Report on the investigation of the loss of the sailing yacht

Ouzo

and her three crew

South of the Isle of Wight

during the night of

20/21 August 2006

Marine Accident Investigation Branch
Carlton House
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Extract from

The United Kingdom Merchant Shipping

(Accident Reporting and Investigation)

Regulations 2005 – Regulation 5:

"The sole objective of the investigation of an accident under the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005 shall be the prevention of future accidents through the ascertainment of its causes and circumstances. It shall not be the purpose of an investigation to determine liability nor, except so far as is necessary to achieve its objective, to apportion blame."

NOTE

This report is not written with litigation in mind and, pursuant to Regulation 13(9) of the Merchant Shipping (Accident Reporting and Investigation) Regulations 2005, shall be inadmissible in any judicial proceedings whose purpose, or one of whose purposes is to attribute or apportion liability or blame.

CONTENTS

GLOSSARY OF ABBREVIATIONS AND ACRONYMS

AB	-	Able Seaman
AIS	-	Automatic Identification System
COLREGS	-	International Regulations for Preventing Collisions at Sea
Disponent owner	-	A person or company which has commercial control over a vessel's operation without owning the ship as in a bareboat charter.
DSC	-	Digital Selective Calling
ENG 1	-	Seaman's Medical Fitness Certificate
EPIRB	-	Emergency Position Indicating Radio Beacon
GRP	-	Glass Reinforced Plastic
HP	-	Horse Power
IOW	-	Isle of Wight
LT	-	Local Time
LWL	-	Length at the waterline
MCA	-	Maritime and Coastguard Agency
MoD	-	Ministry of Defence
NFU	-	Non follow up
Point	-	11¼ degrees of the compass
RCS	-	Radar Cross Section
RNLI	-	Royal National Lifeboat Institution
RYA	-	Royal Yachting Association
SAR	-	Search and Rescue
SARIS	-	An integrated SAR planning tool incorporating both Search Area Determination and Search Area Coverage
THV	-	Trinity House Vessel
UTC	-	Universal Co-ordinated Time
UV	-	Ultra Violet
VDR	-	Voyage Data Recorder
VHF	-	Very High Frequency
VTS	-	Vessel Traffic Services

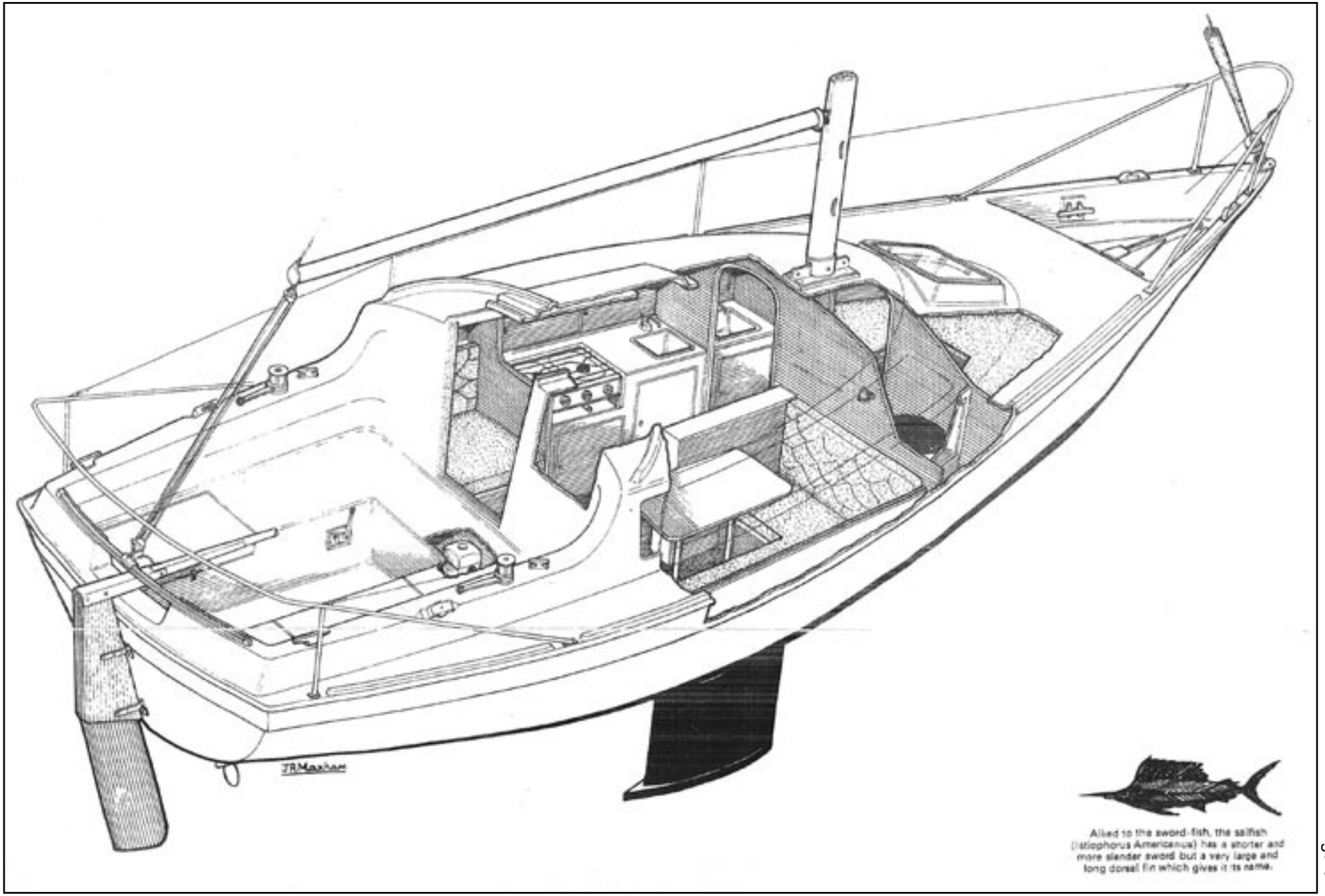


Figure 1

Drawing of Sailfish 25

SYNOPSIS

The yacht *Ouzo* sailed from Bembridge, Isle of Wight (IOW), bound for Dartmouth, Devon on the evening of 20 August 2006. She had her three regular crew members on board who were intending to take part in the Dartmouth Royal Regatta.

The body of one of the crew members was found in the sea just before midday on 22 August about 10 miles south of the Nab Tower. At about 1900 on the following day, the bodies of the other two crew were recovered from the sea. They had all been wearing inflated lifejackets and good quality yachting clothing. Despite extensive surface and sub-surface searches no trace of the yacht has been found.

The last record of the yacht was at 2230 on 20 August when she went out of range of the Southampton/Portsmouth VTS radar system in Sandown Bay. At this time it is believed that the yacht was sailing close hauled in a south-south-westerly direction.

Voyage data recorder (VDR) records from ships that had been in the area during the night of 20/21 August were recovered and analysed by MAIB inspectors in order to use the radar information to trace the movements of the yacht. In the course of this analysis, it became apparent that the ro-ro passenger ferry *Pride of Bilbao* had had an encounter with a small yacht about 6 miles south of St Catherine's Point, IOW, in the early hours of the morning of 21 August.

The lookout on the ferry had not seen the yacht until it was very close ahead, and she had not shown up on the ferry's radars. The officer of the watch tried a last minute manoeuvre to avoid her and believed that he had been successful. The sighting of a single red and then, possibly, a white light astern of the ferry after the incident was considered sufficient by the watchkeeping officer to assume that the yacht was safe, and the ferry continued to Bilbao without taking further action.

After careful analysis of the facts, the MAIB is of the firm opinion that the yacht was *Ouzo* and that *Pride of Bilbao* had collided with her, or passed so close that she had been swamped or capsized by the vessel's wash.

The investigation has considered a number of issues, including:

- Why the lookout did not see the yacht earlier;
- Why the yacht did not show on the ferry's radars;
- Why the yacht's crew did not survive the accident;
- Why the ferry did not stop and assist the yacht.

Recommendations have been aimed at preventing glasses with photochromic lenses being used by bridge lookouts; improving the handover procedures between watchkeepers; and improving bridge night time blackout procedures. Further recommendations are aimed at improving the effectiveness of yachts' radar reflectors, navigation lights and lifesaving equipment.

SECTION 1 - FACTUAL INFORMATION

(All times are UTC + 1 hour, unless indicated otherwise)

1.1 PARTICULARS OF *OUZO* AND ACCIDENT (Figure 1)

Vessel details

Flag	:	UK
Type	:	Sailfish 25 auxiliary sloop
Built	:	1980 – Maxim Marine Ltd, Hamble
Length overall	:	7.75m (25’ 5”)
LWL	:	6.1m (20’)
Beam		2.85m (9’ 4”)
Max / Min draft		1.37m (4’ 6”) /0.61m (2’)
Engine power and/or type	:	Kubota 12HP
Description	:	Dark blue hull, white decks, white sails
Sail marking		“X22”
Other relevant info	:	Vessel equipped with a cast iron aerofoil hydraulic lifting keel

Accident details

Description	:	Vessel missing
Time and date	:	Night of 20/21 August 2006
Location of incident	:	South of the Isle of Wight
Persons on board	:	3
Fatalities	:	3
Damage	:	Vessel has not been found

1.2 ENVIRONMENTAL CONDITIONS

The environmental conditions on the night of 20 / 21 August, off the south coast of the Isle of Wight (IOW), were as follows:

Wind

WSW 4 to 5, occasionally gusting 6.

Sea Temperature

18°C / 64°F

Sunset	20/2015	
Sunrise	21/0601	
Tides		
Bembridge IOW	Low Tide	High Tide
		20/1010
	20/1611	20/2221
	21/0448	21/1111

Moon phase 

1.3 FACTUAL DETAILS CONCERNING THE YACHT *OUZO* AND HER CREW

The yacht *Ouzo* was purchased in 1980. The owner based the yacht in Bembridge, on the Isle of Wight. In the summer, the vessel was kept moored to a buoy in the tidal harbour as she had a retractable keel allowing her to safely take the bottom at low water.

The vessel had been used each summer for many years for family pleasure trips off the south coast of England. Each winter, the yacht was laid up ashore where a local boatyard looked after her maintenance. The owner's two sons also spent time undertaking cosmetic maintenance to the vessel throughout the year. The vessel was believed to have been in good condition, and she was last surveyed for insurance purposes on 23 May 2003.

1.3.1 Vessel inventory of safety related equipment

Magnetic compass

DSC VHF radio

Warning flashlight (1 million candela type)

Boarding ladder

Fog horn (canister type)

Boathook

6” octahedral radar reflector, flat pack type

“U” shaped lifebuoy (secured with a light line weak link to stop it being washed overboard) with white light

Hand bilge pump

Navigation lights

6kg dry powder fire extinguisher

Distress flares

8 lifejackets

Galley fire blanket

Deflated, 3 man inflatable dinghy in locker

1.3.2 The crew of *Ouzo* on the night of the accident

1. **Rupert Saunders**, aged 36, was one of the owner’s sons who took *Ouzo* out 20/30 times a year and had also sailed on other yacht types of up to 15m in length.

   Yachting Certification:

   RYA Coastal Skipper Tidal (Sail) issued June 1995

   RYA Day skipper issued March 1995

   RYA/MCA Coastal Skipper and Yachtmaster issued September 2002

   Maritime Radio Operator – Short Range Certificate issued July 2001

2. **Jason Downer**, aged 35, was a friend and yachting companion of the owner’s family, who had sailed on board *Ouzo* many times previously.

   Yachting Certification:

   RYA Day skipper for sail & motor issued April 2005

3. **James Meaby**, aged 36, was a friend and yachting companion of the owner’s family, who had sailed on board *Ouzo* many times previously as well as other yachts including racing yachts.

   Yachting Certification:

   RYA Day skipper for sail & motor issued April 2005

   RYA Competent Crew issued September 2002

1.4 *OUZO* - NARRATIVE

The three crew had planned to sail *Ouzo* from Bembridge directly to Dartmouth, leaving on 20 August with the intention of taking part in the annual Royal Regatta.

They arrived in Bembridge around lunch time on 20 August, but were unable to sail as they had missed the high tide and the vessel was sitting on the bottom. The three men visited the local yacht chandlers, where they bought some equipment for the boat. It is assumed that they would then have spent time making her ready for sea. The three men were known to be meticulous when preparing a boat for a voyage. All loose items, including mobile phones and personal documentation were normally secured either in lockers or in stowage nets.

While there is conflicting evidence over the exact time of *Ouzo*'s departure from Bembridge, it would appear that she left her mooring at about 2030 that evening, and sailed out of the harbour under power, arriving off Saint Helen's Fort at 2105. The evidence then indicates that the crew raised the sails and sailed in a southerly direction down the east coast of the Isle of Wight **(Figure 2)**.

Initially, *Ouzo* made a speed over the ground of about 2.5 knots as she sailed into what remained of the flood tide. By 2230, as the tide changed to ebb, she was south of the West Princessa buoy and sailing close hauled, south-south-westerly out into the open sea in a moderate west-south-westerly wind.

The normal watch arrangement on *Ouzo* was for two of the crew to be in the cockpit at all times, while the other rested below (usually with foul weather gear on). They rotated in this arrangement every hour. The crew generally navigated using a hand-held GPS navigator and local charts, and kept a logbook in which they entered the yacht's position every 30 minutes, plus any other relevant information.

At just before midday on 22 August, 40 hours after the yacht had left Bembridge, the body of a man was found in the sea about 10 nautical miles south of the Nab Tower **(Figure 3)**. He was wearing a manually inflated lifejacket and yachtsman's clothing.

The body had no identification papers, so the emergency services released a description of the yachtsman in the hope that someone would recognise it and be able to identify him.

Later that evening, a lady contacted the police and informed them she was concerned as the description fitted her partner from whom she had heard nothing since he had departed Bembridge on the yacht *Ouzo* with his friends.

