vessels rolled together under the influence of the weather causing the tug rubbing strake to bear down on the open deck of *Drumsand*. In the process the crewmans leg became trapped between the rubbing strake of the tug and deck of *Drumsand* causing a fracture of the lower leg.

Narrative (2)

The tug *Willem-B*, together with bottom dump barges R8 and R9, had been engaged in dredging operations within Emsworth Harbour. The usual operation was for the barge to be loaded with dredging spoil in the yacht harbour, moved into the outer harbour, and then hipped on to *Willem-B*. The tug and barge then move out of the harbour into the Solent where the barge is released from the hipped position and towed astern of the tug. During the tow, no personnel are on board the barge. On arrival at the dumping ground, the tug moves alongside the barge and the bargeman transfers to the barge. Once on board, he makes preparations to open the bottom doors and dump the spoil.

On this occasion, the force three wind and a 1.5 metre swell were causing both tug and barge to adopt a rolling action. At about 0115 the bargeman stepped over the gunwale and stood on the rubbing strake of the tug while waiting for a suitable opportunity to step on to the barge. While standing there, the tug and barge rolled towards each other crushing the bargeman between the tug and the barge. The tug deckhand, who was standing inboard of the tug gunwale, immediately grabbed the injured man and placed him on the deck of the barge, shouting to the tug master what had happened. The tug master, after confirming what had happened, called the coastguard, telling them of the accident and asking for assistance.

Despite considerable attention by both lifeboat crew and a helicopter paramedic, the casualty died on the way to hospital.

THE LESSONS

In both these accidents, the crewman either placed himself, or was placed, in a position which was inherently unsafe. The object of the gunwale or handrail is to either prevent people moving outboard, or to give protection to people inside from outside forces. Ignoring or bypassing safety features built in to a vessel is dangerous and can, as happened in the second case, prove fatal.

1. NEVER EVER stand outboard of the gunwale on the rubbing strake unless you have an open escape route immediately behind you.

2. ALWAYS BUT ALWAYS keep your feet or hands inboard of any hand or guard rail when approaching another vessel, pier, or jetty. The wash from other vessels or the reflective wave from your own vessel can cause rolling with potentially dangerous results.

3. If you are operating or managing a vessel on which frequent boarding operations are carried out, carry out a RISK ASSESSMENT and confirm that the boarding procedure is safe and agreed by both the master/seaman operating the vessel and the company safety officer. The *Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997*, SI No 2962 provides the statutory framework for risk assessment and MGN 20 (M + F) contains some useful guidance.

Transfer between two vessels at sea is inherently dangerous, and for that reason, the whole question of a safe and reliable transfer procedure MUST be thoroughly examined.

PART 2 - FISHING VESSELS

There was a very high number of fishing vessel founderings during the year 2000. The saving grace was that very few people lost their lives as a result.

Whenever a trend develops, the MAIB tries to identify why. One can, of course, draw almost any conclusion from statistics to meet a particular viewpoint, but two features stand out. The first is the continuing failure of bilge alarms to provide adequate warning that flooding is taking place, and the second is the number of times that those on board find themselves in a situation they are unable to cope with.

We have referred to bilge alarms before. We make no apologies for returning to the same point again and again. One of the most basic checks to be made before going to sea is to ensure it is functioning correctly. If it has been landed for repair and you are sailing without it, or it has been disconnected for some reason, or there is a defect and you havent done anything about it, the chances of receiving adequate notice of flooding are reduced significantly. It matters.

If the vessel then sinks you may well be saying farewell to your livelihood. Some people may start asking awkward questions, the paperwork becomes a nightmare and, worst of all, somebody may get killed. Dont let any of these possibilities happen. Your aim is to make sure flooding doesnt occur in the first place and, if it does, be sure you know what to do about it. The more notice you have of flooding, the greater the prospect of a satisfactory outcome. **Make sure the bilge alarm is working correctly before sailing. Test it regularly once at sea.**

If flooding is detected hopefully very soon after it starts the first priority is to stop or contain it. Bilge pumps can help keep the vessel afloat until either she reaches port, or assistance arrives, but they dont stop the water coming in. Flooding is bad news. It gets in through the hull, broken or corroded pipework, or via a broken or faulty valve. Your aim is to stop that flooding and save the vessel and all on board her.

Knowing your craft is the first step, understanding the nature of flooding is the second. You should have a very good knowledge of all sea openings, where they are and how far below the waterline they are positioned. And remember, the deeper the source of flooding and the bigger the hole, the faster the rate at which the water enters.

The second priority must be to contain the area of flooding. Watertight bulkheads go a long way to achieving this, but the question any crew might reasonably ask is how watertight are the bulkheads?

No two vessels are the same, but every crew should have given very careful thought to how they might deal with a flooding incident, should it arise. Asking the coastguard to provide another pump might help, but the important thing is to stop the water coming in. As quickly as possible.

CASE 14
Fatal Accident while Shooting Pots

Narrative

The 11.19m potting vessel *Dunan Star* was shooting for dog whelks 1.5 miles south-west of the Isle of Arran, when one of the two people on board became entangled in the back rope of a fleet of pots and was dragged over the side. He was not wearing a lifejacket.

The other man on board, the skipper, heard his colleagues shouts and rushed forward to put the engines full astern in an attempt to reduce the weight on the back rope. He also grabbed a knife, but by this time the crewman had been dragged over the side and was nowhere to be seen. The weight of the fishing gear had pulled him under the water.

The skipper then grabbed the next pot, jammed it under the gunwale and cut it from the back rope. This created more slack, and enabled him to get the backrope into the hauler and start heaving.

He then managed to heave the crewman back to the surface; still caught up in the backrope. He cut away a pot that was roped against the crewmans leg, but this led to more weight coming on to pull him back under the water.

Once again the skipper heaved on the hauler until the crewman reappeared, but by now the boat had drifted through the effects of the wind and tide and the victim was being pulled away from the boat.He also had some of the back rope around his chest and arms. The skipper, who could not reach the bight of rope around the crewmans leg, cut some of the rope around his chest in an effort to relieve the strain on his upper body.

Having done so, however, the skipper was left holding the rope that led to the hauler. The deckhand was dragged underwater once again. He was not seen alive again.

The skipper contacted the coastguard immediately. A helicopter and lifeboat were tasked, and a short time later, with the help of the lifeboat crew the body of the deckhand was recovered. He was still entangled in the fleet of pots.

THE LESSONS

1. This is a horrific situation that no fisherman would ever wish to be in. The majority of potting vessel crews are well aware of the hazards involved when shooting pots, and take care to avoid them. Too often, however, accidents happen. By far the most common occurs when shooting pots, and involves somebody getting caught in a bight of back rope. Pay particular attention to keeping your feet out of the bights of back rope.

2. If the deck space allows, try adopting an alternative system whereby the back rope is detached from the pots and stored independently. When shooting, the rope is then physically separated from the crew. Information on the system is available from the Sea Fish Industry Authority (SFIA).

3. There is no means of telling whether a lifejacket would have helped save a life in this situation. What can be said with confidence is that his chances of survival, however slim, would have increased had he been wearing one. Always wear a workingtype lifejacket when on deck. You never know when you might depend on it.

4. Seeing a colleague being dragged over the side is a nightmare scenario. Several things have to happen at once, including taking the way off the boat. With the passing of each second the victims chances of survival diminish. The greatest effort must be to free, almost certainly by cutting, the rope outboard of the body. This frees the weight pulling the body down, but before it can even be contemplated, it is essential to reverse the shooting process and start hauling.

5. If, as must be hoped, the victim is back on the surface and still alive, an altogether new problem emerges. How do you get him back on board? Every skipper should ask himself that particular question and answer it!