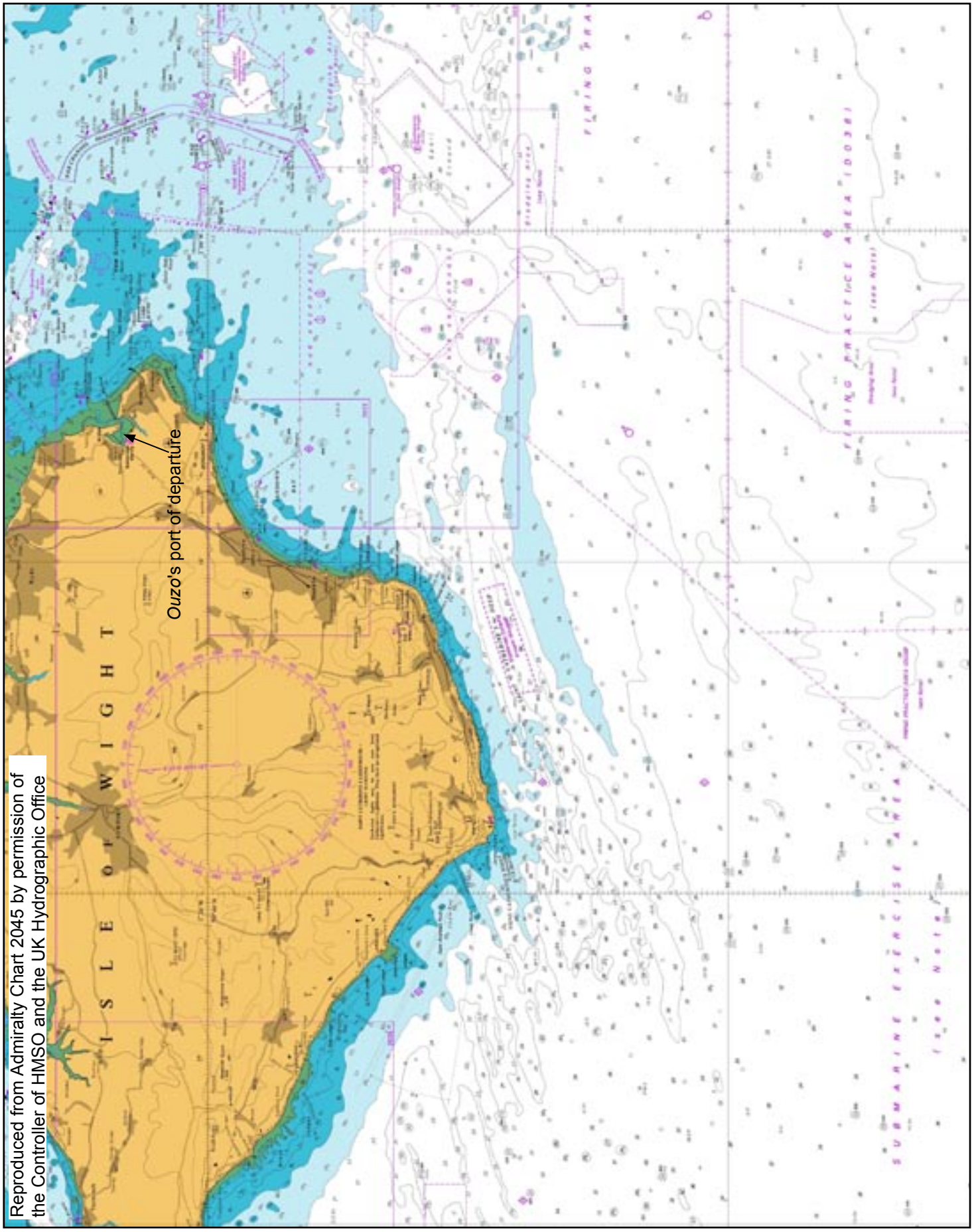
The lady was brought to Haslar Hospital, Gosport the following morning, where she positively identified the body of her partner, James Meaby.

The emergency services then began a large scale search for the two remaining yachtsmen and the missing vessel.

At about 1900 in the evening of 23 August, the bodies of Jason Downer and Rupert Saunders were recovered from the sea about 10 nautical miles south-west of the Nab Tower **(Figure 3)**.

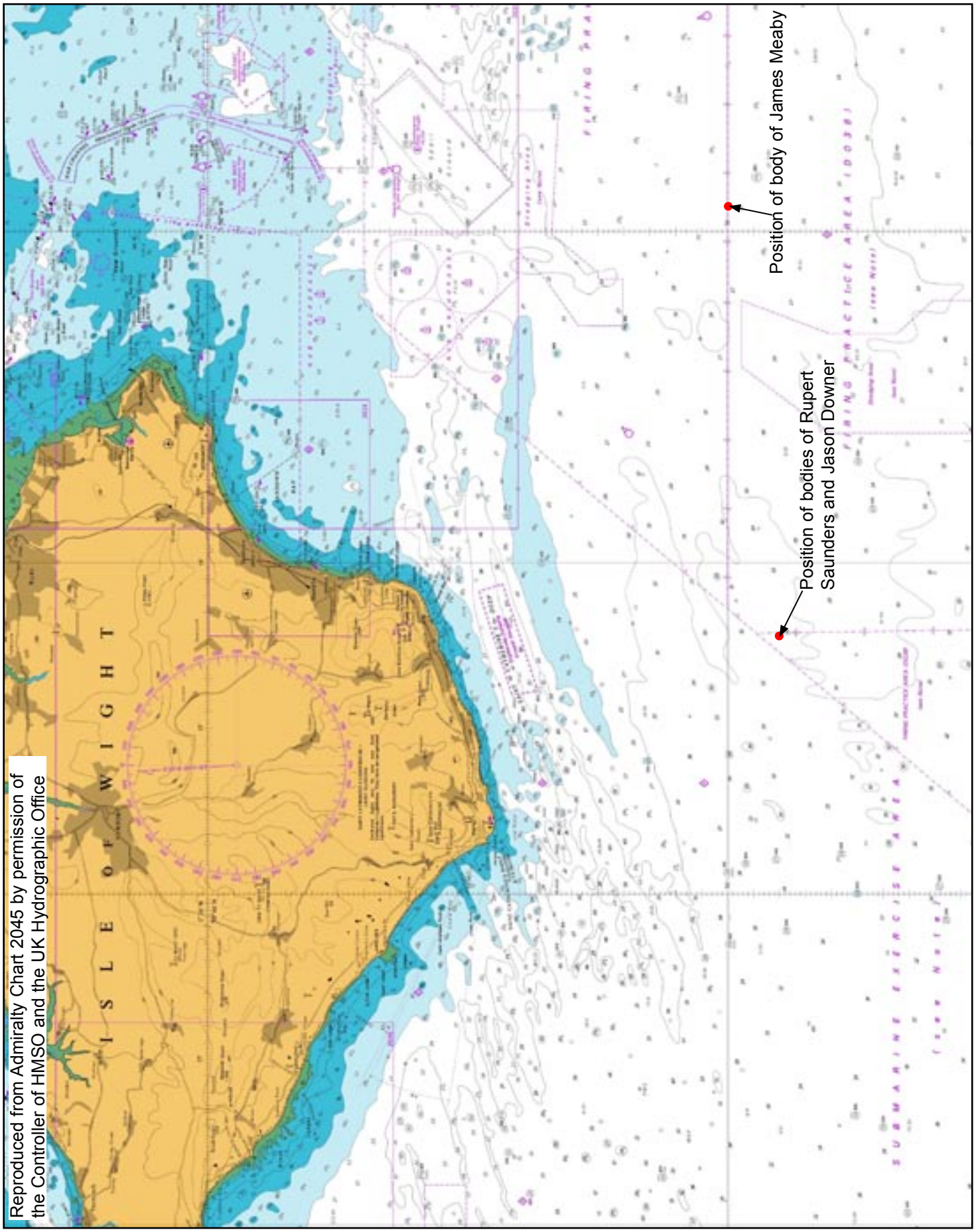
Despite an extensive search of the sea and coastline no evidence of the yacht was found.

Figure 2



Reproduced from Admiralty Chart 2045 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 3


Position of body of James Meaby
Position of bodies of Rupert Saunders and Jason Downer
I S L E O F W I G H T
Reproduced from Admiralty Chart 2045 by permission of the Controller of HMSO and the UK Hydrographic Office

1.5 OTHER VESSELS IN THE VICINITY

Following scrutiny of relevant Vessel Traffic Services (VTS) and Automatic Identification System (AIS) data, the MAIB was able to identify all large vessels that had transited the eastern Solent on the night of 20 / 21 August. Those fitted with a voyage data recorder (VDR) were contacted and asked to land the recordings ashore at the earliest opportunity, principally to enable MAIB inspectors to determine the movements of the yacht from the recorded radar pictures.

Scrutiny of the VDR data received from one of the vessels, the P&O ro-ro ferry *Pride of Bilbao,* revealed she had been involved in an incident with a small yacht about 6 miles south of St Catherine's Head, IOW early in the morning of 21 August.

1.6 PARTICULARS OF *PRIDE OF BILBAO* (Figure 4)

Vessel details

Disponent owner	:	P&O Ferries
Port of registry	:	Portsmouth
Flag	:	United Kingdom
Type	:	Ro-ro passenger ferry
Built	:	1986 Wartsila, Turku, Finland
Classification	:	Lloyd's Register
Construction	:	Steel
Length overall	:	176.80 metres
Gross tonnage	:	37,583
Engine power and/or type	:	4 x Wartsila Pielstick
Service speed	:	19 knots
Other relevant info	:	Ice strengthened Class 1A

Accident details

Description	:	Collision or near collision with a yacht
Time and date	:	0107(UTC +1), 21 August 2006
Location of incident	:	50°28.6N, 001°15.2W, about 6 nautical miles south of St Catherine's Pt., IOW
Persons on board	:	Crew 207, passengers 1490
Injuries / fatalities	:	None on *Pride of Bilbao*
Damage	:	None on *Pride of Bilbao*

Figure 4

Pride of Bilbao

1.7 FACTUAL INFORMATION CONCERNING *PRIDE OF BILBAO* AND HER BRIDGE TEAM

Pride of Bilbao is one of the largest ferries operating in UK waters. She provides a scheduled service between Portsmouth and Bilbao, Spain throughout the year.

Her usual summer departure time from Portsmouth is 2115, and she arrives in Bilbao 36 hours later at about 0800 LT. She then sails from Bilbao the same day at about 1315 LT, returning to Portsmouth the following day at about 1715. Therefore, a round trip takes about 3 days.

The vessel had been operating on this route for about 13 years.

1.7.1 The officer of the watch

The officer of the watch at the time of the incident was a 61 year old second officer. He had begun his seagoing career at the age of 16, as an ordinary seaman then able seaman on board vessels sailing worldwide. He then switched to sailing on cargo vessels around the UK coast.

He studied and took home trade deck officer examinations while sailing on these coastal cargo vessels and, by 1972, he had obtained a middle trade master's certificate of competency. He was promoted and sailed as master on coastal cargo vessels for about 18 months before deciding to leave the sea in 1975 to work on board the Thames Pilot boat cutter as an AB, which he did until 1986.

In 1987 he joined his first cross channel ferry as a deck rating. Between 1987 and 1997 he sailed as AB/quartermaster with P&O European Ferries (Dover). He was offered and accepted a second officer's position with P&O in 1997, and sailed for about 9 years in that rank on *Pride of Calais,* which was operating between Dover and Calais.

He retired from regular employment with P&O in February 2006 when he was 61 years of age. He then signed up with a number of marine manning agencies to gain further work. One of the agencies had a vacancy for a temporary second officer on board *Pride of Bilbao*, and, as he had relevant experience, he was offered and accepted the position.

He joined *Pride of Bilbao* for a 9-day assignment on 18 June. The first 6 days was a period of familiarisation during which he was given comprehensive instructions about shipboard systems and procedures whilst understudying one of the watch officers. He took over his own watch for the last 3-day round trip of that assignment.

He rejoined a month later, on 24 July, for another short assignment. This time he was on board for 6 days and completed 2 round trips between Portsmouth and Bilbao.

He again joined the vessel while she was alongside at Portsmouth on 20 August, the evening before the incident, to relieve one of the permanent second officers for another 3-day round trip.

His certificate of competency allowed him to sail as an officer of the watch on any vessel, or as master on any vessel of less than 3000gt.

He had a valid medical ENG 1 certificate issued in February 2006.

1.7.2 The bridge lookout

The bridge lookout at the time of the incident was 60 years of age. When he first went to sea, he sailed as AB on vessels trading worldwide for a number of years before joining his first cross channel ferry operator in 1968. He spent 12 years with that operator, before sailing as AB for 3 years on a vessel trading to the Baltic Sea. He joined P&O Ferries in 1992 and, since then, had sailed mainly on the vessel *Pride of Hampshire* before changing to *Pride of Bilbao* 10 months before the incident.

A deck rating's normal tour of duty is 21 days on board followed by 21 days on leave, and the usual working shift is 6 hours on watch, followed by 6 hours resting. The lookout had been on board for 12 days prior to the incident and was standing the "twelve to six" watch.

The bridge lookout held a Navigational Watch Rating Certificate, issued in August 2001, and a valid medical ENG1 certificate, issued in September 2005.

1.8 *PRIDE OF BILBAO* - NARRATIVE

Pride of Bilbao left the Portsmouth ro-ro terminal at 2325 on 20 August. This was just over 2 hours later than scheduled, due to a technical fault.

The master had the con of the vessel while in the compulsory pilotage area, and he was assisted on the bridge by the "eight to twelve" second officer and two deck ratings.

Shortly before midnight, the "twelve to four" second officer and the two "twelve to six" deck ratings entered the wheelhouse. The second officer took over the watch from the off-going "eight to twelve" second officer who, a short while later, left the wheelhouse. One of the deck ratings took over manually steering the vessel, while the other took over lookout duties, and the off-going watchkeeping ratings also left the wheelhouse.

At 0022, as the vessel was approaching the Nab Tower, and in accordance with the vessel's normal procedure, the master rang full away on sea passage.

The master handed the con over to the second officer at about 0030. He then completed his night orders, wished the second officer a good watch, and reminded him he would be available in his cabin if he was needed. He then left the wheelhouse.

On the bridge at that time with the second officer, there was a lookout positioned on the port side of the wheelhouse. The other watch rating had gone below to undertake routine safety rounds.

The second officer switched both radar screens from night red display to green, his personal preference, as he checked the positions and movements of the targets. He found and acquired a number of distant vessels, but found none were close enough to give him any concerns. He then spent approximately 30 minutes moving between the chartroom and the wheelhouse as he plotted the vessel's position and monitored the radars. While in the chartroom, he removed the red filter from the chart table light as he found it caused him to strain his eyes and made the chart difficult to see.