CASE 15
Upside Down Louvres

Narrative

At about 0100 on 8 October 2000, the 29m, July 2000-built, fishing vessel *Crystal River* was fishing about 85 miles west of Bergen, Norway. A gale force 8 was blowing; the sea was moderate to rough. The gear had just been shot with the crew working the fish when there was a sudden total loss of electrical power. On entering the engine room, one of the crew found the switchboard on fire. Grabbing the adjacent fire extinguisher he managed to put it out. The resultant damage to the switchboard prevented main electrical power being restored. All propulsive power was lost.

Without propulsion, *Crystal River* lay with the wind and weather on the quarter. Water, which had collected at the stern, ran forward into the fish hopper area. Without hydraulic power, the crew was unable to close the stern trawl doors tightly enough to prevent further seas coming inboard.

With water slowly building up on the fish deck, it started to slosh about on deck and she took on a list to port. Realising the potential danger, the skipper instructed the crew to cut away the fishing gear. The situation deteriorated further as the water on the fish deck found its way through the hatch into the fish room below. To add to the confusion, fish bins broke loose and started to roll about on deck.

With the gear cut away, the amount of water coming through the trawl doors reduced. At the same time the vessels motion eased as the water on deck downflooded into the fish room below. This made it much easier for the crew to move about. Although a small portable generator and a salvage pump were carried, the volume of water sloshing about on deck was beyond its capacity to cope.

The skipper contacted the oil rig *Paul B Lloyd Jr*, whose watchkeepers contacted the coastguard. A Norwegian coastguard cutter stood by until the fishing vessel *Fertile* arrived to take *Crystal River* in tow to Lerwick, where she arrived at 0745 the following morning.

Although it was the fire on the main switchboard that started this unfortunate chain of events, the initiating cause was water leaking into the internals of the board, causing a shortcircuit between adjacent busbars. The source of the water was thought to be from the engine room ventilation fans, which were found to have their inlet vent louvres fixed upside down. This allowed water to feed into the fan. Not only did this permit unwanted moisture to pass into the engine room, but also allowed water to drip on to the switchboard. The shaft generator was also found to be wet from salt water.

THE LESSONS

1. Check the fitting of fan louvres to see they are preventing, rather than encouraging, water to pass through them.

2. Always ensure the switchboard is fitted with a sufficiently large top cover to prevent water entering from above. It should also be capable of deflecting it away from any electrical equipment or connections.

3. Check that all watertight hatches and doors can be securely closed, not only when hydraulic power is available, but also by hand hydraulic methods.

4. Free surface effects brought about by loose water sloshing around on deck can rapidly change an uncomfortable situation into a highly dangerous one. Water will enter fish decks at some point, and adequate deck drainage arrangements must be fitted to cope with this ingress.

5. Equipment fitted on the fish deck, and indeed in all spaces, MUST be securely fixed to the deck or the structure. If it has to be portable, then make sure that in rough weather it can be anchored securely to part of the structure. Loose items of equipment can cause injury or worse.

6. The installation of an emergency generator, capable of providing sufficient power to run necessary main engine auxiliary plant under emergency conditions, would have enabled the vessel to regain some control of the situation. Engine-driven stand-by pumps avoid this problem.

***Crystal River*s skipper was well aware of the dangerous effects of free surface water and the need to get rid of both top weight, and water, sloshing around in the hold.**

FOOTNOTE

Under ideal design conditions, ventilation trunking and piping systems should be routed well away from switchboards. If space restrictions make this unavoidable, NO joints in either system must be positioned above the switchboard.

Switchboards should not be installed close to, or under, hatches or other openings through which water might come.

CASE 16
Attention to Safety Saves Lives

Narrative

Penrose, an 8.94m (29.5ft) long wooden vessel was fishing for pilchards near St Michaels Mount in Cornwall on the night of 16 December 1999. The wind was force 4 to 5 and, although it was overcast, visibility was 20 miles.

The fishing was good and *Penrose* was heavily loaded. The weather worsened, and the vessel was swamped by a couple of waves which wouldnt clear the deck. It is possible flooding of the lower spaces took place. The skipper advised the coastguard by VHF radio that he was taking on water. Although no flooding could be identified, the vessel started to list shortly after the radio call was made. By now the radio had stopped working, so the skipper used a mobile phone to call his agent, who relayed their distress to the coastguard.

Although the vessel was not required to have a liferaft, one was fitted. It was deployed manually, and the crew of three evacuated. Distress flares were activated, and were seen by a coastguard officer in Penzance. Some members of the public also saw the flares, but did not think they were of any importance. The Penlee lifeboat rescued the crew.

Penrose capsized and foundered.

The three fishermen had all attended the basic survival at sea course, and found this training to be a great help.

THE LESSONS

1. Although the boat was lost, readers of the narrative will notice that every item of safety equipment worked when needed. This is as it should be.

2. The owner of the vessel paid particular attention to safety. Although *Penrose* was not required to carry a liferaft, one was carried and it might well have saved the lives of three men. Had one not been carried, the crew would almost certainly have found themselves in a rough sea on a winters night. Survival times in such conditions are measured in minutes.

3. All fishermen should attend the three basic safety training courses. The training that this crew received on the sea survival course paid dividends during this incident. Other accidents have shown that training in first-aid and fire-fighting can also save lives.

4. Flares are required, so make sure they are carried on board. Anyone who sees a flare should report it to the coastguard.

5. If you get into difficulties, follow this skippers example tell the coastguard. It is there to help you and the more information you can pass, the better able it is to assist.

6. A mobile phone is acceptable as a back-up means of communication. If you have one, take it with you when you go fishing. Under normal circumstances distress messages should always be transmitted by radio but, should this not prove possible, a mobile phone call may well be the difference between life and death.

FOOTNOTE

The Fishing Vessel Code of Practice for the Safety of Small Fishing Vessels under 12m in length, came into force on 1 April 2001. Because of the colour of the paper it is printed on (pink), it is known as The Pink Code and has a single aim: to raise the safety awareness of those involved with the construction, operation and maintenance of fishing vessels with a registered length of less than 12m.

If you take the Code seriously and comply with the various requirements, there is every prospect you will never need to put its lifesaving components to the test. And if the worst comes to the worst and something does go badly wrong, there is every chance you will survive just like the crew of *Penrose*.

CASE 17
Engine Room Flooding Leads to Loss of Vessel

Narrative

The 21.09m Banffregistered fishing vessel *Annandale* was fishing 16 miles NNE of the Shetland Islands when her engine room started to flood.

It was not discovered in the early stages; both skipper and crew were busy working on deck clearing the gear that had become foul. When the skipper eventually returned to the wheelhouse he was alerted to a problem by a gearbox low oil warning light.

On entering the engine room he discovered it had flooded to about 1.7m above the bilge level and was already half way up the main engine casing. The engine room bilge alarm had failed to operate.

The skipper attempted to close the seacocks, but was unsure whether his actions had been successful. In the event, it seems he failed to reduce the ingress of water. No attempt was made to use the auxiliary or the hand bilge pump.

The mate, who had already organised the crew in preparing a liferaft, managed to contact a nearby fishing vessel and request assistance. In response, the other vessel began to haul her gear.

Shetland Coastguard also intercepted the call and offered assistance by arranging pumps to be flown out. It was estimated they could be on scene within 20-25 minutes. The offer was, however, rejected on the grounds that it would be too late to prevent her from sinking before the rescue services could arrive on scene.

Because he was worried that *Annandale* might sink before help arrived, her skipper started to head towards the other vessel about four miles away.

For the second time Shetland Coastguard offered to assist by flying out pumps but, once again, the skipper refused on the same grounds as before.

When *Annandale* was still about one mile from the other vessel her main engine stopped. The water level had now reached the top of the main engine casing and was beginning to enter the aft cabin space. The other vessel closed her, and the decision was made to transfer *Annandale*s crew. Before executing the transfer, a previously made up towline was passed across.

Once the crew was safely on board the rescuer, *Annandale* was taken in tow. About 30 minutes later, and some 2 1/2 hours after the flooding was first discovered, she sank.