At 0057 the second bridge rating returned to the wheelhouse having completed the safety rounds. As he passed the chartroom, he saw the second officer was there, so he introduced himself as they had not previously met. He then went to the front of the wheelhouse and stood beside the other lookout on the port side in order to take over lookout duties from his colleague.

At 0059, the relieved lookout left the bridge to carry out the next set of routine safety rounds.

At 0101 the second officer returned to the wheelhouse from the chartroom. He checked the radar screen for targets, and found none close to the vessel, after which he had a general conversation with the lookout.

By then, *Pride of Bilbao* was about 5 miles south of the Isle of Wight and had reached the next passage plan waypoint, so the second officer began altering the vessel's course from 221° to 243° using the autopilot joystick control so as to place the vessel on the next track required to take her to the traffic separation scheme off Casquets. He continued talking to the lookout but did not tell him that he was adjusting the course, and the lookout was not aware he was doing so.

The alteration of course took about 3 minutes to complete, and after checking the radar and acquiring two large targets in the shipping lanes far to the south, he returned to the chartroom. The time was then 0104.

At 0107 the lookout, who was still standing on the port side of the bridge, suddenly noticed a dim white light on the starboard bow. He picked up the binoculars and, as he looked at the light, he noticed a brighter red light. The lights appeared to be close. He called to the second officer saying, "He's showing a red that one".

The second officer heard the lookout say something regarding a light and, with no concerns that the light was anything other than from a distant vessel, did not immediately come out to investigate.

After a few seconds, the lookout realised the red light was from a small vessel close ahead, and he walked quickly towards the port side entrance to the chartroom saying more urgently that the light was "pretty close".

The second officer immediately left the chartroom from the starboard side and, as he entered the wheelhouse, saw what he thought was a cluster of bright white lights close and about two points on the starboard bow.

He moved quickly towards the centre control consol, where the autopilot joystick was situated, and at the same time asked the lookout if it was a yacht. The lookout confirmed that it was.

On arriving at the consol, he placed the autopilot joystick to port in order to turn the bow of the vessel away from the lights. From this position he was now unable to see the lights as they were below his line of sight.

A few seconds later, the lookout, who was standing at the forward windows of the bridge, glimpsed the shape of a small yacht with two white sails close to the starboard bow. It quickly passed from his view down the starboard side and he ran over to the starboard side of the wheelhouse. The second officer, believing that the stern of *Pride of Bilbao* was now swinging to starboard and was in danger of striking the yacht, began altering the vessel's helm the other way, to starboard, in an effort to counteract the swing.

The lookout reached the starboard side of the wheelhouse but, on looking aft, could see no sign of the yacht. The second officer asked if the yacht was clearing, but received no reply from the lookout.

A few moments later, the second officer also moved to the starboard side of the wheelhouse, while the vessel was slowly turning to starboard under the control of the autopilot. The lookout stated that he could see a red light about one point on the starboard quarter. The second officer acknowledged, but did not see the light at that time.

The second officer returned to the centre of the wheelhouse where he turned off a number of aft deck lights, which he believed might have been obscuring their vision, before going again to the starboard side.

The lookout saw the light again, and told the second officer, but did not indicate its relative position.

It is at this point that the second officer believes he saw a single red light about 4 or 5 points off the stern, on the starboard quarter of *Pride of Bilbao.* The sight of the red light provided him with reassurance that the yacht was clear of *Pride of Bilbao's* stern, so he returned to the autopilot joystick at the centre consol and began turning the vessel to port to resume the vessel's original track. The lookout returned to his position on the port side.

Once *Pride of Bilbao* was back on course, the second officer had another look around before returning to the chartroom. At this time, he noticed a single white light about 2 points to port of the stern. He took the light to be the stern light of the yacht, and thus providing further proof, in his mind, that the yacht was not in any trouble.

The vessel continued on its voyage to Bilbao.

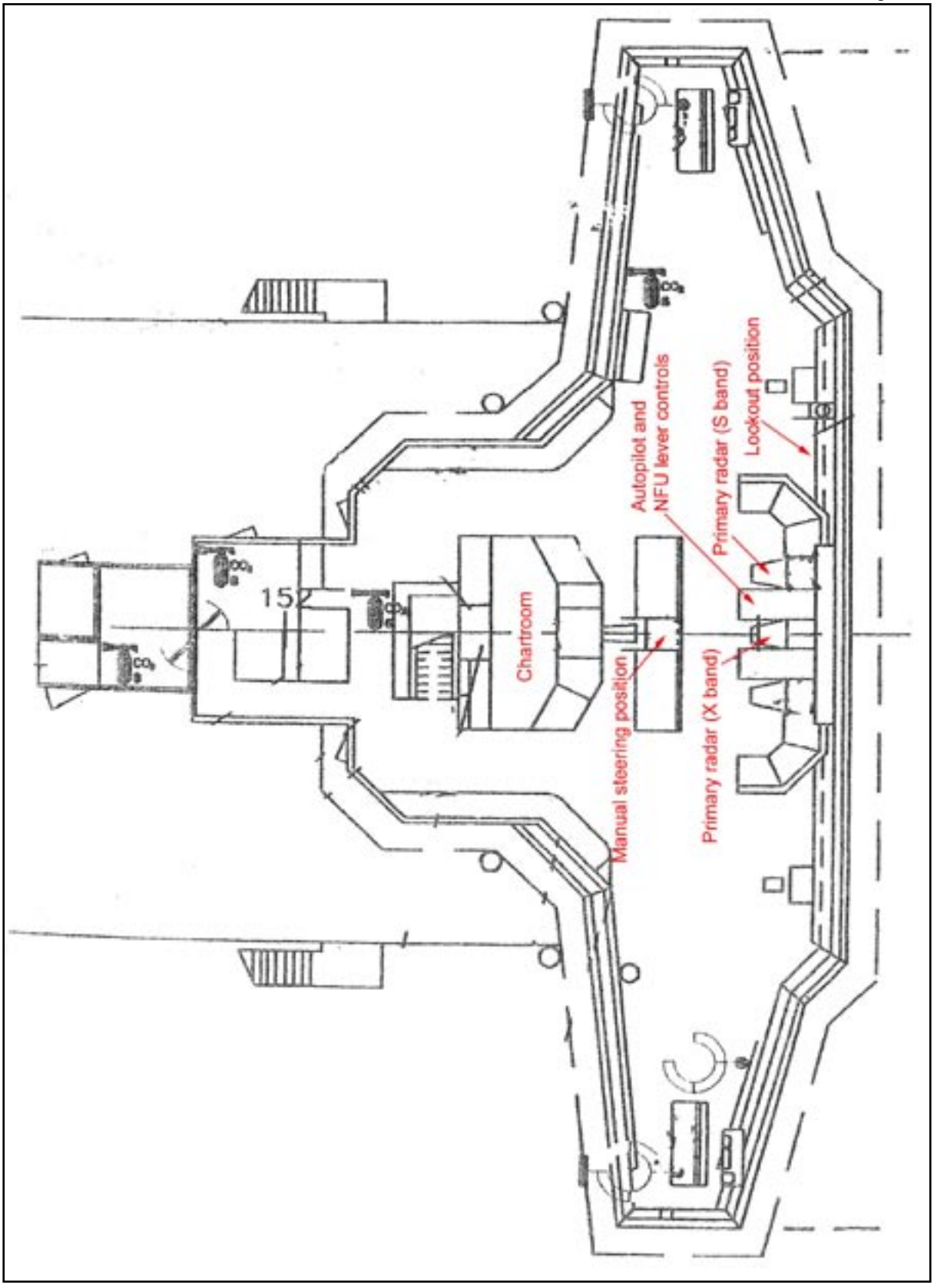
The second officer and the lookout did not discuss the incident any further, other than having a short conversation regarding yachts in general during which the second officer opined that yachts often went around with their navigation lights off, to save electrical power, thus relying on the larger ships' radars to detect them.

1.9 WHEELHOUSE PLAN AND BRIDGE EQUIPMENT (Figure 5)

Primary radar's:	S band (3.05GHz) Sperry Bridgemaster E radar X band (9.41GHz) Sperry Bridgemaster E radar
Automatic pilot:	Kockum Steermaster 2000, self adaptive autopilot
GPS	Magnavox MX200
DGPS	Leica MX400
Echo sounder	Atlas Filicia
Speed log	Krupp Atlas Elektronik twin axis Doppler log
VHF x 4	Sailor compact RT2048
DSC VHF	Sailor compact RM2042
HF SSB	Sailor compact RE2100

HF SSB DSC	Sailor compact RM2150
VDR	Broadgate VER3000
AIS	JRC JHS-180

Figure 5



Wheelhouse plan

SECTION 2 - ANALYSIS

2.1 AIM

The purpose of the analysis is to determine the contributory causes and circumstances of the accident as a basis for making recommendations to prevent similar accidents occurring in the future.

2.2 *OUZO* – POSSIBLE LOSS SCENARIOS

Despite extensive surface, and then sub-surface searches, neither *Ouzo* nor any part of her has been found. The fact that this, apparently well-found, well-equipped and well-manned boat and her three crew were lost without any warning being received by the coastguard, or other vessels in the vicinity, is a clear indication that a sudden and catastrophic event, such as an explosion, hull failure or collision, occurred. These possibilities have each been considered:

Explosion – Butane gas was carried on board the boat and gas appliances and piping have, in the past, been the source of violent and catastrophic explosions aboard vessels similar to *Ouzo.* However, it has been eliminated as the cause of this accident because the bodies of the crew members showed no indications of the effects of an explosion, and no wreckage has been recovered. An explosion almost certainly would have caused severe damage to the boat resulting in floating wreckage being discovered.

Hull failure – Sudden hull failure can cause catastrophic loss. The MAIB investigation revealed that at least one Sailfish yacht had lost her keel unexpectedly and this possible scenario was, therefore, considered carefully by the investigating team. The team concluded, however, that this was highly unlikely to have been the cause of the accident on this occasion as, without the weight of the keel, the vessel would have remained afloat for some considerable time, offering the possibility of support for any crew in the water and a visible target for search parties. Other hull or rigging failure scenarios were also considered, but were dismissed for similar reasons.

Collision or near collision – A near collision with a larger vessel might have caused swamping and/or capsize of *Ouzo,* while actual contact in a collision with a large vessel is likely to have caused substantial damage to the boat and its consequent rapid foundering. In either case, the outcome is likely to have been catastrophic, with the possibility of the crew ending up in the sea. The survivability of a yacht of *Ouzo*'s design in a capsized or swamped condition was considered by a naval architect. He concluded that, although the swamped or upturned hull might have remained afloat for a short time, it would have sunk eventually through progressive flooding, probably within a few hours. *Ouzo* was sailing in an area where large ships might frequently be encountered.

Bearing the above in mind, it was concluded that *Ouzo* was almost certainly catastrophically affected by a collision or near collision with a large vessel.

2.3 *PRIDE OF BILBAO* AND *OUZO*

(All times are UTC +1)

The available relevant evidence has been analysed to determine whether *Ouzo* was the yacht involved in the collision or near collision with *Pride of Bilbao,* at 0107 on 21 August 2006, in position 50°28.6N 001°15.2W.

It was the reported intention of the crew of *Ouzo* to sail from Bembridge to catch the tide and to sail south of the Isle of Wight, keeping clear of the choppy seas that can be encountered due south from St Catherine's Head, en route to Dartmouth. This indicates the possibility that *Ouzo*, at some stage, would have been close to the above position.

An eyewitness apparently saw *Ouzo* leave Bembridge Harbour at about 1900. However, despite scrutinising the Vessel Traffic Services (VTS) radar recording for the evening of 20 August, no evidence of a vessel departing at that time could be detected. However, a small target could be seen leaving the harbour at about 2030 and heading south from St Helen's Fort at just after 2100. This was considered most likely to have been the target of a yacht as it appeared to slow when outside of the harbour in a typical manoeuvre to hoist sails.

The MAIB chartered and sailed an almost identical vessel to *Ouzo* in the area of Bembridge to determine if the vessel would be detected on the port radar systems, with and without a radar reflector being used. This vessel was detected clearly on VTS radar when off Bembridge, without a radar reflector deployed, proving it unlikely that *Ouzo* sailed undetected during the evening of 20 August.

The vessel was then sailed south from Bembridge in a reconstruction of the probable track of *Ouzo.* It remained visible on VTS radar until the yacht was about a mile south of the West Princessa buoy. The target that was tracked south by VTS radar on the night of 20 August was also lost in about the same position. This reinforced the MAIB's view that the target on that occasion was that of *Ouzo*.

The view that the target, which was lost at about 2230 in Sandown Bay, was that of *Ouzo* was reinforced further when investigations indicated that one of the crew had made a mobile phone call from the yacht shortly after that time. Triangulation of the mobile phone signal data had shown that the vessel was in Sandown Bay when the call was made **(Figure 6)**.

At that time, the tide was starting to be favourable and the wind was west-south-westerly force 5. For *Ouzo* to have been close to *Pride of Bilbao* at 0107 she needed to have covered a distance of 13.3 nautical miles in a south-south-westerly direction from her 2230 position. This equates to a ground speed of about 5 knots. Both the course and speed required to achieve this are entirely feasible for *Ouzo* given the prevailing environmental conditions **(Figure 7)**.

Furthermore, *Pride of Bilbao*'s lookout saw a small yacht with two white sails; a description that fits *Ouzo.* No other yacht contacted *Pride of Bilbao* or reported being involved in a near collision with her. If the yacht had survived the encounter, undamaged, some form of communication from her crew would have been expected given the close proximity of the two vessels.

Figure 6

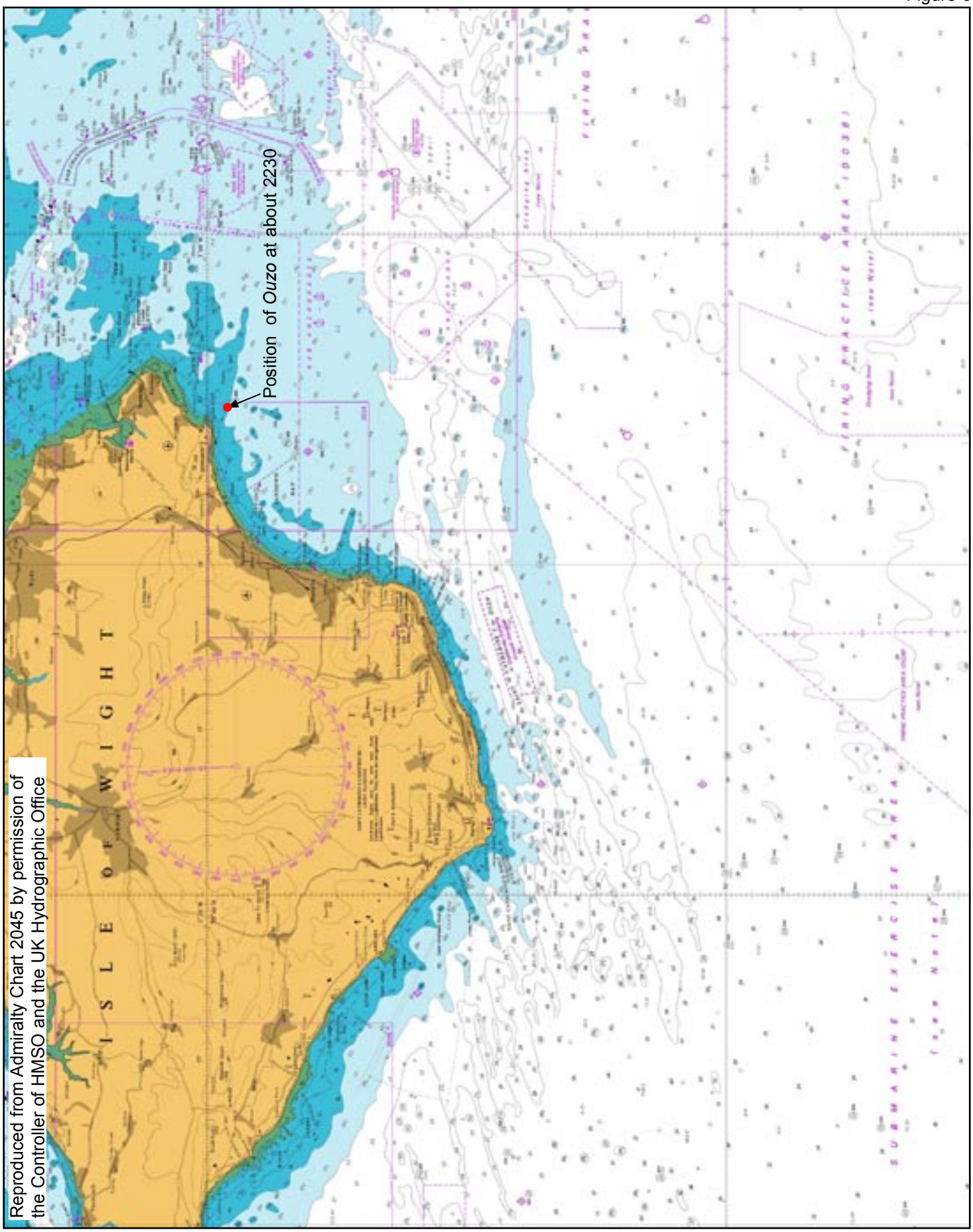
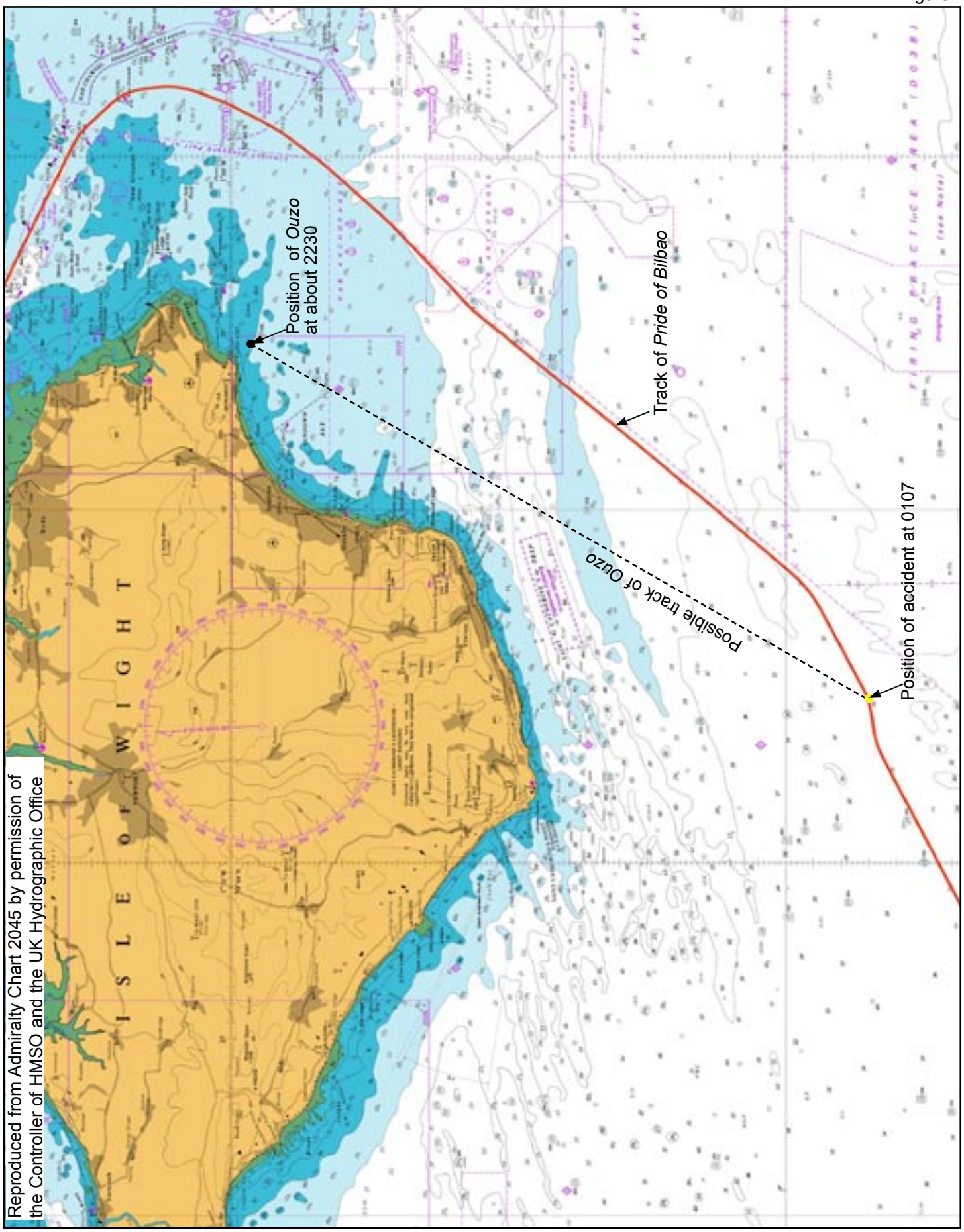

Position of *Ouzo* at about 2230
I S L E O F W I G H T
Reproduced from Admiralty Chart 2045 by permission of the Controller of HMSO and the UK Hydrographic Office

Figure 7


Position of *Ouzo* at about 2230
Track of *Pride of Bilbao*
Possible track of Ouzo
Position of accident at 0107
I S L E O F W I G H T
Reproduced from Admiralty Chart 2045 by permission of the Controller of HMSO and the UK Hydrographic Office

The MAIB, with expert assistance from the MCA, utilised the Coastguard's SARIS II computer software to calculate a hindcast of the possible drift of the body of James Meaby. The position where the body was found, and the date and time of the discovery, were entered into the system, which then took into account the predicted and recorded tidal streams and winds along with relevant known drift criteria. The probable drift of the body was predicted back to the time of *Pride of Bilbao*'s near collision. The programme showed that the body drifted a total of about 40 miles in this time, with the changing tides and wind, and that at 0107 it would have been within about 1 mile of *Pride of Bilbao*.

Taking all of these factors into consideration, and in the absence of any other contradictory evidence, **MAIB is of the firm opinion that *Ouzo* was the yacht involved in the collision or near collision with *Pride of Bilbao* at 0107 on the morning of 21 August**.

This raises a number of important questions:

- Why didn't the bridge team detect the presence of *Ouzo* earlier?
- Why didn't the crew of *Ouzo* effectively warn *Pride of Bilbao* of the danger posed by the developing situation?
- After the incident, why didn't the officer of the watch on board *Pride of Bilbao* take positive action to confirm the yacht and her crew were safe, and take action to raise the alarm?
- What measures could have improved the survivability of *Ouzo*'s crew after they found themselves in the water?
- Why were the last minute avoidance procedures undertaken by *Pride of Bilbao* unsuccessful?

These questions are considered in the sections of the report that follow.

2.4 *OUZO*'S NAVIGATION LIGHTS

2.4.1 The Regulations

A yacht must be fitted with navigation lights to comply with the International Regulations for Preventing Collision at Sea (COLREGS). The lights must be displayed at night and when the vessel is in restricted visibility.

Rule 22 of the COLREGS state a sailing vessel underway shall exhibit sidelights and a stern light. The regulations also confirm a vessel of *Ouzo*'s length, 25 feet, may combine these lights into one lantern to be carried at or near the top of the mast where it can best be seen.

The minimum ranges of the lights shall be:

Sidelights 1 mile

Stern light 2 miles

2.4.2 Visibility of navigation lights

The lights on board *Ouzo* consisted of a combined side and stern light unit at the top of the mast, a combined side light unit on the railing in the fore part of the vessel, a stern light on the stern rail, and a white “steaming” light half way up the mast **(Figure 8)**.

Customary practice when the vessel was at sea was for the crew to sail with the combined mast light unit lit, as it could be seen at a greater distance than the other navigation lights positioned lower down in the vessel.

However it has not been possible to determine which lights were being exhibited on the morning of 21 August.

COLREGS Annex 1 10(b) states that the horizontal intensity of navigation lights fitted to yachts could be expected to decrease if the vessel heels more than 5º. This might have reduced the distance at which *Ouzo’*s lights could be seen.

The combined plastic mast head unit fitted on board *Ouzo* was of a standard design frequently fitted to yachts.

2.4.3 Damage to lenses

The investigation found that after a period of time, the lenses of combined plastic masthead units are prone to crazing as the plastic becomes diffuse due to heating from the lamp (bulb). This reduces the luminosity of the light **(Figure 9)**.

The condition of the lights aboard is not known, but the unit had not been replaced since the boat was built. **Figure 9** shows a unit of similar age to the one on board *Ouzo*.

2.4.4 Navigation lamps

The lighting system on board *Ouzo,* as on most small yachts, was powered by a 12 volt battery.

Lamps can have different power ratings but be, in all other respects, similar. It is possible, therefore, to fit a lamp with a lower rating than that required to fulfil the minimum range requirements for the unit.

The exact situation on *Ouzo* on the night of the accident is not known, and there is no evidence to suggest that the wrong lamps had been fitted. However this cannot be ruled out as a possibility.

2.4.5 Lamp replacement

During the investigation, it was also discovered that it is common for the filaments of new lamps to be damaged in transit such that they light when first switched on, only to extinguish as soon as the boat goes to sea due to vibration affecting the damaged filament. It is good practice to inspect the replacement lamp filament prior to fitting, by gently tapping the lamp to ensure the filament it is still intact.

2.4.6 Lighting circuitry

On yachts, there is usually no automatic warning that a lamp of a navigation light has extinguished. Therefore it is good practice to visually check navigation lights are operational prior to leaving port, and periodically during a voyage, especially when approaching other vessels.

Figure 8

Navigation light arrangement

Figure 9

Combined top light

2.4.7 Conclusion – navigation lights

The condition of the navigation lights on board *Ouzo* is not known. However, a number of factors could conceivably have contributed to the fact that the yacht was not seen by the lookout on *Pride of Bilbao* until the last moment, including:

- The crew might have forgotten to switch from the lower units to the masthead navigation lights;
- The lens of the masthead unit might have been crazed, thus reducing its effectiveness;
- An incorrect lamp may have been fitted to the masthead unit;
- The masthead light might have been out, unbeknown to the crew.
- Due to the vessel heeling more than 5º the horizontal intensity of the lights was reduced.

2.5 VISUAL LOOKOUT ON *PRIDE OF BILBAO*

2.5.1 General comment

One of the most common causes of collisions and near misses at sea, is poor visual lookout. This has been identified in many MAIB investigation reports and was one of the main findings during the 2004 MAIB Bridge Watchkeeping Safety Study.

The AB lookout on board *Pride of Bilbao* was not distracted and was conscientiously looking out for lights, and yet he first saw a light from the yacht when she was only about 300 metres ahead.

Assuming the navigation lights were on (see 2.4), the investigation has analysed why this should have been so, when the visibility at the time was good, it was a dark night and the stern light of the yacht should have been visible at a minimum distance of at least 2 miles, and its side lights 1 mile.

2.5.2 The seaman lookout

The seaman lookout on board *Pride of Bilbao* at the time of the incident was 60 years of age. He had worked on board the vessel for 10 months and had sailed previously on board similar vessels for many years. He was, therefore, an experienced lookout.

He had a valid ENG 1 certificate of health, which includes a requirement for regular eyesight tests.

His eyes had been tested privately in 2005, after which he was prescribed glasses to adjust his slight short-sighted vision. As a consequence, he purchased a pair of reactolite, or photochromic lensed glasses, that he could wear both during the day and at night because they darkened only in reaction to daylight or ultra violet (UV) light.

Following the accident, the MAIB had the lookout's eyes examined once again and his prescription was found to be still correct. His eyes were also tested for other defects or anomalies that might have affected his vision or night time adaptation, but none were found.

2.5.3 The seaman lookout's glasses

The lookout's photochromic glasses were sent to University College London's Institute of Ophthalmology to assess whether they might have had an adverse effect upon his night vision.

The glasses were examined and a report was prepared **(Annex 1)**, which concluded that the optical transmission of the lenses was no more than 80% efficient and, taking into account all of the other known factors, was probably less at the time of the accident. This compares to 94.7% and 99.4% optical transmittance of ordinary uncoated and coated lenses, respectively. This was a startling result as the consequences of such a reduction in night vision had not been fully appreciated by opticians and ophthalmologists before the investigation of this accident.