THE LESSONS

1. As so often happens, the precise cause of the flooding cannot be determined. It is an all too familiar story, and there could be any number of explanations. The main lessons in this instance are not so much to learn from initiating causes, but with what happened after the flooding started.

2. One of the main reasons why *Annandale* sank is that it took so long for the flooding to be discovered. Had those on board been aware of what was happening in the first few minutes, there is every prospect the sinking could have been averted. Fishing boats are designed, and maintained, to keep water out. If this fails, the crews overriding responsibility is to detect flooding with the minimum of delay and contain it.

3. There are various reasons why the flooding wasnt detected for so long (post-event calculations point to it having been in the order of three hours before anyone realised what was happening). There was, for instance, nobody in the wheelhouse for some three hours. Leaving it unattended for such long periods is bad practice. Quite apart from the obligations to maintain a good lookout, it meant nobody was in a position to respond rapidly to any alarm; no matter how triggered.

4. The bilge alarm failed. Once again it is not known why, but the number of times the MAIB receives reports of flooding in vessels where the high-level bilge alarm did not function is very worrying indeed. The most common reasons are a lack of inspection and inadequate maintenance. The lessons are all too obvious: always ensure high-level bilge alarms are easily accessible, are inspected and maintained on a regular basis, tested regularly and switched on.

5. Once flooding has started, skippers face a major damage control predicament. Several things need to happen more or less simultaneously: identify the source, isolate it if at all possible, start the pumps, alert the authorities, initiate damage control procedures and anticipate having to use the lifesaving equipment. All this is much easier to achieve if the crew have anticipated such a possibility and been trained to cope with it. The chances of a successful recovery are greatly increased if the rate of water ingress can be stemmed. Remember that the further below the waterline the point of entry, the faster the water comes in.

6. Get the auxiliary and hand bilge pumps and, indeed, any other pump, into use as soon as possible. The deeper the vessel settles, the greater the rate of ingress.

7. Seek, but dont necessarily rely on, outside help. The rescue services will do what they can to provide high capacity salvage pumps and, unless there are exceptional circumstances to do otherwise, accept the offers of help.

8. Listen to coastguard advice. While your flooding incident may be the first you have encountered, coastguards accumulate wide experience in reacting to such predicaments.

9. You never know when you might have to use your lifesaving equipment. Make sure you are confident in your ability to use it.

10. By far and away the best way of avoiding such a situation is to prevent it happening in the first place. Many flooding incidents occur because of faulty pipework. Dont let it happen to you. Time, effort and resources spent on maintaining sea water service pipework and associated valves will greatly reduce the need for you to put some of these lessons to the test.

CASE 18
Defective Bilge Alarms Lead to the Loss of two Large Vessels

Case 1:

Wistaria II, a 22.04m (72ft) long wooden vessel was trawling about 4 miles to the south east of the island of Barra on the morning of 26 October 2000. The wind was about force 6 with a 3 to 4 metre swell.

The first indication that something was wrong, was when the electrics cut out. The man on watch went into the engine room and discovered floodwater about 0.5m (1.5ft) above the floor plates. The bilge alarm in the engine room had not activated.

The skipper was called whereupon he instructed the crew to prepare to abandon ship. He alerted a nearby fishing vessel, which relayed their distress to the coastguard. The skipper then entered the engine room and started a bilge pump. Because the floodwater was too deep he was unable to shut the seacocks. By now the rest of the crew had already taken to the liferafts. The floodwater continued to build up, and when the deck edge started to dip below the waterline, the crew urged the skipper to evacuate. He did so.

The fishing vessel *Three Sisters* and the Barra lifeboat rescued the crew. *Wistaria II* sank during the afternoon.

Case 2:

Esha Ness, a 24.31m (80ft) long steel vessel was trawling about 60 miles south east of the Sumburgh Head on the morning of 4 November 2000. The wind was about force 4 with a slight swell.

Floodwater was first found in the cabin. The skipper thought this had probably come from the engine room, so he opened the door to this space and found it was half full of water. The engine room bilge alarm had not sounded.

The skipper went to the wheelhouse and sent a distress message to Shetland Coastguard, before returning to the engine room to try and see what was wrong. The seacocks were all submerged by that time, so couldnt be turned off. The vessel was fitted with electric bilge pumps, but these couldnt be used as the floodwater had disabled the electrics.

The skipper asked the coastguard for a helicopter to bring portable pumps to *Esha Ness*, but the helicopter could not get there in time. Three crew evacuated the sinking vessel by climbing into a liferaft and were picked up by the fishing vessel *Evening Star*. A little later *Evening Star* came alongside to take off the skipper and mate.

Esha Ness sank soon afterwards.

THE LESSONS

1. These vessels were lost because their engine rooms flooded. Both skippers thought that the most likely source of this flooding was a burst pipe. No warning was provided by the bilge alarms fitted in these spaces.

2. Fishing vessel crews should be particularly vigilant about pipe corrosion, as this has been the main cause of flooding incidents. If a piece of pipe shows signs of corrosion it MUST be

replaced. It should only be repaired as a temporary measure. Once a pipe has corroded through in one place it is probably about to do the same in other places as well.

3. Seacocks should be readily accessible. Extended spindles should be fitted so that these valves can be closed in the event of flooding. This provides some insurance against burst pipes, because it enables the water to be cut off at source.

4. Bilge alarms are one thing; working bilge alarms are another. Had they worked on these vessels, it is likely that there would have been sufficient time to identify the source of the flooding, and make emergency repairs. Bilge alarms are inexpensive in relation to the cost of a large fishing vessel; fit good quality units, which are connected to wiring fitted inside protective conduit.

5. All the bilge alarms should be tested regularly. They are usually fitted in the engine room and the fish hold and, sometimes, in other spaces as well. As a minimum, testing should be undertaken before each fishing trip.

CASE 19
The Invisible Killer

Narrative

During the afternoon of 10 June 2000, preparations were being made for the 29m fishing vessel, *Mariama K FR242*, to leave Douarnenez, France.

One crewman was ashore, the skipper was resting and the engineer was, among other things, pumping out the engine room bilges using a portable petrol-driven pump within the engine room. Its engine exhausted directly into it. Hoses on the pump led into the bilge for suction, and up through the engine room emergency escape hatch, for discharge. This pump was being used because the vessels own power-driven bilge pumps were defective.

The pump had been running for well over an hour, without ventilation fans or any other machinery running, when the crewman returned from ashore. He went looking for the engineer 20 minutes later, and found him in the engine room, unconscious and slumped over the portable pump which was still running.

After stopping the pump and briefly attempting to revive the engineer, he called the skipper who also made similar efforts. These too were unsuccessful, and the emergency services were alerted from a telephone ashore.

The fire service, police and a doctor arrived, but none was able to revive the engineer. In their efforts a number of the emergency service personnel were seriously affected by the fumes in the engine room, as were the skipper and crewman.

The engineer was found to have been poisoned by carbon monoxide.

THE LESSONS

1. Portable pumps may be very useful; particularly in an emergency. This is shown by the number of incidents where these pumps are supplied by the coastguard to vessels having flooding problems. However, they should always be used with their engine exhausting into a wellventilated area.

2. Petrol gives off highly flammable fumes that are heavier than air. Therefore, using a petrol engine within an engine room runs the risk of explosive fumes accumulating in the bilges; particularly if ventilation is poor.

3. Carbon monoxide gas can be produced by any system which burns a fuel such as petrol or diesel. As it has no smell, it is a notoriously difficult gas to detect without instrumentation, and yet it is extremely poisonous. In this incident, even trained fire officers were unable to detect the presence of the gas without a meter.

4. Portable engine-driven pumps must be seen as for use in emergency conditions only. They should not be seen as a replacement for the vessels own power pumps.

CASE 20
Heavy Weather Damage in Sea Areas Rockall and Hebrides

Narrative

A number of fishing vessels have suffered heavy weather damage while fishing to the west of Scotland. Three such cases are the accidents involving *Aurora*, *Solstice II*, and *Audacious*, all of which are large well-found vessels.

Case 1:

Aurora, a 23.71m (78ft) long steel vessel was trawling to the south of Rockall on the afternoon of 4 May 1997. The weather was worsening with the wind increasing from force 7, to 9 or 10.

There had been a problem with the trawls, and the gear took longer to haul than normal. The vessel was beam on to the weather during this operation. Just before the port net was hauled, the skipper noticed a huge wave approaching. He was able to warn his crew, and three of them were able to hold on. The fourth could not, and was washed overboard.

The wave knocked *Aurora* on to her beam-ends, pushed in a bridge window and caused flooding. Some of the bridge equipment was damaged, and the vessel lost steerage. This made it impossible to come round and recover the man in the water. He wasnt wearing a lifejacket and was lost.

The wave also broke a sidescuttle in the mess on the starboard side. Additional flooding was caused by this broken glass, and also by water ingress through the open fish hatch. The crew was eventually able to restore power and steerage, and subsequently made it back to port, escorted by the fishing vessel *John Scott*.

Case 2:

Solstice II, a 40m (131ft) long steel trawler was to the north of the Hebrides on the afternoon of 30 November 1999. The wind was south westerly force 8 or 9 and the swell was about 10m.

She was steaming west towards the fishing grounds when she encountered a huge wave, which broke against the bridge front, breaching two windows. The skipper was knocked out of his chair and, once he had recovered, found himself waist deep in water, which he saw was draining down into the accommodation space. He managed to initiate a turn to take the vessel before the wind. During the turn the engine control failed, shutting down the main engine. This was caused by the floodwater, which had got into the electrics.

While the engineer tried to restart the engine, other crew members boarded up the two broken windows. After about 2 1/2 hours, the engine was restarted and the vessel was able to steam to Lochinver. However, *Solstice II* had to be escorted back to port, because the electrical failure had affected communication and navigation equipment. Initially the escort was provided by the fishing vessel *Claude Monier*, and then later by the coastguard vessel *Anglian Prince*.

Case 3:

Audacious, a 33.95m (111ft) long steel vessel was trawling to the north of Rockall early on the morning of 29 January 2000. The wind was westerly force 9 and the swell was about 4m.

The nets were being hauled while the vessel was steered into wind, making way at about 1 knot. The skipper was facing aft, overseeing the hauling operation, when he heard a cracking noise.

Almost immediately the bridge filled with water. He assumed a wave had hit the front of the vessel, smashing all seven bridge front windows.

This wave also initiated a large pitching motion, which caused *Audacious* to take water over her stern ramp, forcing the crew on deck to take cover behind the net drums. The water in the bridge downflooded to the accommodation. Just as the skipper was recovering himself the main engine stopped, and the lights went out. Shortly after, the emergency lights came on. After gathering the crew together the skipper issued instructions for boarding up the broken bridge windows. A distress was broadcast via Inmarsat and the EPIRB was activated, which summoned a Nimrod rescue aircraft. Communication was then established using a portable VHF radio. The Nimrod was able to contact other fishing vessels in the area. The main engine was restarted, but there was no way of properly steering Audacious. It was also found that most of her electrics had been disabled by the floodwater.

The fishing vessel *Grove* initially provided a tow, but after a while the fishing vessel *Solstice II* took over. The towrope to *Solstice II* parted twice, but *Audacious* eventually made it back to port.

THE LESSONS

1. Although there are no definite trends, it does appear that there are fewer quieter spells of weather, and strong westerly winds are becoming more predominant. Vessels like those above, which work the fishing grounds off Rockall, are particularly vulnerable to these winds.

2. If dedicated storm covers are not provided, materials that can be used to board up broken bridge windows should be available.

3. Skippers who fish near Rockall should be aware that the search and rescue helicopter based at Stornoway, will be operating at its extreme range if a rescue is required. In some cases, for instance if a large crew has to be evacuated, a helicopter rescue may not be possible. Rockall is a long way out into the Atlantic, if you fish out there take extra care.

4. A careful lookout should be kept at all times, especially in heavy weather conditions.

CASE 21
Corrosion Causes a Serious Flooding Incident

Narrative

Friendship, a 20 year old, 35m beam trawler, was fishing in the North Sea, some 180 miles northnorth- west of the Netherlands port of Den Helder.

The fish-handling system installed on board consists of a gutting trough forward under the whaleback, a conveyor system for handling the dirt and waste, a waste collecting tank underneath, and an overboard discharge trunk. Either side of the conveyor and gutting trough, are fish pounds, into which the contents of the cod ends are emptied. During the gutting operation, the deck wash sprays water over the fish pounds and the conveyor, to both clean the fish and to wash the debris overboard.

During the early morning of December 1, the cod ends had been swung inboard and the catch released into the pounds. With the deck wash operating, the crew started gutting. The fish waste was carried away as usual by the water from the deck wash. This process had been underway for some time when the crew discovered that the fish room had flooded.

The cause was found to be the accumulation of water in the conveyor system, which had leaked through the underside plating of the discharge trunk. This leakage was entirely due to heavy corrosion in the plating; it had allowed water to flood into the fish room rather than discharge overboard.

The amount of water in the fish room had reduced the freeboard to such an extent that the discharge trunk from the waste tank was submerged. This allowed backflooding to occur. Fortunately, the fish room bulkheads were, and remained, watertight. The vessels bilge pumping system was unable to cope, so the coastguards were informed at 0845 UTC, and were asked to arrange the delivery of a salvage pump.

A rescue helicopter from RAF Boulmer delivered a pump at about 1020 UTC, but the crew could not clear the fish room with this pump running as well as its own. Two larger pumps were obtained from the Netherlands and flown out to the vessel from Den Helder, arriving on board at 1630 UTC. By this time her sister vessel, *Enterprise* had closed and both vessels started to make slow progress towards the Netherlands at about 2 knots. Despite the assistance, *Friendship* was still unable to reduce the level of water in the fish hold.

By 0517 UTC on December 3, the salvage tug *Walker* was alongside and escorting *Friendship* at about 4.5 knots towards Delfzyl, where she arrived at 2145 UTC.

Pumping remained ineffective until a diver sealed the overboard discharge trunk from the waste tank. Once the trunk had been sealed, the water was pumped out. This raised the level of the trunk above the waterline. Only then could repairs to the trunk be started.

THE LESSONS

1. This incident graphically illustrates the importance of watertight bulkheads. Without them, this vessel would have been lost.

2. This was yet another incident when the bilge alarm in the fish room was not working. Had it been, this incident would not have developed into such a serious situation. Safety devices

are fitted to save your life, check that they work correctly all the time. If they dont, both vessel and crew might be lost.

3. Although this discharge trunk is normally above the waterline, it had no isolating valve fitted. Once the vessels freeboard had been reduced, there was no way the inlet could be sealed. Look at your own vessel and see if similar hull openings exist. If so, think what you could, or should do to prevent something similar happening.

4. This problem stemmed from excess corrosion in the discharge trunk. The next time it happens, the crew may not be so lucky. Learn from this experience; test the overboard discharge trunk to ensure its thickness has not been reduced by corrosion. If it has, do something about it before going to sea.

CASE 22
Container Ship and Fishing Vessel Meet in Fog!

Narrative

The fishing vessel *Carhelmar* was beam trawling. Gulf Bridge, a 29,872gt container ship was on passage, making good a course and speed of 065° and 18.7 knots respectively.

Carhelmar trawled in an easterly direction initially, and then turned southerly. The visibility was reasonable and the sea was slight. It was dark, and the skipper saw the masthead lights and port sidelight of *Gulf Bridge* about 2 miles to the west. While he remained visible to the oncoming ship, the skipper decided to turn to starboard with the tide and continue around to the north, assessing that his substantial manoeuvre would make his intentions clear.