The report also stated that it would be correct to assume that a uniform reduction in brightness due to the optical density of the lenses would decrease the likelihood that a subject would detect the lights of shipping vessels.

It appears, therefore, that the lookout's glasses would have been a contributory factor when considering why *Ouzo*'s lights were not seen earlier. However, there are no rules or guidelines concerning the wearing of such glasses on the bridge of a vessel at night. This incident has raised a serious concern that glasses fitted with photochromic lenses are inappropriate for use by lookouts on the bridge of merchant vessels. It also raises the question of applicability of use by operators in other modes of transport.

The MAIB also requested the Institute of Ophthalmology to test lenses from the major tinted photochromic lens manufacturers to determine whether the concerns raised in the initial report regarding the lookout's glasses were widespread, and not just applicable to that particular pair or manufacturer **(see Annex 2)**. The report concluded that all of the photochromic lenses tested showed significant reductions in the amount of transmitted light. However the lenses of the glasses supplied for test by the MAIB were significantly inferior to the other currently commercially available lenses indicating that either manufacturers have improved the performance of their photochromic materials, or that the performance of photochromic glasses is reduced with time. As at least one manufacturer only guarantees the performance of lenses for 2 years, the latter reason may be the most likely.

This is obviously an additional concern regarding photochromic lens glasses, however it is outside the scope of this investigation.

2.5.4 Eyesight dark adaptation times

The lookout entered the wheelhouse wearing his glasses at about 0057. He spoke briefly to the second officer in the chartroom before moving to the front of the wheelhouse to start his lookout duties. The relieved lookout left the wheelhouse about 2 minutes later.

The lookout first saw a light from the yacht 9 minutes after entering the wheelhouse.

Good practice dictates that bridge watchkeepers should arrive on the bridge of merchant vessels a period of time prior to the start of their watch, to allow time for the handover and, at night, for their eyesight to adapt to the dark. Research has indicated that this period is typically 10 – 15 minutes.

The seamen lookouts on board *Pride of Bilbao* stand watch for 6 hours and then rest for 6 hours, a not uncommon watch pattern on short sea trade vessels. However on *Pride of Bilbao*, in keeping with common practice in the ferry industry, the rating watchkeepers are also tasked with completing regular safety checks of the passenger

and car decks at sea. To that end, they rotate hour-and-hour-about with a colleague, each spending 1 hour on the bridge as lookout before being relieved to undertake an hour of safety checks and rounds.

The passenger and car decks are brightly lit. Therefore, on returning to the wheelhouse, the watchkeeper's eyes will require a period of dark adaptation prior to regaining reasonable night vision. On this occasion, on returning to the bridge, the lookout first entered the chartroom where the red light filter had been removed from the chart table light. This would have had the effect of starting his dark adaptation "clock" again from zero.

The following is a statement from the Institute of Ophthalmology made in relation to this investigation report:

"*The dark adaptation curves **(see Figure 7.6 Annex 3)** trace the changes in absolute threshold as a function of dark adaptation time. They can be divided clearly into two components. The first is a rapid decline in threshold over the first 5 – 6 mins. The second component shows a slightly shallower decline from approximately 5 – 6 mins to approximately 20 – 30 mins. The initial phases of dark adaptation are associated with a noticeable subjective increase in visual ability in the dark. However, these changes are occurring predominately within the relatively insensitive cone mediated photoreceptors, whose ability to detect absolute thresholds is poor, in spite of the perceived improvements in vision from the observer's point of view.*

From the observer's point of view, the decline in thresholds found after 5 – 6 mins appear to be less significant in terms of his/her ability to see in the dark. Visual function here is mediated by rod photoreceptors which are critical in detecting thresholds at low luminance levels. Rods function over a greater dynamic range than cones and are the main photoreceptor population that functions in a truly dark adapted state.

Hence, while the observer may report a significant improvement in dark adaptation in the first 5 – 6 mins, this is subjective. Appropriate measurements reveal that visual sensitivity is still increasing rapidly after the first 5 – 6 mins when cone function has fully adapted but rod function has not. Hence, there are strong grounds for arguing that the handover period should be extended in a fully dark environment for 20 – 30 mins. However, this may be impractical in marine conditions. In spite of this, there are grounds for arguing that the handover time should be extended such that it covers a time during which rod sensitivity is at least improving. This would mean extending the handover time to 15 mins. This handover period should be within a dark visual environment."

This appears to provide some scientific basis to support the traditional maritime 10 minute handover period. In the early morning of 21 August on *Pride of Bilbao,* the seaman lookout had been on the bridge 9 minutes at the time of the incident. At this stage, the curve indicates that night vision is significantly improving. It is reasonable, therefore, to deduce that the lookout could have seen the first dim white light at that time, and not before, due to improvement in his night vision.

This opinion is also supported by the Institute of Ophthalmology **(Annex 3)**, which concluded that "while it is likely that the glasses contributed to a reduction in the acuity of the lookout, the major contributing factor is likely to be the insufficient dark adaptation due to the relatively short time in the wheelhouse and the levels of environmental illumination within it".

2.5.5 Wheelhouse night blackout procedures

The chartroom on the bridge of *Pride of Bilbao* required light for the deck officers to carry out chartwork and other navigational duties. In common with many ships, the light had a removable red filter fitted to reduce its adverse effect on night vision.

The second officer found that working under red light gave him headaches, and, on the night of the accident, as was his normal practice, he had removed the red screen and allowed the unfiltered white light to illuminate the chart table. This would have adversely affected both his night vision, because he was working in there during the watch, and the lookout's, as he had entered the chartroom after arriving on the bridge before taking over his watch.

Further investigation on this subject has also revealed that, to all intents and purposes, as soon as a person's eyes are subjected to white light, their dark adaptation time starts again from zero. Therefore, the second officer's and the lookout's dark adaptation periods started from when they left the chartroom.

This also meant that, due to the second officer's regular visits to the chartroom, his night vision would have been poor throughout the period.

Curtains are normally fitted around chartrooms to reduce the problem of wheelhouse light pollution. This was the case on *Pride of Bilbao*. The arrangement consisted of three curtains above the chart table, and two curtains either side of the space **(Figure 10)**.

The second officer's normal practice on board the vessel was to close all three of the top curtains, but to leave the other curtains open, except for one curtain on the port side to protect the lookout's night vision, as the lookouts normally stood on that side.

On the morning of the incident, strict observance of blackout procedures had slipped further, and only the top three curtains were closed **(Figure 11)**. This allowed white light into the wheelhouse directly behind the lookout, which would have had a negative effect on the lookout's ability to see the lights of the yacht.

The wheelhouse on *Pride of Bilbao* was totally enclosed for the entire breadth of the vessel. There were no open bridge wings. Therefore white light from the passenger decks and aft floodlights indirectly shone through the aft wheelhouse windows. As there were no curtains fitted to these windows, this had a further negative effect on the bridge watchkeeper's night vision.

2.5.6 Conclusion – visual detection

Assuming that the lights on the yacht *Ouzo* were working, they were not seen earlier by the lookout on the bridge of *Pride of Bilbao* because:

- At least 20% of his night vision was obscured due to his wearing glasses with photochromic lenses;
- His eyes had had insufficient time to adapt to the dark; and,
- There was significant white light pollution in the wheelhouse due to poor blackout procedures.

Figure 10

Port side chartroom black out curtains

Figure 11

Starboard side curtains, and port side were in open position as shown

2.6 WHY WASN'T *OUZO* DETECTED BY RADAR OR OTHER MEANS

The MAIB has examined in detail the "X" Band radar picture from *Pride of Bilbao*, as recorded by the vessel's VDR. Even with the benefit of hindsight, it showed no trace of the yacht *Ouzo* during the incident, either ahead or, later, astern of the vessel. Other evidence indicates that the yacht probably did not show on the other, "S" Band, radar either.

Radar experts from QinetiQ Funtington were contracted to investigate the reasons why the yacht did not show on the vessel's radars. Their report is attached at **Annex 4**.

2.6.1 The radars

The Sperry Bridgemaster E radars on board the vessel are a type fitted to numerous merchant vessels worldwide.

The serviceability of the radars on board *Pride of Bilbao* was tested, and it was found that both main radars were operating correctly and within the operational limits of their specification.

2.6.2 Radar lookout

The "X" band starboard radar was being operated on the 12 mile range and the sea clutter was set to automatic control.

In accordance with good watchkeeping practice, the second officer regularly checked this radar for targets, and acquired various distant vessels prior to the incident.

His last check for targets had been just 3 minutes prior to the lookout sighting the yacht's lights. The yacht was about 1 mile ahead of the vessel, and not showing on the radar screen.

In areas where small craft may be expected, it is good practice, when using automatic sea clutter, to regularly change to manual control to improve the chances of detecting them. During this incident, the second officer did not do so in an area where small yachts might be encountered, especially during the summer months.

2.6.3 Radar cross section

The ability of a properly functioning radar to detect a target such as a small yacht is dependent upon a number of factors, including the yacht's radar cross section (RCS) and the prevailing sea conditions. The best chance of detection occurs with a large RCS and calm seas.

Using the best available information, it appears that *Pride of Bilbao* approached *Ouzo* from her port quarter. *Ouzo* offered a very small RCS in this direction. The QinetiQ report concludes that this, coupled with the moderate sea conditions, made it unlikely that the radars on board *Pride of Bilbao* would have been able to separate *Ouzo* from the sea clutter.

It is possible that the crew of *Ouzo* had hoisted their radar reflector in the expectation that the yacht's RCS would thus be substantially improved.

2.6.4 Detection of *Ouzo* by the VTS radar system

MAIB believes that *Ouzo* was detected by the VTS radar system from the time the yacht left Bembridge until 2230 when she was crossing Sandown Bay. The VTS utilises a marine "X" band system, and this therefore poses the question as to why the VTS radar detected the yacht when *Pride of Bilbao's* didn't. The answer is believed to lie in the different sea conditions that the yacht would have been experiencing at the relevant times. As the yacht left Bembridge she was in calm, sheltered conditions which would have provided no barrier to her detection. Outside the harbour, as she progressed further south, the sea conditions would have steadily increased as the boat obtained less shelter from the land. The fact that the target was lost to radar as she crossed the bay might have been partly due to the increasing sea conditions, but also because she was nearing the outer area for radar coverage and she might have disappeared behind the land in a radar shadow. South of the Isle of Wight, near the position of the accident, the yacht was fully exposed to the west-south-westerly wind and consequent moderate sea conditions and, as has been discussed, this would have had a serious detrimental effect on her radar visibility.

2.6.5 Radar reflectors

There are various types of radar reflectors available to operators and owners of small craft.

Ouzo had on board a flat pack "Octrahedral" reflector, similar to many carried by small craft worldwide, which the crew were known to hoist at night and during periods of poor visibility **(Figure 12)**. It is not known whether the reflector was deployed at the time of the incident.

QinetiQ Funtington is the UK's main type approval test house for radar reflectors and its experts considered how much *Ouzo*'s radar reflector would have improved the chances of the yacht's detection **(Annex 4)**.

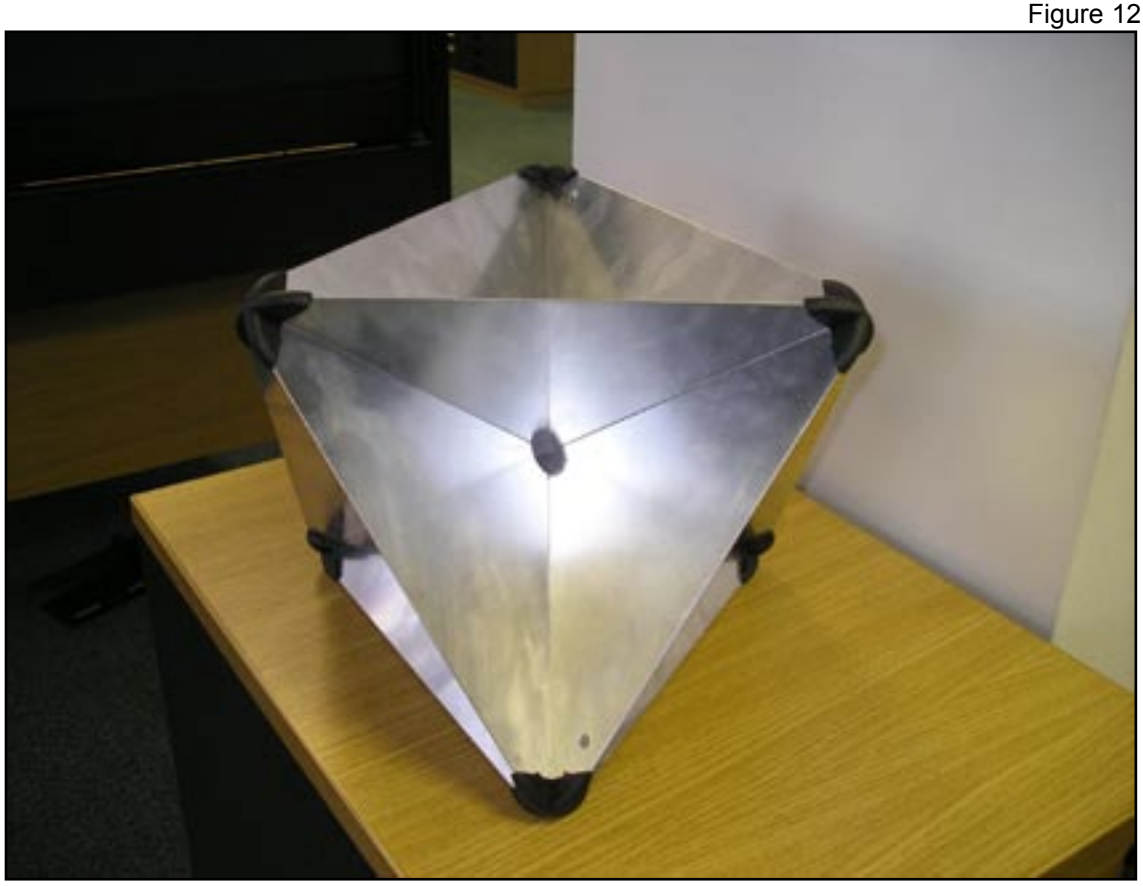
From the report, it can be seen that, although any radar reflector is better than none, the type of reflector fitted to *Ouzo* can theoretically produce a reasonable peak increase in the RCS but, in practice, its overall performance is poor, and it is now evident that at best there was only a 50% probability that the ship would have been able to detect *Ouzo* on the radar at close range.