Immediately before, or during, the turning manoeuvre, *Carhelmar* crossed ahead of *Gulf Bridge*. Having settled on a northerly heading, the fishing vessels skipper looked at the radar display, and assessed from the echo trail of *Gulf Bridge* that she would pass clear astern of him. He then switched on the deck lights and started hauling the main warps. By this time dense fog had closed in. C*arhelmar* maintained her northerly heading and speed of about 2.5 knots. The skipper continued to monitor the echo trail of the oncoming ship and, realising the bearing remained steady, became increasingly concerned.

The same sentiments were being echoed on board *Gulf Bridge*. When it became evident from the radars on board the container ship the fishing vessel had turned around and that a collision was imminent, avoiding action was taken by altering course to starboard first, and then to port, in an attempt to clear the fishing vessels stern.

As *Carhelmar*s skipper was about to activate the crew alarm, the bow of *Gulf Bridge* carried away the starboard warp, with consequential damage to both vessel and gear.

Following the accident, *Carhelmar* informed the coastguard that she had been struck, and damaged, by another vessel. *Gulf Bridge* denied striking the fishing vessel, but admitted passing very close to her.

THE LESSONS

1. This accident resulted primarily from assumptions made on both vessels:

- ***Gulf Bridge* assumed *Carhelmar* would maintain her original course and speed.**
- ***Carhelmar*s skipper assumed his manoeuvre had been seen by *Gulf Bridge* and that his intentions had been clearly conveyed.**
- ***Carhelmar*s skipper assumed from his initial observation of the other vessels lights that she would pass clear to the south.**
- **Until immediately before the encounter, *Carhelmar*s skipper assumed, from his monitoring of the other vessels radar echo trail, that she would continue to pass to the south.**

Rule 7(c) of the Collision Regulations is particularly relevant in stating:

Assumptions shall not be made on the basis of scanty information, especially scanty radar information.

2. Rules 5, 6, 7 and 19 of the Collision Regulations are also relevant in that:

- ***Gulf Bridge* should have systematically monitored the radar echo of *Carhelmar* and adjusted her speed to the extent that she could reduce it to a minimum when it became apparent that a close quarters situation could not be avoided.**
- ***Carhelmar*s skipper should have plotted the radar echo of *Gulf Bridge* so as to make a full appraisal of the situation, and of the risk of collision before turning his vessel around and, again, before starting to haul his gear. He was unaware that his vessel had crossed *Gulf Bridge*s bow.**

3. On sighting or detecting another vessel at sea, watchkeepers can do one of two things: they can either make a careful assessment about what the other vessel does until she is past and clear, or they can assume it. The common denominator with virtually all collisions is that the person in charge of at least one of, if not both, the ships involved has made assumptions about what the other is either doing, or is going to do. Whenever the word assume features in your calculations, the warning bell has started to toll. Heed it.

PART 3 - LEISURE CRAFT

Serious accidents in the leisure craft sector are, thankfully, relatively rare. We try and learn from them and identify common features.

In previous *Safety Digests* we have commented on how bad weather takes its toll on both equipment and people. We have identified the importance of having the best possible weather forecast, backed up by personal observation of the sea, sky and barometric pressure. We have stressed the relevance of understanding the effects of sea state and the dangers posed by breaking waves. We have often reminded the leisure craft sailor to make sure he has done all his basic planning before leaving harbour, and to make absolutely certain everything is very firmly secured on board before clearing the breakwater. None of this advice should be a surprise; sound seamanship is based on common sense and experience.

Experience is the one factor that takes time to accumulate. It involves sound training, exposure to a wide variety of incidents in all weathers, and learning from mistakes. The process is neverending, and even the saltiest skippers acknowledge this.

Experience breeds confidence. It can also lead to over-confidence and a tendency to take unnecessary risks. Analysis of a number of small boat accidents reveals the number of times a very experienced skipper does something that, in retrospect, was one of the causes of the accident.

One of the most common observations is how often, after the event, there is criticism of the initial brief from those onboard. Either it has not been given at all, or was so vague as to be practically useless. We have heard how members of the crew were never told where safety equipment was stowed, let alone how to operate it. Lifejackets have not been tried on and newcomers have not been informed about how to use the radio in an emergency. These are just some of the examples we hear about, but we very rarely find ourselves having to investigate an accident where a full safety brief has been given. It might be too simplistic to draw any conclusions from this observation but.!

We have also noticed how often a natural desire not to disappoint family, friends or other guests on board has led to an unwise decision. Visitors might have been promised a days sailing, a crosschannel passage, or an afternoons sea angling, but any such commitment can be very unwise if the skippers common sense suggests a less ambitious plan. The sun might be shining on the day, but the forecast is not good. The correct decision might be to potter up the river, but the desire not to disappoint can be a powerful factor. That desire can lie at the heart of many serious accidents.

It is far better to disappoint people than risk a serious accident at sea. If someone is killed, you may never forgive yourself. Going afloat is something to be enjoyed. Keep it that way.

CASE 23
Vessel Drying Out Falls Over, Away From Quay

Narrative

While drying out alongside a quay wall in Brixham harbour, the 100 tonne displacement, 25m long sailing vessel, *Leader* fell away from the quay.

Leader, an ex-trawler fitted out as a gaffrigged ketch, is normally used for adventure holidays. She usually berths at a pontoon in Brixham harbour, but on this occasion had been alongside a quay wall for two or three days to enable repairs to be carried out. To allow her to dry out safely at low tide, she had been heeled slightly towards the quay using drums filled with water, and the main halyard taken ashore and made fast to a ring on the quayside.

On this particular occasion the crew member looking after *Leader* had gone to another vessel to carry out some work, and left her unattended as the tide fell. There was nobody around to notice that she was upright on taking the ground, and the halyard made fast to the ring on the quayside had been released as the tide rose and had not been made fast again.

She remained on an even keel until, with only 1m of water remaining, she fell away from the quay.

Although the ground slopes away from the quay, the remaining water cushioned the fall and little damage was done. Nobody was on board *Leader* at the time.

THE LESSONS

1. There have been a number of reported instances where vessels have fallen away from the quay when drying out. There is considerable potential for damage to the vessel or injury to personnel; especially if the vessel is a deep keel sailing craft. The process of safely drying out alongside a wall should present no problems, providing some simple precautions are taken.

2. If it is intended that the vessel will take the ground as the tide falls, she should be tended at all times until she has safely dried out. The aim is to make sure the keel touches bottom sufficiently far out from the wall so she can lean towards it once the tide is out.

3. Sufficient weights should be placed on the inboard side to assist the heel as she takes the ground. The main halyard should be unclipped, or unshackled, from its normal harbour securing point, and led ashore to a point well back from the edge of the wall and made fast. A line should also be passed around the main mast, and both ends made fast ashore in such a way that the mast can slide up and down inside the bight.

4. As the tide begins to fall, it is strongly recommended that at least two people are onboard attending to the warps, fenders and most especially the main halyard, to ensure a steady heel towards the quay is maintained. Once the vessel is firmly on the ground, warps should be tightened, the rope round the mast pulled tight and the main halyard tensioned and made fast.

5. If the owner is not personally supervising the process he should make sure that those entrusted with the task are in no doubt about what to do. If the vessel is being used commercially with a paid crew, it is strongly recommended the instructions are in writing.

CASE 24
Capsize of a RIB

Narrative

Towards the end of a white-water adventure trip to the Bitches, a ledge on the south east of Ramsay Island off the Pembrokeshire coast, two RIBs, *Atlantic Eagle* and *Storm Raven*, were returning to the lifeboat slip at St Justinians to disembark their passengers. It was late September 2000. Because the coxswain of one of the RIBs knew there would be a delay before he could go alongside the slip, he decided to carry out one further whitewater run. In the process the craft capsized. All on board were rescued.

On completion of the scheduled programme, and with both RIBs returning to the slip, *Storm Raven* was in the lead. As there was only sufficient space at the slip for one boat, *Atlantic Eagle*s coxswain realised he would have to wait several minutes to disembark his passengers. Rather than loiter, he decided to extend the white-water trip by carrying out some further manoeuvres in turbulent water. He chose the vicinity of Horse Rock, about 1100 metres off St Justinians, and not normally visited.

The tide was setting to the north at its maximum rate of about 6 knots, making the waters around the rock resemble a witches cauldron. While approaching the rock from the north at full throttle, the RIB began to surf on the front of a wave. Moments later the bows entered a whirlpool, or eddy, and sheered to port. The boat decelerated rapidly, the port quarter lifted to an irrecoverable angle and she capsized.


Select the thumbnail to view the accompanying image (155KB)

The coxswain and several passengers were thrown clear, but a crewman and two passengers were initially trapped under the overturned boat. The crewman had snagged on a loose mooring line while the two passengers had difficulty extricating themselves from under the boat due to the buoyancy in their lifejackets.

Many of the occupants were wearing several layers of clothing and heavy footwear, and experienced difficulty in staying afloat. Several experienced problems inflating their lifejackets by mouth.

Seconds after the capsize, *Storm Raven*s coxswain saw the overturned boat as he approached the lifeboat slip. He immediately turned around, with his 12 passengers still embarked, and was able to recover *Atlantic Eagle*s passengers and crew from the water without any delay. Although a head count revealed one passenger missing, he was seen and recovered.

The coastguard was alerted by a company employee who was watching from St Justinians while awaiting their return.

THE LESSONS

1. By definition adventure experiences involve risk. It is an accepted part of the process, but safeguards must exist to ensure that every aspect of the operation has been thought through, and that contingency arrangements are in place to cater for the unexpected. A bad accident

can have serious, if not terminal, implications for the future viability of a venture. A key feature of any such risk assessment is that those responsible for carrying out the operation must remain within the declared limits.

2. Although the RIB *Atlantic Eagle* was well designed and built, and was handled by an experienced coxswain familiar with operating in white-water, she was no match for the strength and unpredictability of the conditions encountered in the vicinity of Horse Rock that day. The effects of a strong tide can be extreme and, in the vicinity of hazards such as Horse Rock, are capable of turning tranquil waters into cauldrons. Such conditions are hazardous to small craft including highpowered RIBs, especially when carrying paying passengers. The lessons for general small boat users will be different to those who organise adventure trips, but for the majority of people, tide rips, overfalls, eddies and whirlpools should be avoided. For the adventure trip organiser, each location must be very carefully studied, the risks identified and operating parameters laid down. Coxswains must then operate within those limits and not be tempted to take an unassessed risk.

3. When operating small boats in potentially hazardous pursuits, there is safety in numbers. With another RIB close by in this instance, assistance was readily available and a prolonged search and rescue avoided. Always be aware of the additional risks of being at sea with no other vessels nearby to render assistance.

4. Capsize and foundering can occur without warning. Unless someone else has seen what has happened it is probable your predicament will go unnoticed. If, however, there is somebody ashore who is aware of where you have gone and knows when you expect to return, he or she is well placed to raise the alarm when you fail to return at the expected time.

5. Selecting the right type of lifejacket for any type of activity afloat requires care and attention. What might be suitable for a windsurfer will be very different to the needs of blue water sailor or the member of the lifeboat crew. Whatever type is selected it has three aims: to work when needed, to keep ones head above water and it must not aggravate the situation further. To work when needed it must be robust, and have a system of inflation that requires the minimum of effort at the right time. To keep ones head above water it must fit correctly, have the correct inflation properties and must not ride up over the ears. And to not aggravate the situation further, it must inflate at the opportune moment and by reliable means. Inflating a lifejacket manually when you are cold, exhausted and in rough seas is not sensible. Having an automatic system when you might be trapped beneath an upturned boat is equally unhelpful. Owners must make up their own mind about the best system, and it may not be possible to cater for every eventuality. Whatever type is adopted, it must be reliable, and in date.

6. Securing mooring lines etc in lockers when not at sea is not only sound husbandry, it is also a sensible safety precaution. If equipment is not needed, stow it away.

7. If people who are taken in a boat are unfamiliar with the safety equipment or environment, they must be given a detailed safety brief. Where possible this should be conducted clear of distractions and before putting to sea. Safety briefs can be monotonous and boring for the crew, but they are essential for passengers. (Examination of a number of accidents where passengers have been embarked, reveals that after the event many of them have complained about the quality of the safety brief. Very often it was superficial, inaudible, unintelligible or inadequate for what they actually experienced.)

8. The importance of conducting a head count following capsize or foundering cannot be over-emphasised.Without it, the absence of passengers or crew may go undetected, and valuable time in which to find them may be lost. The knowledge that all personnel are accounted for is not only a morale booster for survivors, it is also vital information required by lifeboats and the coastguard.

A PAUSE FOR THOUGHT

When the draught of your vessel exceeds the depth of water..........

The mariner can experience few more humiliating situations than going aground. A stranded vessel can make an outstanding spectacle and, if they can get anywhere near the scene, the media will make the most of it.

In its most benign form, the vessel will take the bottom gently on a mud or sandbank, and those on board will suddenly realise the ships log is registering zero. The tide will rise and, at the appropriate moment, she will come afloat. The passage will be resumed with nothing much to show for it other than injured pride or a delayed ETA.

Leisure craft sailors who find themselves in such circumstances will hope against hope that none of their friends have noticed. They are likely to be disappointed. By the time they creep back to their mooring they will find it is the talking point in the sailing club bar.

For other types of vessel the consequences of a more serious grounding fall into a totally different category. A VLCC that finds herself impaled on rocks, with tonnes of crude oil pouring out of ruptured tanks, will have her name embedded in peoples minds forever. You only have to ask the average person in the street to recall the name of any ship and, after the obligatory reference to the *Titanic*, he or she will almost certainly come up with *Torrey Canyon*, *Exxon Valdez*, *Amoco Cadiz*, *Braer* and *Sea Empress*. They were all oil tankers, and they all went aground, albeit in differing circumstances.


Select the thumbnail to view the accompanying image (119KB)

Grounding can happen to anyone, and hardly a day passes without the maritime press reporting such an event somewhere in the world. In recent years cruise ships, tankers, cargo vessels, fishing vessels, a warship or two, and numerous leisure craft have all found themselves aground with the inevitable consequences of damage, delays, unwelcome publicity, injury, pollution, the attention of the salvors and, from time to time, and very sadly, loss of life.

In times gone by, stranding was the most common form of marine casualty. A reliance on wind as the main means of propulsion and an inability to determine ones position with any accuracy in certain weather and visibility, meant that many a vessel would find itself running out of sea room and being driven ashore.

Coastal communities would look on a good wreck as an act of providence, and you only have to go into any British seaside towns bookshops to find volumes of books about local shipwrecks to demonstrate the continuing fascination with this particular type of marine accident.

Advice to the navigator of yesteryear to prevent grounding, focused on the four Ls of safe navigation: Lead, Log, Latitude and Lookout. Many hundreds of years ago some unknown mariner wrote *navigating is not by chart and compass, but by the sounding lead*. Although much has changed since then, the sentiments expressed still have some relevance today. A common feature of many recent groundings reveals that whoever was in charge of the vessels navigation prior to going aground, had little idea of how much water was beneath the keel. Such knowledge does help!

Modern ships do not have to endure the handicaps of the low powered steamers and sailing vessels of yesterday. Todays ships have reliable means of propulsion, excellent aids to navigation, and the seas are well charted. The seamen of today have everything going for them, but despite the improvements, groundings still occur. Why? And what can be done to prevent them happening again?