This type of radar reflector gives optimal performance when deployed in what is termed the "catch rain" orientation **(Figure 12)**. However, if the unit is tilted even a few degrees from this orientation, the reflected energy drops very significantly, thus reducing the RCS. This type of radar reflector, although popular and widely sold, is of little benefit on board a yacht which is frequently heeled.

Furthermore manufacturers are not required to supply instructions on the optimum method of deploying the unit, and most do not do so. The problem is further compounded because many of the reflectors come supplied with holes drilled for connecting to a halyard **(Figure 13)**, which encourages the units to be hung in the incorrect orientation, 45° removed from the optimum "catch rain" position.

QinetiQ Funtington's report **(Annex 4)** concluded that, bearing the above factors in mind, it was unlikely that deployment of the radar reflector on *Ouzo* would have made very much difference to the RCS of the yacht.

Figure 12



Octrahedral type radar reflector ("catch rain" position)

Figure 13

Radar reflector (not in "catch rain" position) suspended from the fixing points

2.6.6 AIS

AIS is being carried by an increasing number of yachts, partly to assist in their being more “visible”. Had *Ouzo* carried AIS it would have made no difference to the outcome as AIS information was not displayed on the radar of *Pride of Bilbao*. This situation should improve as AIS is being integrated into more ships’ systems in the future.

2.6.7 Conclusion – radar detection

The yacht *Ouzo* was not detected by the radars on board *Pride of Bilbao* due to a combination of the following:

- The small radar cross section area of the yacht;
- The poor performance of the yacht’s radar reflector;
- The sea conditions;
- The use of auto-clutter suppression combined with an absence of periodic manual adjustment of the clutter controls to search for small targets.

2.7 ACTIONS BY THE CREW OF *OUZO*

The crew of *Ouzo* were thought to have been skilled and conscientious in their approach to navigation and watchkeeping and, if they were conforming to their usual practices, they will have set watch routines with two crew members in the cockpit at all times, whilst the third rested below (usually fully dressed in yachting clothing). At sea, at night, they routinely switched to the masthead navigation lights and they hoisted their octahedral radar reflector. A million candela flashlight was kept ready, near the cockpit, for use, if necessary, to warn ships of their presence. With the above and other evidence in mind, it is possible to hypothesise about what might have happened.

In the early morning of 21 August, the two crewmen in the cockpit would have, almost certainly, seen the approach of *Pride of Bilbao.* The visibility was very good, the night was dark, the ferry would have been brightly lit and it was approaching from a direction that would not have been obscured by the sails. As regular sailors in those waters and with local knowledge, the crew might even have realised that it was *Pride of Bilbao,* bound for Spain.

The quality of the lookout on *Ouzo* as *Pride of Bilbao* approached will never be known, however if the crew were alert to her approach it would have appeared that she was going to pass well clear. In fact, up until 0101, she was steering a course to pass them at a distance of about 0.5 nautical mile (a little over 900 metres).

On reaching the waypoint position at 0101, *Pride of Bilbao* began a slow turn to starboard. We do not know if *Ouzo*’s crew noticed this but, if they had done so, with no other obvious reason for the course alteration, they might have thought the ferry was altering course to give way to them in compliance with Rule 18 of the COLREGS. This, in turn, might have led them to believe that the ferry’s bridge team had seen them, thus possibly relieving some anxiety.

The alteration of course took more than 3 minutes to complete. The reason for this was the second officer’s *modus operandi* of altering the course slowly by a succession of small alterations to avoid heeling the vessel, rather than inputting the final course and allowing the autopilot to turn the vessel at a preset safe rate. Altering course in such a slow manner can lead to doubt and indecision on board other vessels in the vicinity as

it does not provide a clear indication of the vessel's final intentions. Although the ferry settled on her new course about 4 minutes before the incident, those on *Ouzo* might have taken some time to realise that the turn had stopped and that the ferry was going to continue heading towards them.

The precise circumstances on the yacht will never be known, but it seems likely that by the time they were aware that a collision or close passing was inevitable, they had too little time to effectively warn the ferry's bridge team. In this respect it should also be borne in mind that they might have been distracted by attempting to take evasive action and the possible need to alert their colleague who might have been down below resting.

When the second officer was alerted to the presence of the yacht by the lookout he momentarily saw a cluster of bright white lights before moving to the steering controls and losing sight of the yacht. It is possible that these lights resulted from the use of the flashlight, which the yacht's crew kept to hand for such emergencies, although they might have come from the cabin as the two watchkeeping crew alerted their colleague or from another source.

Apart from shining the flashlight on the sails or, in extremis, towards the bridge of the ship, the yacht's crew might have called *Pride of Bilbao* using the VHF, or, let off a red flare. Any of these actions, taken early enough, could have successfully alerted the bridge team.

2.8 WHY DIDN'T *PRIDE OF BILBAO* ASSIST *OUZO*?

2.8.1 The relevant obligations

Mariners have a legal and a moral obligation to assist others who may be in distress.

The UK law which requires the master of a UK ship or any other ship in UK waters to standby and offer assistance to the other vessel after a collision is as follows:

U.K. Merchant Shipping Act 1995, Part IV, S.92

In every case of collision between two ships, it shall be the duty of the master of each ship, if and so far as he can do so without danger to his own ship, crew and passengers …

(a) to render to the other ship, its master, crew and passengers (if any) such assistance as may be practicable, and may be necessary to save them from any danger caused by the collision, and to stay by the other ship until he has ascertained that it has no need of further assistance; and

(b) to give to the master of the other ship the name of his own ship and also the names of the ports from which it comes and to which it is bound.

There is also a clear obligation in international and UK law to go to the aid of a vessel in distress. The UK legislation, which accords with international requirements, is as follows:

Merchant Shipping Act 1995, Part IV, S.93

The master of a ship, on receiving at sea a signal of distress or information from any source that a ship or aircraft is in distress, shall proceed with all speed to the

assistance of the persons in distress (informing them if possible that he is doing so) unless he is unable, or in the special circumstances of the case considers it unreasonable or unnecessary, to do so, or unless he is released from this duty …

The law, therefore, requires a master to lend assistance where either his vessel has been in collision or where he understands, that for any reason, another vessel is in distress.

2.8.2 Collision or near collision?

After being alerted to the presence of the yacht, the second officer saw a cluster of bright white lights when he came out of the chartroom. He was then busy trying to swing the bow and then the stern away from the yacht. He did not actually see the yacht or positively confirm how close it had passed by.

Based upon this brief sighting, the second officer believed the yacht had passed by at what he considered to be a safe distance of about 30 metres. He believed this despite seeing the lights just once, and not knowing the course or speed of the yacht.

The lookout had a glimpse of the yacht as she passed by, and therefore had a better idea of the passing distance, her aspect and her size. However, he was not asked his opinion by the second officer at any time.

During the investigation, while the ship was alongside in Portsmouth, the lookout was able to position a launch at approximately the same range and bearing that he had seen the yacht as it passed by **(Figures 14 and 15)**. This test suggested that the yacht passed no more than 20 metres from the bow of *Pride of Bilbao*. Subsequent analysis (see Section 2.8.4) indicates that she could have passed considerably closer to the hull.

In fact, neither the second officer nor the lookout could be certain *Pride of Bilbao* had missed the yacht. The second officer certainly thought that it would pass sufficiently close to warrant trying a zig-zag alteration of course to avoid it. This manoeuvre is usually reserved for very close passing situations.

2.8.3 Safe passing distance

A large, fast moving vessel creates substantial wash and a large area of disturbed water around her. This can pose a serious threat to small craft in close proximity.

The second officer believed that the yacht passed his vessel at a distance of about 30 metres, which he judged to be a safe distance.

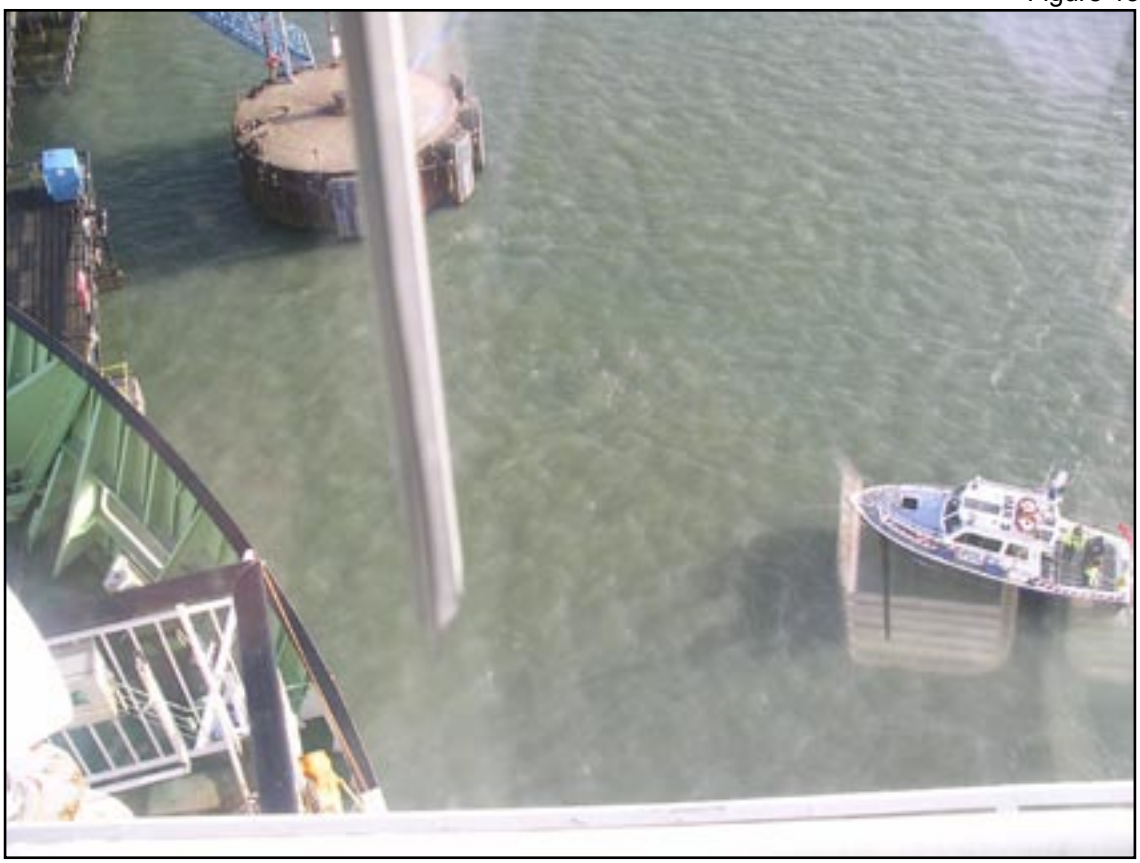
Pride of Bilbao has an ice strengthened bow that creates a very pronounced bow wave. She also has a large trailing wake on each quarter **(Figure 16)**. The vessel was travelling at a speed of 19 knots through the water. The yacht was sighted on the starboard bow, and is thought to have passed down that side, which was the windward side, where the sea waves would have been more pronounced.

It is the firm view of the MAIB that a passing distance of 30 metres or less was unsafe for a small yacht in this situation.

Figure 14

Approximate position of *Ouzo* as she passed by

Figure 15



Approximate position of *Ouzo* looking down from starboard side of bridge

Figure 16

Pride of Bilbao's bow wave and trailing stern wake

2.8.4 Was the yacht safe after the incident?

The lookout had run across the bridge to the starboard side as the yacht passed from view to determine where it was. At first, he did not see the yacht or her lights, probably because he was not looking from the extreme outboard vantage point on *Pride of Bilbao'*s bridge, but a few metres inboard. From his position he would only have been unable to see a boat that was very close alongside the hull **(Figures 17 and 17a)**.

After starting an alteration of course to starboard, the second officer walked over to join the lookout. At that time, the lookout saw a single red light about a point (11 degrees) on the starboard quarter and fairly close. This was probably a light from *Ouzo*.

The lookout reported the light, however despite acknowledging the report the second officer did not actually see it himself. The second officer believed glare from some of the vessel's floodlights was obscuring his vision aft, and he walked to the after light consol and switched them off.

He then returned to rejoin the lookout. The lookout then saw the red light once again, and reported the fact without indicating the direction. It is thought that this could well have been a light from the yacht. The second officer heard the report and saw a light himself about 4 to 5 points (45-56 degrees) off the stern, on the starboard quarter. A reconstruction of the probable relative positions of the two vessels indicates that the yacht would have been between 1 and 2 points (about 11 to 22 degrees) off *Pride of Bilbao*'s stern at the time of this sighting. It is concluded, therefore, that the light the second officer saw could not have been associated with the yacht.

Figure 17

View from inboard starboard side

Figure 17a

View aft from extreme starboard side

However, the sighting of the light was confirmation in the mind of the second officer that the yacht was clear of his stern and that it was safe for him to bring the vessel back around onto her original course. He returned to the autopilot joystick and input the original course. The vessel began turning as the lookout returned to the port side.

The second officer also apparently saw a single white light a few minutes later on *Pride of Bilbao*'s port quarter. He assumed that this light was the stern light of the yacht, and he was further reassured that the yacht was safe and he then returned to his work in the chartroom.

The battery compartment on board *Ouzo* was well protected, and might have stayed dry for a period of time if the vessel had been swamped or capsized. It is therefore possible that *Ouzo'*s lights stayed on for a while despite the boat being in distress with, possibly, her crew washed overboard.

Therefore, the sighting of a light after a close passing or collision does not represent confirmation that the other vessel is safe. It certainly does not confirm her crew are safe.

In most circumstances when there has been a near collision between two vessels, the aggrieved party is quick to use the VHF radio to complain to the other vessel and/or to the coastguard. The crew of the yacht on this occasion would, at the very least, have been very frightened by the experience, and very aggrieved, yet no call was made. The lack of such a call could have been another indication to the second officer that the yacht was not safe.

2.8.5 Psychological factors

The second officer could not have known accurately how close the yacht had passed, or in fact whether or not the two vessels had collided. This should have given him concern for the safety of the yacht and her crew, and he should have taken positive action to confirm whether it and her crew were safe.

His belief that 30 metres was a safe passing distance, was misguided. He should have realised that a small yacht, on the windward bow of a large vessel proceeding at 19 knots, in the open sea, would be in danger, and he should have had serious concerns for its safety.

A psychologist experienced in accident investigation considered the circumstances of the accident, especially with regard to the thought process that led to the officer of the watch deciding that the yacht was safe and no positive action was required. It was concluded that the failure to take any positive action to ensure the security of the yacht, after the encounter, most probably reflected a lack of appreciation rather than a deliberately cavalier attitude. The psychologist further concluded that the officer was not so atypical as to exclude the possibility of similar behaviour from others in a similar situation.

For this reason, it is important that all masters and officers of large vessels positively assure themselves of the safety of smaller vessels after a near collision. Furthermore, they should learn the lessons from this accident to ensure such critical decisions are not made on scanty information.

2.8.6 Calling the master

Pride of Bilbao had passed so close to a yacht that the officer of the watch felt it necessary to carry out last minute avoiding action. Whatever the views of the officer and bridge team, concerning the safety of the yacht after the incident, in these circumstances, the master should have been alerted so that, at least, he could provide a second opinion on the actions that were necessary. The fact that the master was not called, represented a serious error of judgment.

2.8.7 Conclusion

Ouzo probably passed within 20 metres from the bow of *Pride of Bilbao,* and then passed close down the windward side of the vessel and out into her wake. *Ouzo'*s navigation lights remained on for a period, despite the yacht being catastrophically affected by the encounter.

The officer of the watch on *Pride of Bilbao* did not positively seek confirmation that the yacht and her crew were safe after the near collision because:

- The second officer believed that he had passed a safe distance from the yacht;
- The second officer believed that the sighting of a single red and/or white light astern was sufficient proof that the yacht was safe;
- The second officer lacked an appreciation of the likely or possible effect of the close encounter with the yacht.

Whatever the views of the officer of the watch and the bridge team, the master should have been called and told of the incident.

2.9 SURVIVABILITY OF THE YACHTSMEN

In the circumstances that prevailed on 21 August, the survivability of the crew of *Ouzo* depended on means to raise the alarm; the survivability of the yacht; the safety equipment carried on board the vessel; and the crew's own personal protective and safety equipment.

Pleasure craft the size of *Ouzo* are not covered by any statutory requirements for the carriage of lifesaving or fire-fighting equipment. However, the Maritime and Coastguard Agency (MCA) produces a Pleasure Craft Information Pack which provides valuable instruction and advice for yachtsmen.

2.9.1 Raising the alarm from on board

It is not known when the crew realised they were in danger, but there appears to have been no time for the crew to raise the alarm either before or during the accident because they did not use the fixed VHF radio or the distress flares which were carried on board.

It is good practice for yachtsmen to have a waterproof hand-held VHF radio immediately to hand or attached to their person, which can be used to call for assistance in case there is no other means of sending a distress or they find themselves in the sea.

2.9.2 Survivability of the yacht

Evidence indicates that when beating[1] to windward in the prevailing conditions on the morning of the accident, *Ouzo*'s hatch washboards would have probably been unshipped. The cockpit on a Sailfish 25 is relatively large, as is the hatchway down to the cabin. This arrangement is conducive to the boat retaining large quantities of water in a swamping or capsizing situation.

MAIB's naval architects considered the effects of water retention on a Sailfish 25 and deduced that the boat would probably float bow up for a limited period of time before eventually sinking. In this condition it would have afforded little or no shelter, or support, to those in the water **(see Section 2.12 for stability analysis)**.

2.9.3 Raising the alarm from on shore

In accordance with good practice, the crew of *Ouzo* told relatives and friends of their basic passage plan, including their estimated arrival time at Dartmouth. However, the accident took place early in the voyage, so no one ashore was likely to become concerned about their safety until some time after the accident.

The UK Coastguard operates the Coastguard Voluntary Safety Identification Scheme (commonly known as CG66). It is free, and easy to join. A yachtsman who takes part enters the details of his/her yacht into the scheme's database which is then accessible to all Coastguard Co-ordination Centres throughout the UK. This provides them with the information they need to mount a search and rescue operation should the boat get into difficulty.

Ouzo was not entered into the scheme. In this case, the tragedy would not have been averted if the voyage had been registered, but the emergency services would have had the details of the boat and crew to hand once she was reported as missing.

2.9.4 Automatic distress notification

Ouzo was not fitted with equipment that could automatically broadcast a distress such as an Emergency Position Indicating Radio Beacon (EPIRB). Had she been, and had it had been rigged with a hydrostatic release to enable it to float free once the yacht had sunk, the alarm would have been quickly raised, thus dramatically increasing the crew's chances of survival.

There are various EPIRBs available on the market, at prices ranging from about £400. They are typically about 30 to 40cm in size and weigh about 5kg.

2.9.5 Lifejacket and other lights

Each member of *Ouzo*'s crew had a fully functioning lifejacket. However, none had lights fitted to them. When purchasing lifejackets, a light is often an optional extra. However, had the crew of *Ouzo* had lights fitted to their lifejackets it is possible that one of the many craft that passed through the area on the night of the accident might have seen the lights and raised the alarm.

There are various personal emergency warning units available, such as personal emergency locator lights which can be fitted to lifejackets or personal protective gear, all of which will greatly improve the chances of being seen in the water at night.

[1] making way against the wind

2.9.6 Liferaft

The MAIB believe a liferaft would have provided the best means of improving survivability. *Ouzo* was not fitted with a liferaft because, when the owner was fitting the boat out, he considered the yacht physically too small. However, a four-person liferaft is now a relatively compact unit typically measuring 75x50x30cm and weighing about 40kg. In this instance, it appears the crew had little time to deploy a raft, so an invaluable addition would have been a hydrostatic release mechanism enabling the raft to float free once the yacht had sunk.

In this case, a liferaft and hydrostatic release would almost certainly have saved the lives of the three crewmen.

2.9.7 Survival times

The full circumstances that led to the crew of *Ouzo* being found in the sea will never be known.

Once in the water, a number of factors affect a person's likely survival time. These include:

- the sea temperature and wave conditions;
- the provision of shelter from the elements using floating wreckage, the boat itself or a liferaft;
- the provision of flotation aids like lifejackets and lifebuoys;
- the amount of insulation provided by clothing; and
- the person's physical fitness and build.

In the early morning of 21 August, the sea temperature was about 18°C and the sea conditions were moderate caused by a south-westerly wind of about force 5.

Once in the sea, and with no ready means of gaining shelter, each crewman's survivability was then dependent on their physical build and the protective equipment they were wearing.

All three men were physically fit and of moderate build, and they were wearing good quality yachting clothing which gave them good protection. These factors increased their likely survival times. Each person was also found wearing an inflated lifejacket, one of which had inflated automatically while the other two had been manually inflated.

The MAIB contracted a renowned expert on sea survival to look into the circumstances of the accident and report on the survivability of the three crewmen. **See Annex 5** for extracts of his report.

His report concludes that James Meaby probably survived the initial incident and remained alive, floating in a survival mode, for a period in the region of at least 12 hours. It continues that it was not possible to deduce how long Rupert Saunders or Jason Downer could have survived after initially entering the water. Importantly, however, the expert concludes that they would have had little beneficial support from their lifejackets because they were both poorly fitted. Despite this, it is possible they would still have been capable of surviving at least 3 hours.

It appears that James Meaby survived much longer than his two fellow crewmen because his lifejacket was fitted properly. The report further concludes that simply fitting crotch straps to the lifejackets, which are normally sold as a cheap optional extra, would have enabled them to have stayed in the correct donning position, irrespective of how tight they had been fitted. Had crotch straps been fitted to their lifejackets, it is possible that all three crew would have survived for longer than 12 hours.

In the situation that prevailed, it would have made no difference to the final outcome because the first crewman was not found until about 36 hours after entering the sea. However in different circumstances, an improvement in survival time of that magnitude could have led to the survivors being found alive.

The fact that James Meaby probably survived the initial incident, and remained alive for a period in the region of at least 12 hours, also means that, had the ship's crew raised the alarm, even some time after the event, it is very likely that James Meaby, at least, would have been found alive. It is also possible that Jason Downer and Rupert Saunders would have been saved.

2.10 WHY WASN'T *PRIDE OF BILBAO*'S LAST MINUTE AVOIDANCE MANOEUVRE SUCCESSFUL?

2.10.1 General comment

Bridge team management on board cross channel ferries is generally of a high standard due to the large number of port entries and short sea passages carried out in busy shipping areas.

The second officer on *Pride of Bilbao* had sailed for 10 years as watch officer on the Dover / Calais route. He was therefore very experienced in navigating in high density traffic situations on fast, highly manoeuvrable ferries.

When he joined the vessel on 20 August, he started his fourth round trip between Portsmouth to Bilbao as officer of the watch.

2.10.2 Rapid helm control

On seeing the cluster of lights ahead of the vessel, the second officer decided that he needed to take quick action. His initial intended action was to alter the vessel's course to port and away from the lights which had been confirmed by the lookout to be those of a yacht.

There are various methods of doing this on *Pride of Bilbao*.

He could have switched from automatic to manual steering at the main steering stand, enabling him to use as much or as little rudder as he wished. Once the vessel was turning, he could then have asked the lookout to take over the wheel, leaving the second officer free to assess the situation more closely, but still having immediate control of the steering through verbal commands to the helmsman.

The vessel was also fitted with a Non-Follow Up (NFU) system. Use of this control automatically overrides the autopilot and gives the watch officer immediate control of the rudder, thus enabling him to turn the vessel as quickly as he/she wishes. There were a number of NFU controls positioned around the wheelhouse **(Figure 18)**.

The second officer elected not to use either of these two steering modes, despite the fact that he considered that he urgently needed to turn the vessel quickly to port. Instead, he opted to keep the vessel in autopilot steering mode and adjust the course using the autopilot course input joystick **(Figure 18)**.

Figure 18

NFU and autopilot joystick

Large ferries when travelling at full sea speed are extremely responsive to the helm, and they tend to heel easily when altering course. The tighter the turn the more they heel over. This has implications for passenger safety and comfort, and therefore the rate of turn the automatic steering will apply, and ultimately the amount the vessel will heel is normally restricted. Regardless of what course the watch officer inputs, the autopilot will only put sufficient helm on to first begin the vessel turn and then to continue it at the preset rate.

Pride of Bilbao is set to turn at a rate governed by a preset turning circle radius of 1.5 nautical miles. This setting is adjustable down to 0.3 nautical mile.

The second officer knew he had to take rapid action due to the proximity of the yacht, and therefore it is surprising he elected to use the autopilot control, a steering system which limits the vessel's turning capability.

The second officer did know the autopilot restricted the rate of turn, but he used this control because he knew it would still put immediate helm on to begin the turn. He believed the rudder would go to 10 degrees, possibly more, thus turning the bow away from the yacht.

During its investigation, the MAIB conducted trials of the autopilot control on board *Pride of Bilbao* in open sea and under controlled conditions. The MAIB inspector input a new course to steer of 15 degrees to port. The autopilot duly put on between 10 and 15 degrees port helm, but within seconds it returned the rudder to midships as the vessel began a slow turn. This would have also been the result on the morning of 21 August.

After the incident, the VDR records showed that, in using the autopilot the vessel's heading had changed just 1° to port prior to the yacht passing, and this would have had only a negligible effect on the passing distance with *Ouzo* **(Figure 19)**.

This also means that the second officer's subsequent actions designed to prevent *Pride of Bilbao's* stern from swinging were unnecessary, as the vessel was not swinging and, in any case, the yacht was already astern of his vessel.

The investigation concluded that, by the time the officer was aware of the yacht it was probably too late to take effective action. However, in attempting to do something, the officer should have switched to manual steering at the main consol or used the NFU control, giving him better control of the rudder. In such a situation the comfort of the passengers and crew was secondary to that of the critical necessity in altering the course to avoid the yacht.

2.11 FATIGUE

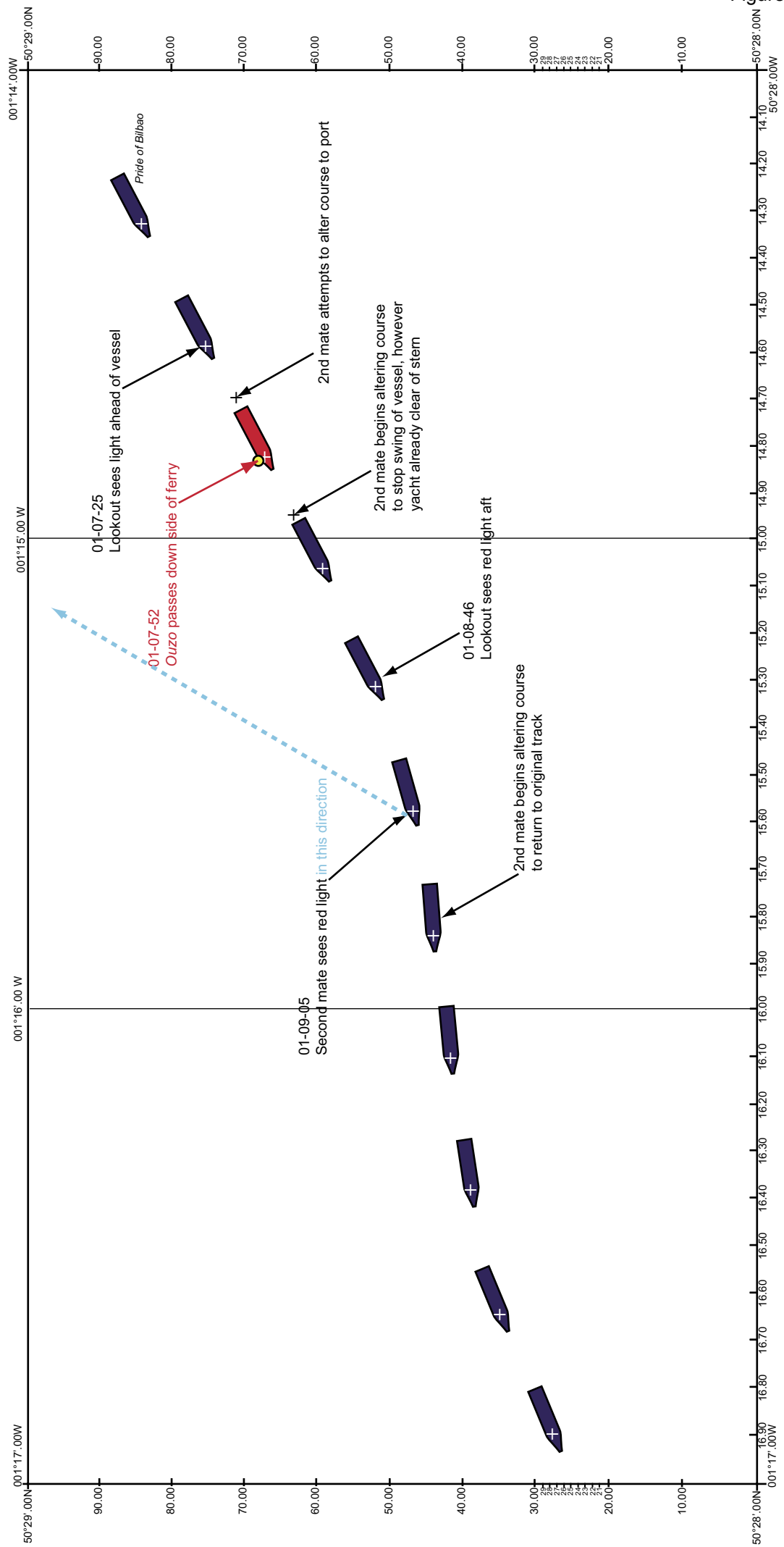
The working and rest hours of the watchkeepers on *Pride of Bilbao* were examined, and it was concluded that fatigue did not contribute in any way to the circumstances of this accident.