Scrutiny of a number of recent groundings and analysis of their causes, reveals certain features which repeatedly crop up. Very few new lessons emerge, but plenty of old ones are worth revisiting.

There are, arguably, three typical scenarios for grounding: machinery breakdown, the failure of a watchkeeper to stay awake and, most common of all, that emotive catch-all state known as navigational error.

MACHINERY FAILURE

The first scenario, machinery breakdown, is not as common as many would suppose, and does not happen quite as frequently as some embarrassed seamen might have you believe.

The initial cause is frequently attributed to steering failure. It is a convenient way of explaining how a well-found ship with a welltrained crew lands up on the rocks. Whenever possible, the steering system is subjected to expert inspection after such an incident, and it is interesting to note how often it is found to be working perfectly.

Sometimes the helm is put the wrong way. Everyone who ever gives a conning order, or who selects a new course to steer on the auto-pilot, should instinctively look at the rudder indicator to verify the rudder is turning in the right direction. Helmsmen do make mistakes from time to time but, when they realise the ship is swinging the wrong way, often compound the problem by increasing the wheel, rather than reversing it.

Such mistakes can lead to a grounding. When the helm is applied the wrong way, the effects can be contained providing someone spots it immediately. The most effective way of making sure the correct helm is applied, once the error has been noticed, is to use the single word midships, followed by the correct wheel order. Such a technique means the helmsman will automatically reverse what he was doing previously. Giving the order calmly will ensure success. It is not the moment to give the unfortunate helmsman his annual appraisal! A second source of error often occurs when attempting to change from auto pilot to hand steering.

Genuine steering failures do occur from time to time. An analysis of such situations reveals that the bridge watchkeeper very often fails to recognise what has happened in time to do anything about it. Sometimes the time available is measured in seconds.

Understanding the alarm system is a basic first step. When the alarm sounds do you know if it is an indicator problem, a system defect or a rudder failure? If the alarm analysis is correct and the appropriate action is taken, the transition to the alternative mode of operation should be seamless. If not, there is the prospect of an ominous grinding sound under foot, and a frantic search for three black balls.

The more thoroughly the bridge users know their steering system, the better, and there are few better places to learn than in a simulator. Not only does constant practice ensure that when the system fails for real, the person in charge of the ship will probably know, instinctively, what to do.

Some precautionary measures should be taken in advance. If in confined waters the anchors should be cleared away, both steering motors per rudder should be running, and there should be sufficient people immediately available to identify, and rectify, any problem.

If an alarm sounds, the watchkeeper must know what it means, and the measures needed to deal with it. Among the initial questions to pass through the operators mind are How long have I got to resolve the problem? and What must I do to prevent things deteriorating further?

An intimate knowledge of the system will do much to ensure you take the correct action to restore whatever has been lost.

Whenever the steering or main propulsion fails and there is any risk of subsequent grounding, the first, and overriding priority is to ensure the safety of the vessel. If there is any suggestion that the fault is anything other than temporary, and there is even the remotest possibility that your vessel could drift ashore, tell the local authorities straight away. Time and time again masters show an extreme reluctance to do so, but are usually quick to discuss the position with their owners. Their usual explanation for not informing the authorities, or for downplaying the potential seriousness of the problem, is that those charged with repairing the system are confident they can fix it with little delay.

Dont risk it. Tell the coastguards (rescue coordination centre), or the port authority, what has happened and keep them informed. If the problem is resolved after just a few minutes wonderful. Nobody will be more delighted than those you have kept informed. They will, however, be less amused and also placed at a severe disadvantage if you fail to alert them to a problem that, despite your optimism, cannot be resolved. The more notice you can give them, the greater the prospect of a successful outcome. Nobody will thank you if you do go aground and it subsequently transpires help would have been possible had more notice been given.

But the most effective way of preventing mechanical failure is to ensure it doesnt happen in the first place. Rigorous testing of the gear, proper maintenance with effective quality controls and regular training, will minimise the likelihood of a system failure.

FATIGUE

When a well-found vessel, equipped with the latest navigation equipment, ploughs into some well charted coastline, island, lighthouse or other obstruction in the middle of the night, usually between the hours of 0100 and 0600, the chances are that two ingredients were in place. The officer of the watch was asleep in a comfortable chair, and the lookout was not on the bridge.

The problems of fatigue and sleep deprivation have featured in other *Safety Digests* and it is not the intention to repeat them here, but falling asleep on watch (no matter how loud the bridge alarm, or how effective its fall-back alert capability) is a surprisingly common cause of grounding. (The MAIB has evidence of both bridge watchkeeper and the master, in whose cabin the alarm was remoted, sleeping through an extremely loud such alarm system.)

The fishing vessel that sails soon after midnight, having just landed a catch, is particularly vulnerable to going aground. The night watchkeepers are often very, very tired.

The risks can be reduced if additional care is taken in planning the passage, particularly at night. A longer route that takes you further offshore, or well clear of obstructions, might pay dividends.

Ultimately however, falling asleep on watch can be prevented by keeping your mind occupied, insisting on having the lookout posted throughout the night, drinking adequate quantities of water and, above all, recognising the moment when you are getting sleepy. When this happens, get out of the comfortable chair. If your body is relaxed and you realise you are having difficulty keeping your eyes open, there is nothing to prevent you from going to sleep if you are sitting down.

The saving grace is that you can always recognise the symptoms of drowsiness. Heed them.

NAVIGATIONAL ERROR

Very few vessels run aground if the passage has been planned with care, dangers are highlighted on the chart and the person on watch retains an instinctive feel for the depth of water under the keel. Add to these practices the discipline of fixing the ships position regularly by at least two methods, calculating the dead reckoning after every fix, and working out when to put the wheel over, the prospects of going aground are much reduced.

Navigating in coastal or pilotage waters in poor visibility introduces additional risks. An in-depth knowledge of radar as an aid to navigation including the ability to use parallel indexing techniques, will do much to reduce the risk of going aground. Safe navigation in poor visibility has to compete with the need to avoid collision. When the navigation dimension is relegated to the back of the mind, the risks of grounding increase significantly. Sometimes two heads are better than one in a busy situation with one person concentrating on ensuring the ship remains in safe water.

The fact that vessels continue to go aground is evidence enough that the navigation in some vessels is at best, sloppy, and at worst, negligent.

Some of the most frequently observed navigation shortcomings are predictable. An inspection of a vessels chart after a grounding will often reveal that no track had been prepared, and fixes were, at best, sporadic.

We live in the age of the GPS, a very accurate, very reliable and very easy system to use. We use it all the time to fix our position and we all have come to rely on it. The younger generation will have been brought up on it, and will invariably assume that the position given on the read out, or the marker on the automatic chart plotter, will be correct. Everything else must, by definition, be relative to where our own ship is. But there is one big problem. What happens if, on rare occasions, it isnt working for some reason? Can we spot when it isnt functioning correctly, and can we still navigate safely if it isnt available? The ancient mariner will be in his element, but the younger one may find he is not as familiar with the traditional methods of navigating as he should be.

The traditional concept of working up a DR is still a very effective way of preventing groundings. It is interesting to note that so far as we can ascertain, we have no recent record of a vessel going aground because of navigational error where the DR has been worked up from the last fix.

Modern navigational systems that rely much more on electronic charts, integrated radar displays and GPS derived positions provide excellent navigational information. The navigator, however, still needs to know their limitations. He needs to continually check that the information he is using is accurate against some other reference, and is a reliable indicator as to when to put the wheel over.

Misidentifying navigational marks, especially by day, is a common feature in many groundings. Being familiar with an area is a great asset but, to adapt an old military adage, time spent in preparation is seldom wasted. Close scrutiny of the largest scale chart and the sailing directions will pay dividends. Other basic techniques such as identifying natural transits, calculating clearing bearings and working out minimum depths of water, all play a valuable part in ensuring a safe passage when navigating close inshore.