Likewise, the yacht's crew had been at leisure during the day and there is no reason to think that fatigue affected their judgment.

2.12 APPROXIMATE STABILITY ANALYSIS OF A SAILFISH 25

The MAIB could find no stability data concerning the Sailfish 25 yacht type, probably because only 25 were built before the builder went out of business. MAIB inspectors examined a sister vessel of *Ouzo* to determine the internal hull volume and approximate stability criteria, to provide a rough indication of the vessel's survivability in various swamping scenarios. However the calculations were heavily dependent upon assumption, due to the lack of physical evidence.

The stability analysis suggests that with a flooded cockpit and 10% flooding of the cabin space, *Ouzo* would not have capsized without substantial external forces from wind or waves. But with 30% of the hull flooded, then her stability might have become marginal in any condition. The critical unknown factor was the effect of the sails, which, if still filling with sheets cleated, might have provided a heeling moment that would cause the vessel to capsize with only 10% of the hull flooded.



Representation of events taken from the VDR records of *Pride of Bilbao*

The MAIB also looked at whether a completely swamped yacht could have partially floated for any length of time if air had become trapped in either the bow or stern sections. It was found that it might have floated for some time, but very low in the water in either a bow up or stern up configuration. In either case, progressive flooding would almost certainly have caused the boat to have sunk after a few hours. See also Section 2.9.2.

2.13 THE SEARCH FOR *OUZO*

In the hours that followed the discovery of the bodies of the three crew members from *Ouzo,* airborne and surface SAR assets thoroughly searched the sea surface off the south coast of the IOW. Had the yacht been afloat or partially afloat during that time, it would have been seen. Therefore, in the absence of any other evidence, it can be concluded that the yacht probably sank prior to the large scale search being mounted.

The last known position of the yacht was when she was passed by *Pride of Bilbao* soon after 0107 on the morning of 21 August. The MAIB utilised the Coastguard Search and Rescue Information Service SARIS II computer programme and analysed the likely drift pattern of the yacht for a period of 36 hours after the incident.

Utilising the services of, firstly, the Trinity House Vessel (THV) *Alert* and then a Royal Naval mine hunter, a total of 125 square miles of seabed in the relevant area was thoroughly searched, but without success. The search was then continued by exploration of possible targets using commercial divers but, again, without success.

It is possible that some buoyancy remained in the vessel when it sank, and that this enabled it to drift, under the surface, out of the search area. It is also possible that the wreck of the yacht remains hidden in the area despite the considerable resources that have been deployed to search for it.

2.14 PREVIOUS SIMILAR ACCIDENTS

In the course of the investigation, the MAIB's accident database was searched for relevant similar cases. In the last 10 years, there had been 87 hazardous incidents between yachts and merchant vessels in open sea conditions, and 14 collisions. The following three cases represent a sample of the most relevant ones.

2.14.1 *Aliniel/Pride of Bilbao* 2000

On 28 August 2000, at about 2200, in moderate to good visibility, *Pride of Bilbao* was involved with a near collision with the yacht *Aliniel* (Moody 30) south of the Isle of Wight. *Pride of Bilbao*, when less than a mile from the yacht, changed her course and headed directly towards her. The yacht's crew only had enough time to put the engines full ahead and to shine a powerful light onto the sails; there was no time to use flares despite them being readily accessible by the chart table. On this occasion, *Pride of Bilbao* did take effective emergency action and eventually passed less than a cable away.

During the subsequent exchange on VHF radio, the ferry apologised and stated that they had "lost" the yacht off the radar.

2.14.2 *Tuila/unknown vessel* 2000

Tuila, a 28 foot Twister was lost with all four crew in the North Sea in July 2000. The yacht was on passage from Ijmuiden in the Netherlands to Harwich. She was being skippered by her owner and was crewed by three students from Cambridge University.

The alarm was raised when she failed to arrive, and an extensive air and sea search failed to find the yacht. Three weeks later, three bodies were recovered from the sea off the Dutch coast and the fourth body was recovered two months later.

About 4 months after the accident, a Dutch fishing vessel trawled up some wreckage from the seabed which showed signs of catastrophic damage.

Although no positive proof has been discovered, it is likely that *Tuila* was catastrophically damaged in a collision with a merchant vessel.

2.14.3 *Wahkuna/P&O Nedlloyd Vespucci* 2003

In 2003, in the English Channel, in thick fog, there was a collision between the yacht *Wahkuna* (*M*oody 47), and the large container ship *P&O Nedlloyd Vespucci*. On this occasion, each vessel had detected the other using radar but had incorrectly interpreted the situation. The bow of the yacht was broken off in the collision and she subsequently sank. However, fortunately, the yacht carried a liferaft and the crew successfully abandoned to the raft and waited several hours before they were seen and safely rescued.

SECTION 3 - SAFETY ISSUES

After considering a number of possible loss scenarios, it is believed that *Ouzo* was catastrophically affected by a collision or near collision with *Pride of Bilbao* at 0107 on 21 August about 6 miles south of the Isle of Wight [2.2;2.3]

The investigation has highlighted the following safety issues:

1. *Ouzo* was not seen or otherwise detected by the bridge team on *Pride of Bilbao* until it was too late to take effective avoiding action due to one or more of the following issues:

    - The lenses of navigation light units similar to the one fitted to *Ouzo* are prone to crazing. This substantially reduces their efficiency. [2.4.3] ***[MAIB Flyer]***
    - The lamps (bulbs) fitted to the navigation lights used on *Ouzo* can easily be accidentally replaced with lamps of a lower rating. [2.4.4] ***[MAIB Flyer]***
    - It is quite common for replacement lamps for yacht navigation lights to have damaged filaments, which cause an intermittent fault. [2.4.5] ***[MAIB Flyer]***
    - If *Ouzo* was heeled more than 5º the horizontal intensity of her navigation lights might have been reduced. [2.4.2] ***[MAIB Flyer]***
    - By wearing glasses with photochromic lenses, the lookout effectively reduced his ability to see small lights by at least 20%. [2.5.6] ***[MAIB Flyer, Actions Taken and Recommendation]***
    - The lookout first saw the yacht when he had been on the bridge for 9 minutes. His eyes were still adapting to the dark at that time, and it is possible that he did not see the light earlier because of this. There is a scientific basis to support the need for a 15 minute handover period at night. [2.5.4] ***[MAIB Flyer, Actions Taken and Recommendation]***
    - On the morning of the incident, there was significant light pollution on the bridge of *Pride of Bilbao* due to poor blackout procedures. [2.5.6] ***[MAIB Flyer, Actions Taken]***
    - The second officer generally removed the red filter from the chart table light because the red light caused him to develop headaches. [2.5.5] ***[MAIB Flyer, Actions Taken]***
    - The “X” band radar was adjusted using automatic clutter control and, in the minutes before the incident, the second officer did not switch to manual clutter adjustment to check for small targets. [2.6.2] ***[MAIB Flyer]***
    - *Ouzo*’s small radar cross section, coupled with the moderate sea conditions, made it unlikely that the radars on *Pride of Bilbao* could separate Ouzo from the sea clutter. [2.6.3] ***[MAIB Flyer and Recommendation]***
    - Even if *Ouzo* had been displaying her octahedral radar reflector, it would have made little difference to the yacht’s radar cross section. [2.6.5] ***[MAIB Flyer and Recommendation]***

2. The crew of *Ouzo* did not effectively warn *Pride of Bilbao* of their presence because:

   - *Pride of Bilbao* altered course slowly towards *Ouzo* between 7 and 4 minutes before the incident and this possibly confused the crew about her intentions, such that they did not recognize the danger they were in until it was too late. [2.7] ***[MAIB Flyer]***

3. *Pride of Bilbao* did not raise the alarm or stop and assist the yacht *Ouzo* after the incident because the watchkeeper was unaware that she was in distress. However:

   - The vessels passed at less than 20 metres apart, but even if, as the second officer believed, they had passed 30 metres apart, such a distance between a ship like *Pride of Bilbao* travelling at 19 knots in open sea conditions, and a small yacht, was unsafe. [2.8.3] ***[MAIB Flyer]***

   - The sighting of a light after a close passing or collision should not be taken as confirmation that the other vessel is safe. [2.8.4] ***[MAIB Flyer]***

   - The second officer's failure to take any positive action to ensure the yacht was safe after the encounter most probably reflected a lack of appreciation rather than a deliberately cavalier attitude. It should be further noted that he wasn't so atypical as to exclude the possibility that other officers might have acted similarly [2.8.5] ***[MAIB Flyer; Actions Taken]***

   - It is considered likely that one of the yacht's crew survived in the water for at least 12 hours and that the other two probably survived for at least 3 hours. With this in mind, had the ship's crew raised the alarm, even some hours after the event, it is very likely that at least one of the yachtsmen would have been saved. [2.9.7] ***[MAIB Flyer; Actions Taken]***

   - Whatever the views of the officer of the watch, the master should have been called and told of the incident [2.8.7] ***[MAIB Flyer; Actions Taken]***

4. After the incident with *Pride of Bilbao*, the crew of *Ouzo* had no means to raise the alarm because:

   - There appears to have been too little time for the yachtsmen to raise the alarm before they found themselves in the sea. A hand-held VHF set in a waterproof cover would have provided a means of sending a distress alert. [2.9.1] ***[MAIB Flyer]***

   - The boat did not carry an EPIRB and/or a liferaft rigged with a hydrostatic release unit. Had it done so, the chances of the crew raising the alarm and surviving the incident would have been increased substantially. [2.9.4; 2.9.7] ***[MAIB Flyer]***

5. Two of the yachtsmen's lifejackets were not fully effective because:

   - They were not fitted tightly. The addition of a crotch strap would have improved the performance of the lifejackets substantially. [2.9.7] ***[MAIB Flyer, Recommendation]***

6. The last minute helm action taken by the second officer, to avoid the yacht, was ineffective, partly because it was too late and partly because:

   - He used the autopilot controls, which automatically restricted the rate of turn that was induced. In the emergency, he should have chosen to engage manual steering or use the automatic pilot override controls. [2.10] ***[MAIB Flyer and Actions Taken]***

SECTION 4 - ACTION TAKEN

1. MAIB has contracted **QinetiQ Funtington** to carry out research into a number of common types of radar reflectors to compare performance with International Standards (ISO 8729). It is intended that this report will be published on the MAIB website (www.maib.gov.uk) on 1 May 2007 after appropriate consultation.

2. **MAIB** will include the safety issues arising from this accident in two flyers: one aimed specifically at merchant vessels and one aimed at yachts. The flyers will be circulated widely at the time of this report's publication.

3. **P&O Ferries Ltd** has produced five fleet directives or circulars following this incident **(included at Annex 6)** covering the following topics:
    - Keeping a Proper Lookout at Night
    - Radar Operating Procedures for Optimal Performance
    - Calling the Master
    - Familiarisation with Bridge Equipment and with Bridge Team Members
    - Maintaining Situational Awareness While Taking Avoiding Action.

4. **The DfT Medical Adviser** is considering the relevance to other modes of transport, of the Institute of Ophthalmology research.

SECTION 5 - RECOMMENDATIONS

The Maritime and Coastguard Agency is recommended to:

2007/136 In light of the findings of this investigation on the detrimental effect on watchkeeping of bridge lookouts wearing glasses with photochromic lenses at night, institute measures to:

1. Eliminate the practice on UK registered vessels, and

2. Raise awareness of the dangers internationally.

The Maritime and Coastguard Agency and the **Royal Yachting Association** are recommended to:

2007/137 Promulgate, by the most effective means, the lessons to be learned from this investigation, and the research being carried out on MAIB's behalf by QinetiQ Funtington, on the ineffectiveness of many radar reflectors and the inability of ships' radars to detect small yachts in moderate sea conditions.

The British Standards Institute is recommended to:

2007/138 Consider the likelihood that during an emergency, lifejackets will not be fitted tightly and that, therefore, to be effective, a crotch strap should be standard supply with every lifejacket.

The International Chamber of Shipping is recommended:

2007/139 In the next revision of the 'Bridge Procedures Guide', to include:

(i) Clear guidance to watchkeepers on the time of adjustment needed to ensure adequate adaptation for night vision on the takeover of a watch;

(ii) Clear guidance on the absolute need for good bridge blackout procedures;

(iii) Advice on the fact that exposure to white light effectively sets the adaptation to night vision clock back to zero, and the effect that this knowledge should have on watchkeepers who periodically work in lit chartrooms.

Marine Accident Investigation Branch
April 2007

Safety recommendations shall in no case create a presumption of blame or liability