Other groundings have been caused by the decision to veer off the planned track for, perhaps, very good reasons. You may be altering slightly to give a wider berth to a vessel coming the other way, or perhaps keeping well clear of one that is at anchor. There is nothing wrong in doing so provided the new heading, no matter how temporary, isnt leading you into shallow water or towards some other hazard.

Whenever it is necessary to alter course in confined waters, the careful mariner will project the new track ahead on the chart to make sure it is safe. It is interesting to note the number of times ships will do this without anyone checking to ensure there is sufficient water available.

This leads to the final and, perhaps, the most useful tool in the navigators armoury to prevent groundings: the echo sounder. It is probably the most ignored item of equipment on a ships bridge. Whenever a ship runs aground one of the first questions the accident investigator will ask is whether the echo sounder was switched on and, if so, was anyone monitoring it. The answer to both questions is, very often, no.

It should be at the heart of every navigation system.

- Think draught.
- Think depth of water.
- Think echo sounder.

The navigators of old had the right idea, *Navigation is not so much knowing your latitude and longitude, but finding your way by the lead*.

As the title of this article states, *when the draught of your vessel exceeds the depth of water available*.

You can always consider the delights of gardening!

Select the thumbnail to view the accompanying image (131KB)

APPENDIX A

Investigations commenced in the period 01/03/2001 30/06/2001
Date of Accident
Name of Vessel
Type of Vessel
Flag
Size
Type of Accident
06/03/01
Philomena
Fishing vessel
UK
165gt
Accidents to Personnel
14/03/01
Finnreel
ro-ro cargo
UK
530gt
Grounding
14/03/01
Marine Explorer
Research
UK
2,198gt
Machinery

18/03/01 *Christine Nielsen* Fishing vessel UK 147gt Foundering/flooding
31/03/01 *Beatrice* Passenger UK unknown Machinery
16/04/01 *Van Dijck* Fishing vessel UK 203gt Accidents to Personnel
20/04/01 *Rebecca Kay* Fishing vessel UK 2,57gt Foundering/flooding
23/04/01 *Gudermes* Oil tanker Malta 17,824gt

Collision

Saint Jacques II

Fishing vessel

France

153gt

24/04/01

Crimond II

Fishing vessel

UK

23,67gt

Foundering/flooding

27/04/01

Dutch Navigator

General cargo single deck

Netherlands

2,999gt

Dangerous occurrence

07/05/01

Lysfoss

General cargo multi-deck

Norway

4,471gt

Grounding

05/05/01

Bramble Bush Bay

Passenger

UK

Collision   *Unknown* Yacht UK 17/05/01 *P&OSL Canterbury* Ro-ro passenger UK 25,122gt Foundering/flooding 07/06/01 *Hampoel* General cargo- multi-deck Cyprus 2,568gt Collision   *Atlantic Mermaid* Reefer Panama 9,829gt Collision 13/06/01 *Resplendent* Fishing vessel UK 587gt

Grounding
15/06/01
Primrose
Fishing vessel
UK
112gt
Grounding
20/06/01
Our Sarah Jayne
Fishing vessel
UK
20,94gt
Collision
Thelisis
Ro-ro cargo
Greece
8,904gt

APPENDIX B
Report issued in 2000 (Priced)

MAIB Annual Report 1999
Published July 2000
ISBN185112 186 2
£16

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APPENDIX C
Reports issued in 2001 (Unpriced)

***Alfa Britannia* -** parting of a mooring line while Bahamian-registered tanker was berthing at Tranmere oil terminal near Birkenhead on 18 November 1999, resulting in injuries to crew members on board a gig-boat.
Published 31 January 2001

***Angela* -** capsize and foundering of fishing vessel in the North Sea on 6 February 2000.
Published 26 April 2001

***Annandale* -** flooding and foundering of fishing vessel 16 miles NNE of the Shetland Islands on 23 March 2000.
Published 7 March 2001

***Atlantic Eagle* -** capsize of vessel off St Justinians, Ramsey Sound, 28 September 2000
Published 25 May 2001

***Baltiyskiy* -** accident on the general cargo vessel, resulting in the death of a seaman on the 10 September 2000 while on passage from Riga, Latvia to Poole, UK
Published 11 May 2001

***Celtic King/De Bounty* -** collision between UKregistered feeder container ship *Celtic King* and Belgian-registered fishing vessel *De Bounty*, to the south of The Smalls traffic separation scheme off the south-west coast of Wales on 19 March 2000.
Published 2 February 2001

***Coastal Bay* -** grounding of vessel in Church Bay, Anglesey on 21 July 2000.
Published 9 March 2001

***Diamond Bulker* -** incident on bulk carrier with the loss of two lives, when at anchor in Lough Foyle, Londonderry, Northern Ireland on 5 April 2000.
Published 3 April 2001

***Eastfern/Kinsale* -** collision between Irishregistered cargo ship *Eastfern* and Cyprusregistered bulk carrier *Kinsale* 10.6 miles SW of

Dover on 25 September 2000.
Published 3 May 2001

***European Pioneer* -** grounding off Fleetwood 1 December 2000.
Published 27 April 2001

***European Tideway and Vrouw Grietje* -** collision between vessels in North Sea 16 October 2000.
Published 25 May 2001

***Fivla* -** death of an engineer on board vessel in the Bluemull Sound, Shetland on 16 July 2000.
Published 17 April 2001

***Girl Alice* -** loss of skipper from vessel 1.5 miles south-east of Burnmouth 19 November 2000.
Published 2 May 2001

***Happy Lady* -** grounding of vessel off Shoebury Ness, Thames Estuary, 21 January 2001
Published 11 May 2001

***Highland Pioneer* -** collision between the offshore supply vessel and the DA jack-up rig of the Douglas offshore installation in Liverpool Bay 27 January 2000
Published 27 April 2001

***Horizonte Claro* -** grounding of fishing vessel on Soyea Island, Loch Inver, 21 October 2000.
Published 18 May 2001

***Inga* -** death of a crewmember on motor tanker after falling down a pumproom hatch at Pembroke on 7 July 2000.
Published 10 April 2001

Lifeboat Safety Study 1/2001 - Review of Lifeboat and Launching Systems' accidents.
Published 22 February 2001

***Mariama K* -** carbon monoxide poisoning on vessel in Douarnenez, France 10 June 2000 - one fatality
Published 20 April 2001

***Portsmouth Dory* -** capsize of school boat on Fountain Lake, Portsmouth with the loss of one life on 16 September 1999.
Published 20 March 2001

***P&OSl Calais* -** failure of No 5 lifeboat winch on 25 June 1999, and related investigation into self-lifting sprag clutch behaviour.
Published 20 April 2001

***Pride of Bilbao* -** rescue boat falling from *Pride of Bilbao* into Cherbourg Harbour injuring two people on 1 July 2000.
Published 16 February 2001

***Ross Alcedo* -** fire on board vessel while underway about 32 miles north-west of the Isles of Scilly on 16 January 2000.
Published 15 February 2001

***Solstice II* -** investigation of a fatal accident to a crew member, 25 miles south-west of Rockall 13 May 2000.
Published 18 May 2001

***St Helena* -** engine room fire on 25 August 2000.
Published 4 May 2001

***Wightstone/Rose Ryal* -** collision between Wightstone and the moored yacht Rose Ryal in River Medina, Isle of Wight on 9 November 2000.
Published 8 June 2001

***Wintertide/MSC Sabrina* -** collision between vessels off Texel Traffic Separation Scheme on 13 June 2000.
Published 15 March 2001

***Safety Digest 1/2001*: Published April 2001**

SAFETY DIGEST

Copies of the *Safety Digest* publication can be obtained, free of charge, on application to the Marine Accident Investigation Branch
(Mrs J Blackbourn (023 8039 5509)).

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